U.S. Joint Forces Command

Joint Meteorological & Oceanographic (METOC) Handbook

1st JMOC Edition, April 2011

MEMORANDUM FOR: Distribution List

1. This publication is the 1st edition of the Joint METOC Handbook (JMH) as written to accompany the Joint METOC Officers Course (JMOC). This document is a complete revision of the 4th edition, 2002 release. It was compiled from inputs by Senior METOC Officers, former and current Joint Force METOC Officers, and METOC experts in various Service organizations.

2. The Handbook reflects comments from across the METOC community: Combatant Commands, US Joint Forces Command's Component Commands, Service headquarters, and leading Air Force, Navy, and Marine Corps METOC organizations. The purpose of this Handbook is to serve as a reference tool for prospective Joint Force METOC Officers (JMO) on the infrastructure, policies, principles, and responsibilities inherent in providing joint METOC support to the warfighter and in conducting Joint METOC operations. This Handbook can also serve as a guide for Combatant Command Senior METOC Officers.

3. The JMH does not constitute a requirements document or initial doctrine. Joint Publication 3-59 serves as joint doctrine for METOC Operations. This Handbook serves solely to provide the JMO, his or her staff, and Service and functional component METOC units, an easy to use manual to help plan and execute METOC support for joint operations.

4. This document is to be updated annually by a Joint METOC team. Due to the disestablishment of USJFCOM, updates will be led by the METOC Operations Officer, Joint Staff J-39 ROD. This handbook is intended to be a living document and your comments and suggestions are welcomed.

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RECORD OF CHANGES

Change Number	Date of Change	Date Entered	Posted By	Remarks

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Executive Summary

The Joint Meteorological and Oceanographic (METOC) Handbook (JMH) serves as a primary reference for the new Joint METOC Officer Course (JMOC). The intention of the JMH is to provide the Joint METOC Officer (JMO), associated METOC staff, and Service and functional component METOC personnel, an easy-to-use reference manual to assist in the planning and execution of METOC support for joint operations. Some information previously included is better found through on-line sources which are more easily updated, and a web-based resources listing is included as an appendix.

The JMH describes existing Joint METOC structure, how METOC personnel and organizations are integrated into the combatant command and JTF structures, and what METOC resources are available. Separate chapters cover METOC capabilities and support to operational forces within Service organizational structures.

It is important to understand the joint operational planning process and how the METOC officer fits into that process. The duties and responsibilities of the Senior METOC Officer (SMO) and JMO and their interaction during a joint operation are important concepts. The coordination between the JMO and his Service and functional component METOC units is vital to the success of joint METOC operations. The concept of "one theater, one forecast," highlighted in Joint Publication 3-59, is the cornerstone of METOC support to a joint operation.

Joint METOC personnel should understand the capabilities of Service level METOC equipment and tactical and fixed communication systems for interoperability. The sources of METOC data and available products and services from various METOC production sites and theater level operational commands are useful for any military operation.

The latest JMH version is available on the Joint Doctrine Education and Training Electronic Information System (JDEIS).

1. USAF METOC

This chapter describes U.S. Air Force METOC organizational structure, command relationships, and support capabilities and requirements, including typical USAF METOC and communications equipment.

a. Background and Overview

Air Force Weather (AFW) forces, as part of the Joint team, deliver accurate, consistent, relevant, and timely environmental products and services anywhere in the world, tailored to the operational requirements of supported joint forces.

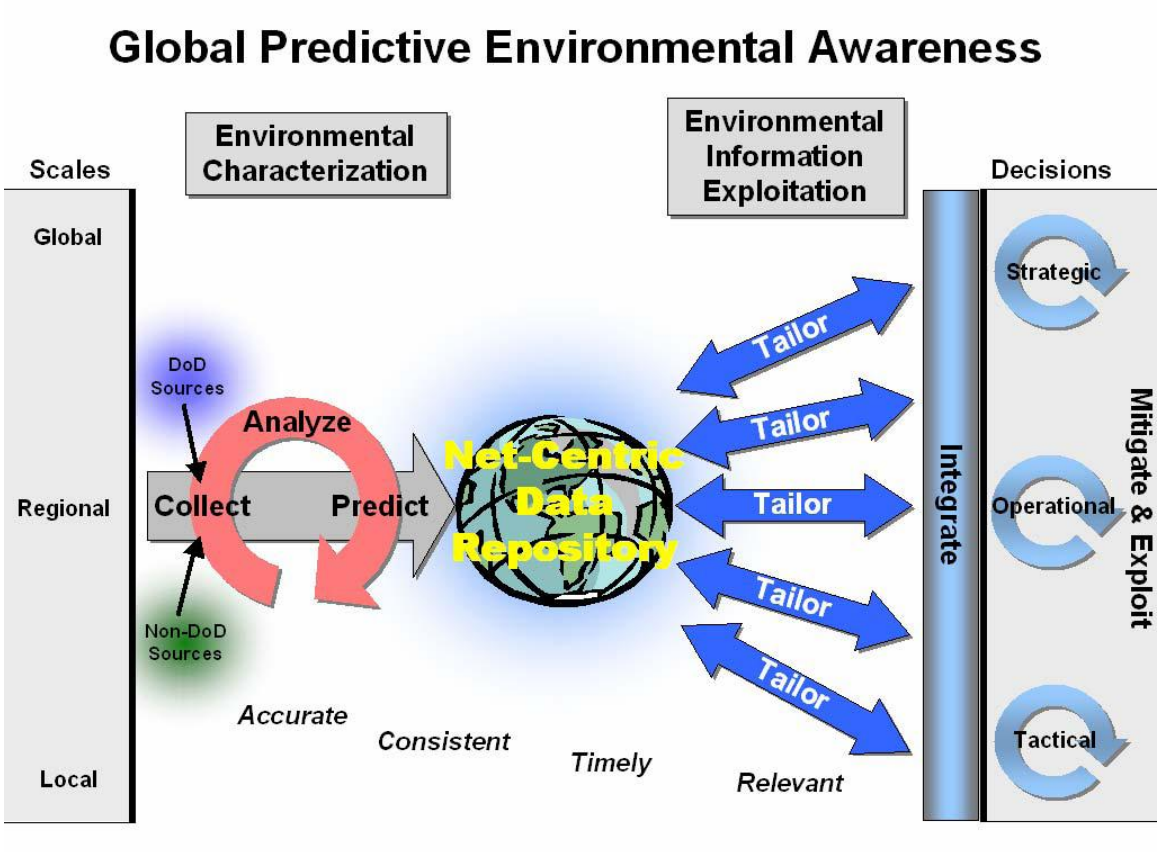

Figure 1: The AFW Weather Operations Concept Model

Executing their core competencies to collect, analyze, predict, tailor, and proactively integrate environmental threat information into commanders' decision cycles and command and control (C2) systems, AFW enables commanders at all levels to anticipate, mitigate, and exploit the weather…optimizing air, space, cyberspace, and ground operations…to the advantage of allied objectives and the detriment of the adversary.

Following the establishment of an independent U.S. Air Force in 1947, Air Force Weather (AFW), in its original incarnation as the Air Weather Service, began providing environmental awareness for both the Air Force and the Army.

By 1991, Air Weather Service had divested itself of its major field structure and the bulk of AFW was realigned under the direct administration of the supported commands.

In April 1991, the Office of the Director of Weather was created on the Air Staff to provide policy and guidance for AFW. In the latter half of the 1990s, Air Force Weather Agency (AFWA) was formed through the merger of Air Weather Service and Air Force Global Weather Central. Into the 21st century, AFW continued to re-engineer to better meet the demands of modern military operations.

From its beginning, AFW has been instrumental in the protection of life and property at home and optimization of deployed operations abroad. Since World War II, AFW personnel have provided hurricane reconnaissance, and in 1948, issued the first tornado warning in the U.S. AFW also participated in the development of the nation's severe storm forecasting centers and, to this day, performs nuclear consequence assessment with its Navy METOC partners aboard U.S. Strategic Command's (USSTRATCOM) Priority Level-1, E-6B "Looking Glass" Airborne Command Post.

AFW was at the forefront of the Space Age with its early adoption of emerging computing and communications technologies. In the 1960s, it began assimilating weather data collected from meteorological satellites, and as the single agent for all of the Department of Defense (DoD), began solar observations and forecasting.

Over the past 60 years, AFW personnel have been among the first to deploy to the combat zones of Korea, Vietnam, Grenada, Bosnia, the Persian Gulf, Iraq, Afghanistan, and many other military contingencies, bringing their special operational brand of environmental expertise directly to the warfighter.

AFW provides worldwide coverage and produces continuous weather information to engage any target in any battle space around the world. Whether it's supporting Army and Special Operations aviation and ground forces, space shuttle launches, worldwide global air mobility missions, optimizing target acquisition for strike aircraft, enabling safe passage for unmanned aerial vehicles, or protecting government assets and safety of life and limb, Air Force Weather continues to meet the challenges of an ever-changing environment for the 21st Century.

b. Air Force Forces (AFFOR) METOC Organization

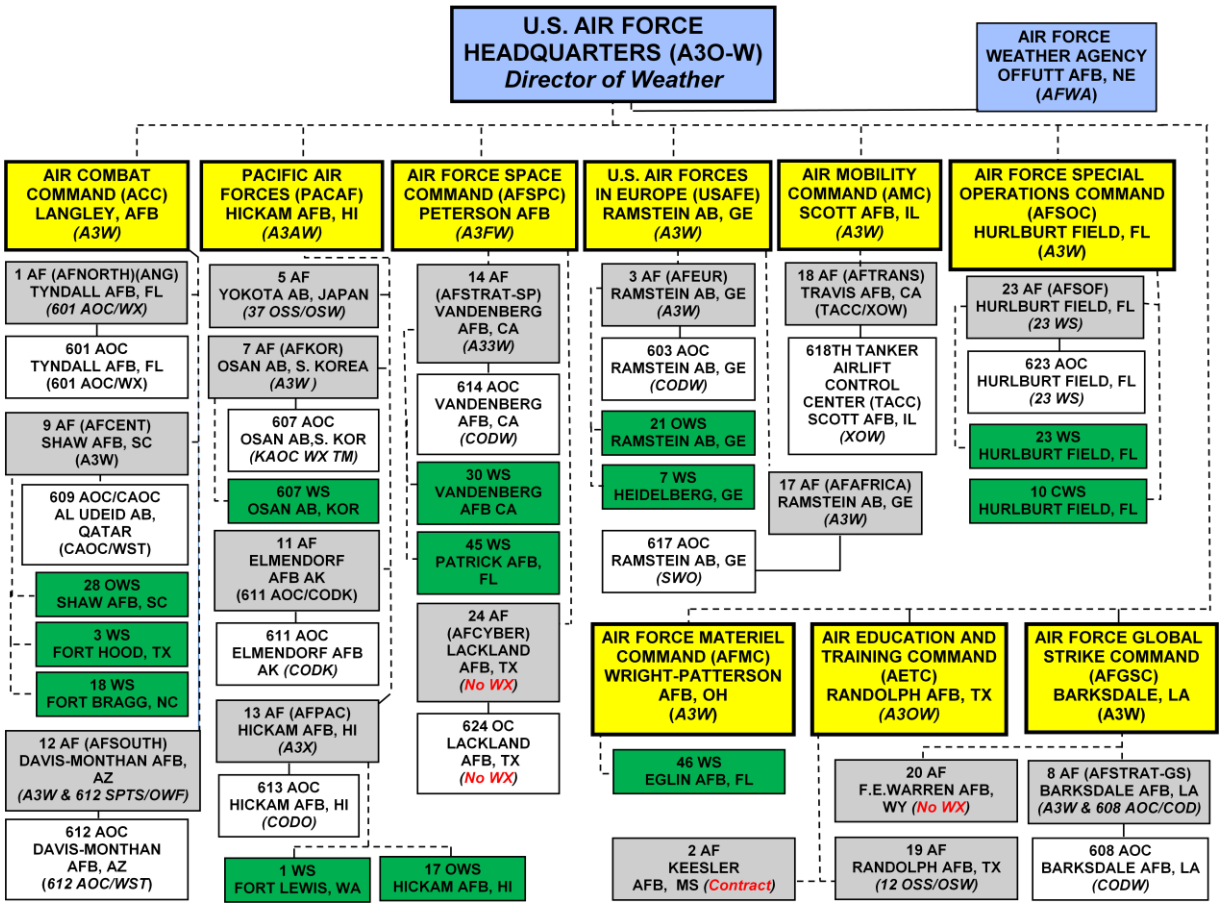

Figure 2: Air Force Weather Functional Alignment

c. Air Force Weather Support to Joint & Air Force Organizations

Air Force Weather (AFW) personnel provide weather support to unified commands, major commands (MAJCOMs), numbered air forces (NAFs), component numbered air forces (C-NAFs), joint task forces (JTFs), air operations centers (AOCs), operational flying units (wings/squadrons), air and space expeditionary forces (AEFs), and Army and Special Operations aviation and ground forces.

Per Figure 2, staff support to MAJCOMs is conducted through Directors of Weather (typically designated A3W), usually an O-5 or O-6 with a staff of weather officers and senior noncommissioned officers (NCOs). NAFs and C-NAFs with weather personnel either have a staff weather officer (SWO) or leverage support from the C-NAF's air operations center (AOC) weather specialty team (WST) or collocated weather flight or squadron.

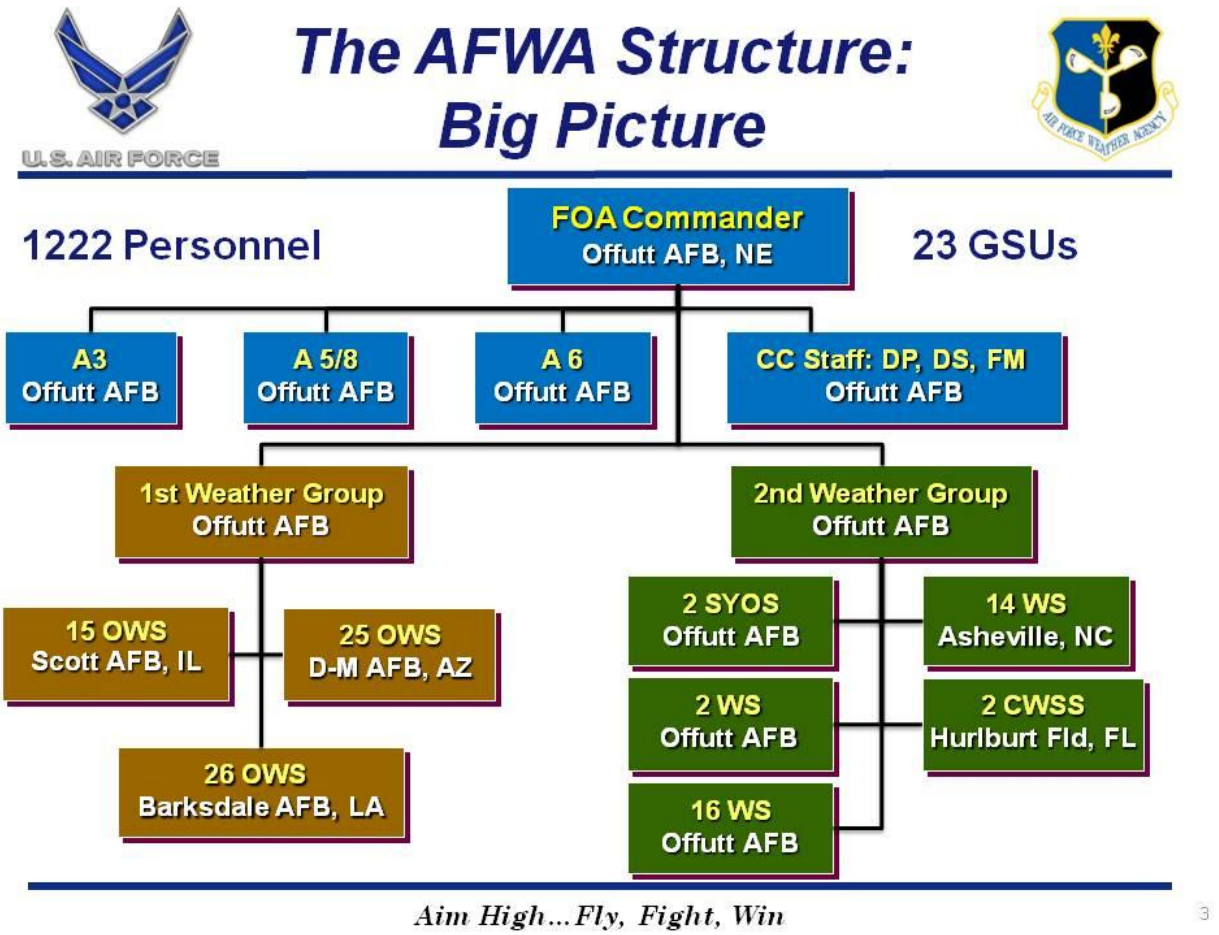

Figure 3: Air Force Weather Agency Organizational Structure

Air Force Weather Agency (AFWA) at Offutt AFB NE (see Figure 3) is a Field Operating Agency (FOA) under the HQ USAF Director of Weather (HQ USAF/A3O-W). AFWA's 2d Weather Group (2 WXG) builds a comprehensive global weather database, providing current, forecast (including numerical weather prediction), climatological, and space weather products emphasizing the global/hemispheric and longer temporal domains for every military operation, contingency mission, and humanitarian relief effort conducted by the United States. This includes direct support to Air Force and Army warfighters, unified commands, National Programs, and the National Command Authorities.

AFW reachback support to Air Force, Army, Navy, Marine, Guard, Reserve and geographic combatant commanders (GCCs) is provided by eight mission-/function-specific production centers with global scope as well as seven regional centers. Mission-/function-specific global centers include (see Figure 4): a Special Operations Forces (SOF) weather squadron (23 WS) in Air Force Special Operations Command (AFSOC); space/top secret mission support (2 WS), climatology (14 WS) and modeling (16 WS) weather squadrons under AFWA's 2d Weather Group; the 618th Tanker Airlift Control Center (618 TACC) in AMC, Air Combat Command's (ACC's) AOS/AOSW for global CORONET support, and the 432 OSS/OSW and 3 SOS/WX for global UAS support. The 7 regional centers include (see Figure 4): 6 operational weather squadrons (OWS; 3 under AFWA's 1st Weather Group and 1 each in ACC, Pacific Air Forces

(PACAF) and United States Air Forces Europe (USAFE) as well as ACC's 612 AOC Weather Flight (612 SPTS/OWF).

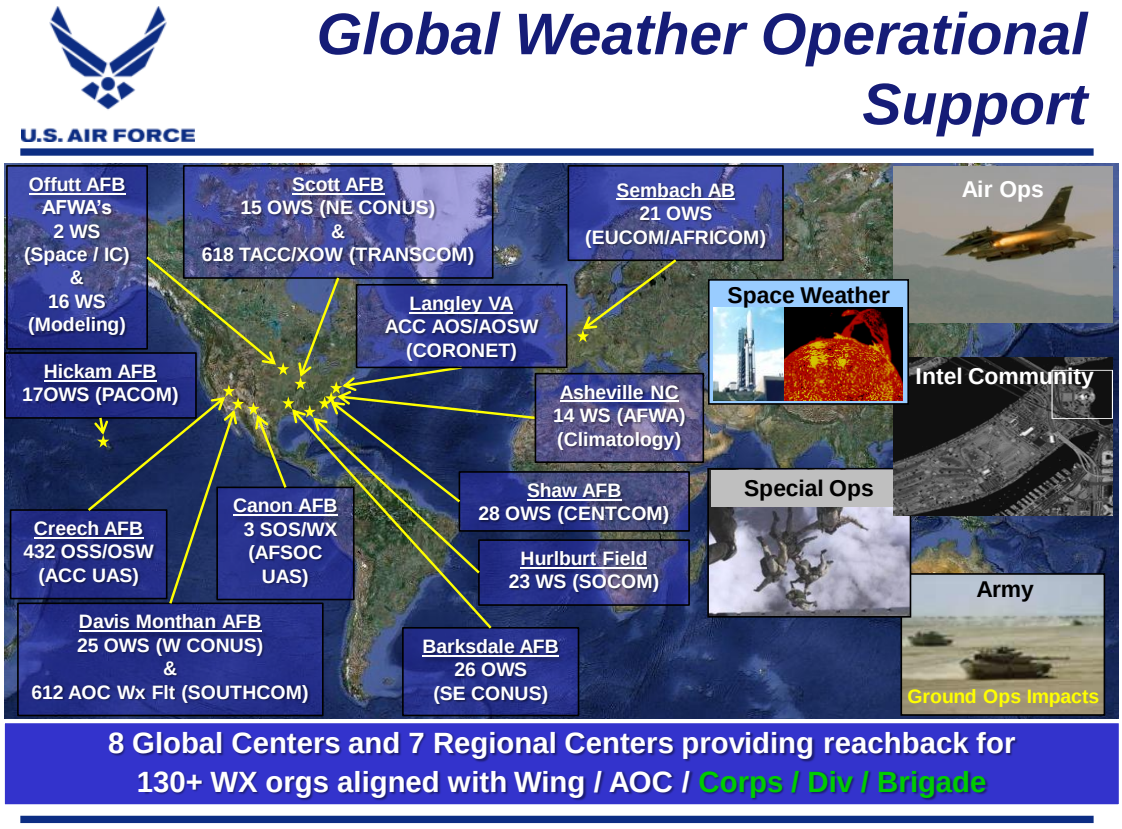

Figure 4: Air Force Global Weather Centers

The operational weather squadron (OWS) is the primary provider of data, products, and services for the theater. Typically, in coordination with their C-NAF's AOC and tactical-level weather units in theater, the OWS continuously monitors, evaluates, and assesses current conditions and predicts the onset of weather events, tailoring regional-scale products to support theater operations. The OWS issues terminal aerodrome forecasts (TAFs) and resource protection products (watches/advisories/warnings) previously issued by tactical weather flights. AFW's six OWSs also provide all forecaster upgrade training for new AFW recruits.

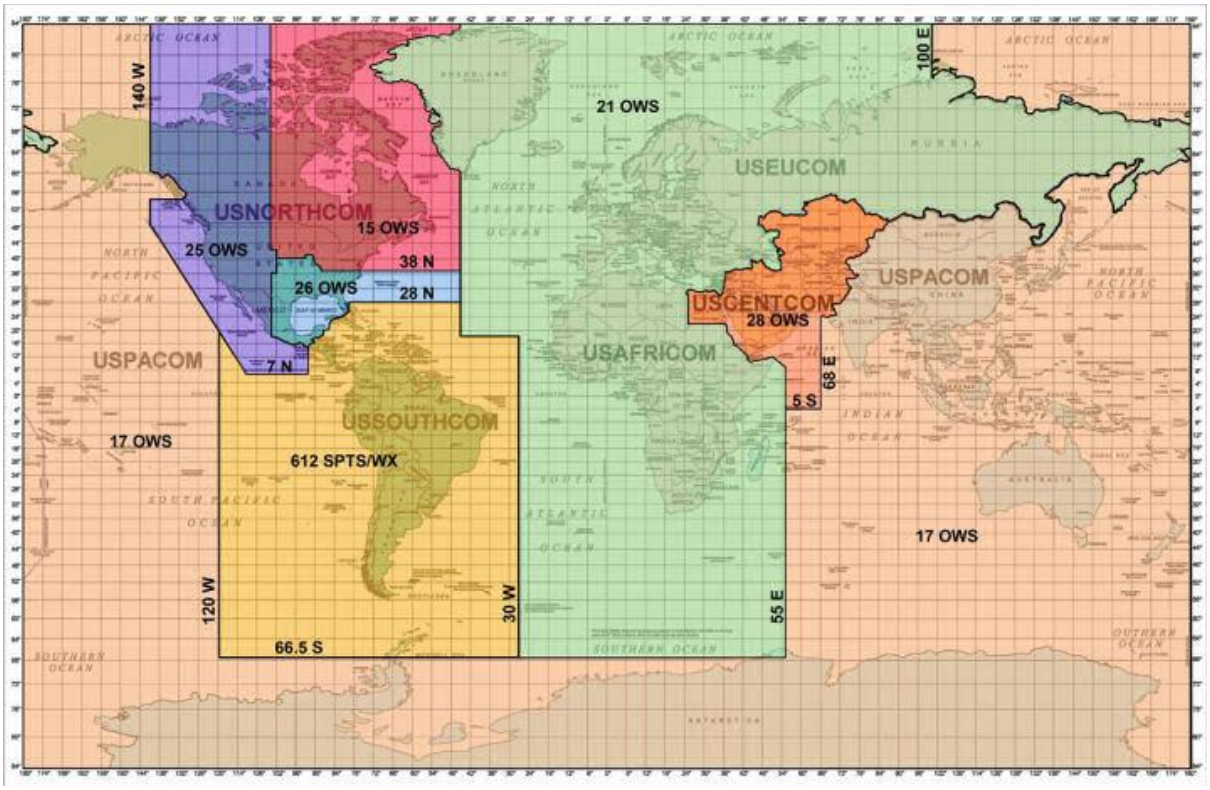

Figure 5: Air Force OWS Geographic Areas of Responsibility

Over 130 other weather organizations including both continental United States (CONUS) and deployed AOC WSTs, weather flights supporting aviation forces, expeditionary weather squadrons/flights supporting ground forces, and staffs reach back to the OWS or specialized weather unit responsible for their GCCs' area of responsibility (AOR) for theater/operational-level weather products (see Figure 5 for OWS-specific AORs). These organizations concentrate on specialized weather support to their respective mission execution functions. Weather flight meteorologists and technicians must strive to become experts on terrestrial and space weather effects/threats to the aerospace expeditionary force (AEF) weapon systems and tactics they support and leverage OWS operational-level weather products to develop tailored environmental threat-mitigation information for missions going into execution.

d. Air Force METOC Capabilities: Personnel and Equipment

(1) Air Force METOC Personnel

The Air Force specialty code (AFSC) for enlisted weather personnel indicates overall weather skill level. Enlisted AFSCs for conventional Air Force and Army weather support are 1W0X1. Enlisted AFSCs for special operations weather team (SOWT) support are 1W0X2. In both cases, X represents skill level (i.e., 3-, 5- or 7-level):

- **3-level.** Individual just graduated from the Weather tech school at Keesler AFB MS. Furthermore, SOWT 1-Levels must also complete additional requirement outlined in the SOWT CFETP.

- **5-level.** E4-E5 forecasters with 3-10 years of experience.
- **7-level.** E6-E8 forecaster with 6 to 20 years of experience but can be at the E-5 grade level.

Weather officer AFSCs are 15W4 and 15W3. The "4" suffix indicates a staff officer whereas the "3" suffix indicates an operational weather officer. Prefixes for weather officer duty AFSCs include:

- **C.** Commander (i.e., C15W3 = operational commander)
- **B.** Operations Officer
- **J.** Jump qualified
- **X**. Flight qualified
- **R.** Plans

An "A" suffix on a Weather Officer duty AFSC indicates a weather advanced academic degree.

Army Battlefield Weather units and Air Force EOSS Weather Flights will typically be manned with 15W3s, 1W071s, and 1W051s.

(2) Air National Guard (ANG)

Air National Guard Weather is tasked to support Air National Guard and Army National Guard (ARNG) combat units with mission execution and mission planning METOC services.

ANG "Battlefield Airman" Weather Flights deploy with conventional Army and Special Operations (active and reserve component) units when required. ANG weather teams are embedded in ANG "ACC or AFSOC gained" wings to provide weather support for active and reserve component combat air forces (CAF), including ANG "ACC gained" Remotely Piloted Aircraft (RPAs). Two ANG weather flights provide NORTHCOM "homeland security" weather support. No less than (often more than) one weekend a month and two weeks a year, traditional ANG members train to provide deployed weather support. ANG weather units train to deploy, operate, and communicate in tactical and non-tactical environments before, during and after combat operations and natural disasters.

Requests for ANG Weather support (in Title 10/federal status) are made to ACC/A3WC, Langley AFB, VA (DSN 574-8459, fax 574-8455), or AFSOC/A3W, Hurlburt Field, FL (DSN 579-1541), with concurrent notification to National Guard Bureau (NGB)/A3O or NGB/A3J, NGB, Arlington, VA (DSN 327-3286/5787, Comm 703/607-xxxx, Fax 327-3693).

Requests for ANG Weather support (in Title 32/state status) are made through the ANG Crisis Action Team (DSN 278-7492, Comm 301/836-xxxx), or directly to the specific state's Joint Operations Center (JOC) with concurrent notification of NGB/A3O or NGB/A3J.

The ANG website is http://www.ang.af.mil. Information is also available through Air Force Portal at https://www.my.af.mil/faf/FAF/fafHome.jsp.

(3) Air Force Reserves (AFRES)

Information on the Air Force Reserve is available at http://www.afrc.af.mil. There are two components of AFRES that include METOC resources.

The AFRES individual mobilization augmentee (IMA) program supports gaining units for backfill and wartime mission needs. Individuals can volunteer for duty assignments or be ordered to duty during a mobilization. IMAs are on twenty-four hour notice for call-up. Typical non-mobilization tasking includes operational readiness inspections (ORIs), backfill at a weather unit or headquarters (HQ) staff, or any active duty shortfall that creates a requirement. Reservists are normally permitted to be on extended active duty (EAD) 179 days each fiscal year. Many staffs (both Army and Air Force) have AFRES METOC personnel assigned to fulfill a variety of reserve tasks.

There are also several AFRES weather units, supplemented by civilian/contractor workers, providing full aviation meteorological support to AFRES flying customers. Air Reserve bases with weather units include Dobbins (GA), Westover (MA), March (CA), Grissom (NY), and Homestead (FL).

For availability and/or tasking of AFRES resources, see the Volunteer Reserve System website (https://vrs.afrc.af.mil/) or contact the METOC office of the appropriate AF Major Command:

Air Combat Command (ACC), ACC/A3W, Langley AFB, VA (DSN 574-8452/8441, fax 574-8455)

Air Mobility Command (AMC), AMC/A3W, Scott AFB, IL (DSN 576-4337/2922/5082, fax 576-5801)

AFSOC/A3W, Hurlburt Field, FL (DSN 579-5640, fax 579-2243)

(4) Air Force METOC Hardware

A deployed, fixed-site airfield requires tactical systems that provide the capability to take 24-hour airfield observations, access a full suite of centrally produced weather forecast products, and generate mission execution forecasts. Equipment requirements are determined by the Air Force component theater weather planner and tasked to appropriate MAJCOMs. Descriptions and additional hardware are also detailed in Joint Publication 3-59.

- **AN/TMQ-53**, **Tactical Meteorological Observing System.** Self-contained, deployable unit that provides measurements of wind speed, wind direction, gust (configurable for crosswinds), temperature, relative humidity, pressure, cloud ceiling heights, visibility, present weather, precip accumulation (rain guage), and lightning detection.

- **Manual Observing Kit (MOK; AFSOC only).** Man-portable observing kit comprised of Leica Vector IV Laser Rangefinder Binocular, Thunderbolt TB-M1 Handheld Lightning Detector (range: 75 miles), Boltek LD-250 Lightning Detector (range: 250

miles), Kestrel (see description below), Snowboard ruler, Rain Gauge Collector, Digital Camera (optional), and Pelican case.

- **Kestrel (available to all AFW).** Pocket-sized Handheld Observing equipment. Measures temperature, pressure, humidity, winds speed.

- **Laser Range Finder (available to all AFW).** Used to measure cloud ceiling heights.

- **Vaisala DigiCORA Sounding System MW31** (replacing AN/UMQ-12, MARWIN Tactical Upper Air Measuring Set). This upper air sounding system provides pressure, temperature, relative humidity (PTU) and wind data collection and processing, as well as message coding and archiving. It also supports the measurement of ozone concentrations and radioactivity. Telemetry range: up to 350 km with directional antenna and RS92-SGP radiosonde.

- **New Tactical Forecast System (N-TFS)**. Computers and software in man-portable containers that currently serve as the primary deployable METOC data handling system.

- **Joint Environmental Toolkit (JET; due to replace N-TFS in FY10).**

- **METSAT receivers**. Various systems to ingest direct broadcast METOC satellite imagery and derived data from Defense Meteorological Satellite Program DMSP, geostationary operational environmental satellite (GOES), polar orbiting environmental satellite (POES), METEOSAT, GMS, and other satellite systems. Fielded systems include **the Mod III** (AFSOC only) and the **MARK IVB**.

    - **Mod III (AFSOC only).** A small, deployable, computer-based satellite imagery reception and analysis system, which receives data from geostationary weather satellites.

    - **MARK IVB.** Direct read-out Ground receiving station for weather satellite imagery and data.

- **Tactical Wx Radar (TWR)**. Deployable doppler and non-doppler weather radars for use at fixed and deployed sites. Examples include the Ellason Weather Radar (EWR), a highly-transportable non-Doppler radar, and the Portable Doppler Radar (PDR; expected fielding FY11).

(5) Air Force METOC Software

Deploying units require software for remote data access and specialized customer support.

- **Internet web browser.** Opens the door to most of the available weather data in Joint Air Force and Army weather information network (JAAWIN), as long as the external agency is on a DoD domain or has a JAAWIN userid and password. Various other METOC data

sources (e.g., NOAA, universities, commercial activities, *etc*.) are also accessible via any web browser.

- **Mark IVB Client-server software.** Primary means of receiving satellite data is through the Mark IVB system, which requires display software and internet connectivity to access geostationary and polar orbiter data from Mark IVB downlink sites around the world.

- **File Transer Protocol (FTP) software.** For larger file transfers or for support assistance request (SAR) delivery, FTP software may offer a faster transfer method. Note however, that AFWA is transitioning to Secure File Transfer Protocol (S-FTP) that will require secure socket layer (SSL) encryption if the external agency is not on a DoD domain. Secure FTP server/client tools must meet Defense Information Systems Agency (DISA) requirements; currently FIPS 140-2 compliant Secure Shell protocol 2 (SSH-2).

- **Tactical decision aid software.** Target acquisition weapon software (TAWS) is used to develop weather impacts to missions employing infrared (IR), television (TV), and laser-guided weapons. TAWS is an electro-optical decision aid that provides the operator several types of performance predictions for mission planning. It computes lock-on and detection ranges based on pilot, targeteer, and weather forecaster inputs. Pilots enter the time and mission profile data, targeteers input target information (*e.g*., composition, backgrounds, and dimensions), and the forecaster enters the atmospheric data. TAWS also includes a calculator that computes target scene light levels from natural (i.e., solar, lunar, stars) and man-made illumination sources, as well as the resulting weather effects on mission effectiveness (e.g., detection ranges).

- **Infra-Red Target Scene Simulation (IRTSS) Software**. Not yet certified and accredited for use on DoD systems, IRTSS provides more detailed mission planning output by producing a simulated infrared image of the target area based on weather conditions.

- Several other solar/lunar calculation programs are also available. AFWA recommends using the solar/lunar calculator embedded in TAWS or using the US Naval Observatory web site at http://aa.usno.navy.mil/data/ The AFWA Consolidated Support Center offers technical assistance with the calculation programs in TAWS.

(6) Air Force METOC Communications and Computers

Environmental threat information is most effective when it is integrated into command and control systems and processes. A net-centric repository of environmental information and operational impacts facilitates such integration by enabling deployed weather forces and operational decision-makers unfettered access to relevant weather threats at key decision points in the planning process. This optimal fusion of weather and weather-driven hazard intelligence into the operational picture maximizes warfighters' ability to choose COAs that best mitigate or exploit the weather for battle.

In order to realize this ideal fusion, weather forces must be able to leverage robust, assured common user communications. Because a readily available net-centric global data repository requires extensive processing systems, data storage capacity, and communications capabilities, environmental characterization must generally be accomplished centrally from fixed locations (like the OWSs and 2 WXG) employing a high degree of automation. Then, through reachback and/or distributed operations, deployed AFW forces can reliably access the necessary information and resources while minimizing their theater footprint.

- **Weather Subscription Service (WSS).** Subscription service for the AFWA dissemination system known as the weather product management distribution system (WPMDS). The WPMDS currently serves customers directly, via the global broadcast system (GBS), and through NIPRnet communication handler (NCH). WSS enables the end user to control their own data requirements. This system (WPMDS) is scheduled to be replaced by the weather data analysis system (WDA) late FY10.

- **Tactical AFFOR Communications--**Information passed over tactical AFFOR communications systems feeds, fixed base weather stations and various command control computers and intelligence C4I systems that contain METOC data (e.g., TBMCS, AFMSS, GCCS). Data transfer can be accomplished through:

- **SATCOM** (e.g., GBS, BGAN, INMARSAT, IRIDIUM phone)

    - **GBS**. Global Broadcast System (GBS) operates as a one-way, wideband transmission service capable of supporting timely delivery of classified and unclassified data and information products for mission support and theater information transfer. GBS is analogous to Direct TV for the warfighters. GBS disseminates IP-based real-time video and large data files (up to 4GB in size) over-the-air (30 Mbps per transponder) to garrisoned and deployed combat forces using smart push and user pull - information based on unit mission reception priority profiles. GBS operates from satellite broadcast manager (SBM) sites, broadcast satellite payloads and receive suites (RS). A primary uplink site, through which information products are transmitted to the satellite for relay to forces over a large geographic area, serves each satellite. GBS also has the capability, through use of the theater injection point (TIP), to inject information directly from within a theater of operations.

    - **Broadband Global Area Network (BGAN)**. Provides worldwide combat forces a mobile satellite service that combines internet access (up to 500kb) and telephone capability simultaneously through one device. Service is accessed via a lightweight satellite terminal about the size of a laptop PC and can be ordered through the Defense Information Systems Agency.

    - **INMARSAT.** International Maritime Satellite System (INMARSAT) provides telephonic and data services to users worldwide, via portable or mobile terminals which communicate to ground stations through twelve geosynchronous telecommunications satellites.

- **IRIDIUM.** The Iridium satellite constellation is a large group of satellites used to provide voice and data coverage to satellite phones, pagers and integrated transceivers over Earth's entire surface. The constellation requires 66 active satellites in orbit to complete its constellation. Additional spare satellites are kept in-orbit to serve in case of failure

- **Other Common-user Communications** (e.g. deployed TACLAN, etc.). Weather planners need to ensure the communications community includes weather forces' communication requirements when establishing deployed requirements for NIPRNET/SIPRNET. Communications planners normally require a minimum bandwidth for planning purposes. The combatant commander J-6/theater Information manager (TIM) controls data flow. The SMO, in coordination with the J-6, identifies and documents joint-level communications requirements in the supported and supporting CCDR's OPLAN, Annex K, Communications, to include frequency clearance requirements. Component planners need to work with their communications staff (A-6, G-6, J-6, etc.) to determine the feasibility of receiving weather data via common user communications and appropriately incorporate weather data requirements.

Tactical Meteorologist (TACMET) frequencies. AFW forces must coordinate frequency clearance requests for all transmitting Tactical Meteorologist (TACMET) (tactical weather radar, TMQ-53, etc.) during pre-deployment planning. Coordination should begin with the SMO/JMO and gaining AFFOR SWO, who will coordinate with the designated approval authority.

e. Air Force METOC Data Sources

(1) Real-time atmospheric data

There are several sources of real-time METOC data within the Air Force tactical structure:
- Fixed-site airfield observations
- Environmental reconnaissance weather teams [e.g. SOWT]
- Afloat METOC teams
- Weather Pods and TMQ-53s
- Pilot reports
- Aircrew debriefings
- Ground force debriefings
- Radar (primarily tactical)
- Satellite (METSAT)
- Upper air observations (Vaisala Digicora MW31)

These sources can also be supplemented by deployed NAVY METOC data sources as well as indigenous/coalition upper air soundings, observations, TAFs, and proven local-area forecast charts and models.

Deployed weather flights/teams may or may not be tasked to take/disseminate surface and/or airfield observations. In some cases, the host nation takes the official airfield observation. However, Air Force METOC personnel who are tasked to take observations must make these

observations available for dissemination via the global information grid (GIG). Weather flights can pass information to the responsible OWS, disseminate select information themselves, or post appropriate information on NIPRNET/SIPRNET homepages as appropriate.

METOC personnel must seek pilot/ground reports of weather conditions through pilot-to-METRO service (PMSV) calls, aircrew debriefings, and ground-force mission debriefings (from Air Force/joint/host-nation/coalition weather and non-weather forces). This information is invaluable for verifying mission forecasts and refining forecast products. Because weather personnel may not always be asked or expected to attend aircrew or ground force mission debriefings by their operational customer and/or joint/coalition partners, they should proactively seek out the debriefings in order to establish a weather presence as a permanent part of the mission debriefing process.

(2) Special Weather Intelligence (SWI) Data

SWI is weather reports for locations that are not available in global broadcasts or through mutual exchange agreements. These data can be current observations, forecasts, Pilot Reports (PIREPS), Significant Meteorological Information (SIGMETS), and other formatted METOC information. SWI is currently provided via various national and theater intelligence data systems. These data are and can be of particular value to operations centers for mission planning, en-route updates, and near real-time awareness of target area/mission weather during execution. Further information on types of data and availability of connectivity to sources may be obtained by contacting a combatant command's SMO or AFWA's 2 Weather Squadron (WS) (see contact information in section 1.5.6 at the end of this chapter).

f. Air Force Weather Products and Services

(1) AFWA Products and Services

AFWA provides mission-tailored, worldwide decision assistance for warfighters, the National Command Authorities, and Air Force Precedence 1-1 programs controlled by the Secretary of the Air Force. AFWA tailors products to meet mission-specific weather thresholds and format (alphanumeric, vector graphic, TIFs/GIFs, raster scan, etc) according to customer's requirements and provides aviation/maneuver parameters and applications to worldwide DOD agencies. AFWA is also the DOD center of excellence for satellite meteorology and space weather forecasting.

Most routine AFWA products are listed and described in the JAAWIN or JAAWIN-S catalog of products. If what you want is not listed in the catalog or available from other agencies linked from JAAWIN-S, call the 2 SYOS Global Duty Officer (GDO) at DSN 271-2586. AFWA may have added the product since the last update of the list, or may be able to provide the product via a Support Assistance Request (SAR). The following is a general listing of the types of products available from AFWA.

(a) AFWA Visualized products

- Up to 16-day theater outlook, based on customer thresholds for ceiling, visibility, and significant weather
- Wind-chill and heat index forecasts
- Standard level (surface to 200mb) forecasts
- Icing and turbulence forecasts
- Precipitation forecasts (amount, type)
- Severe thunderstorm indices (*e.g.*, convective available potential energy (CAPE), Total Totals, etc.)
- Low level wind shear forecasts
- Surface temperature forecasts
- Surface temperature change forecasts
- Forecast Skew-Ts (for select locations)
- Forecast relative humidity and wind cross sections (for select locations)
- Surface wind vector/magnitude (for select theaters)
- Contrail forecasts (for low, non, and high by-pass engine types)
- Medium range forecast products (1000-500 mb thickness and 500mb heights/isotachs)
- Jet stream forecasts
- Absolute humidity
- Dust visibility
- Dust concentration
- Stratospheric turbulence
- Model visualizations (meteograms, vertical cross-sections, etc)
- Radar and lightning data
- Surface and upper air analyses
- Model output from weather research forecast model (WRF), global forecast system (GFS), Navy Operational Global Atmospheric Prediction System (NOGAPS), UKMO

(b) AFWA Satellite (METSAT) Products

Visual, infrared, and some multi-spectral from GOES, DMSP, POES, GMS, and METEOSAT platforms. Availability varies with the theater in question. Products include 1.5 and 3 nautical mile resolution, with city overlays, geography, and SSMI/MSI-derived areas of fog, thunderstorms, and surface wind speeds.

(c) AFWA Charts and/or Alphanumeric Bulletins

- Point analyses
- Surface analyses/forecasts
- Surface pressure centers, fronts, and sensible weather analyses/ forecasts
- Upper air analyses/forecasts
- Satellite imagery/DMSP special sensor information
- Nephanalyses/cloud forecasts (bases/tops, total cloud amounts, and cloud layers)
- Ceiling, visibility, and precipitation forecasts
- AGRIMET (precip/evapotranspiration/soil moisture) analysis estimates
- Snow and ice analyses
- Terminal aerodrome forecasts

- Meteograms (worldwide, based on 5th generation meso-scale model (MM5) and medium range forecast (MRF) models)
- Synoptic discussion bulletins
- Effective downwind/trajectory messages
- Tropical storm positions/intensities
- En route hazards (*i.e.* turbulence, icing, and/or thunderstorms) information/forecasts
- Severe/advisory weather information
- Contrail forecasts (for low, non, and hi by-pass engine types)
- Anomalous propagation bulletins
- National Weather Service analyses/forecast products
- National Weather Service model output
- National Weather Service radar summaries
- Precision Airdrop Forecasts
- Field artillery forecasts

(d) AFWA Space Weather Products

AFWA's 2 WS provides analyses, forecasts, and warnings of space weather phenomena that may impact DoD or enemy operations. These products are disseminated to customers worldwide. The products identify the state of the space weather environment and focus on phenomena that may affect communications, satellite operations, space tracking, navigation, and intelligence collection

Space weather products in support of communications include analyses and forecasts of ionospheric conditions that affect high frequency (HF) communications and ultra high frequency (UHF) satellite communications (SATCOM). Product contents include, but are not limited to, predictions of usable frequencies for point-to-point high frequency (HF) communications and predictions of space weather-caused disruptions to ultra high frequency (UHF) SATCOM. Model output of a Gauss-Markov assimilative ionospheric model is available with 15 minute observational updates and 24 hour forecasts (updated hourly).

Space weather products in support of satellite operations include analyses and forecasts of ionospheric and magnetospheric conditions that may affect the ability of a satellite to perform as expected. Product contents include analyses and predictions of energetic electrically charged particles influences and fluxes (the number of charged particles bombarding a satellite). In those cases that anomalous behavior within a satellite is reported by satellite controllers, space weather products also include assessments of whether or not the space weather environment was disturbed enough to cause the anomalous behavior

Space weather products in support of space tracking include analyses and forecasts of ionospheric conditions that may affect the ability of ground-based space tracking radars to perform as expected. Product contents include, but are not limited to, correction factors required to account for the ionospheric-induced errors in tracking radars

Space weather products in support of navigation include analyses of ionospheric conditions that may reduce the positional accuracy of single-frequency global positioning system (GPS)

applications. Product contents include geographic maps that depict locations where single-frequency GPS accuracy is most likely to be affected by large ionospheric-induced positional errors

Space weather products in support of intelligence collection include a variety of classified products to assist customers in identifying when, how, and how much space weather is affecting both friendly and adversary operations

(e) AFWA Product Dissemination

Classified/unclassified
Dedicated/common user circuits
SIPRNET/NIPRNET
FTP to servers

(f) AFWA Request Procedures

Send requests for "normal" operational support to:

Normal (CONUS) duty hours:
HQ AFWA/A3O
DSN (312) 271-1631/3/4
comm (402) 294-1631/3/4
unclass fax: DSN (312) 271-1637
106 Peacekeeper Drive, Ste 2N3
Offutt AFB NE 68113-4039
Email: afwasar@afwa.af.mil; can also use "first name.last name@afwa.af.mil" if an individual's first and last names are known.
Secure email: 2syosdor@offutt.af.smil.mil

For urgent, short notice request:
AFWA 24-hour Point of Contact:
GDO: DSN (312) 271-2586 / comm (402) 294-2586
Secure DSN (312) 272-2467 / comm (402) 232-2467. This phone is not monitored, so call GDO number above first.
Unclass fax: DSN (312) 271-5872 / comm (402) 294-5872
Email: afwaops@offutt.af.mil

(g) AFWA Web access

SIPRNET homepage: http://safwin.offutt.af.smil.mil
NIPRNET homepages:
JAAWIN: https://weather.afwa.af.mil (CAC enabled, but username and password registration required at first login)
AFWA (FOA information): http://wwwmil.offutt.af.mil/afwa/

(2) 14 WS (formerly Air Force Combat Climatology Center, AFCCC) Products and Services

The 14 WS provides a broad spectrum of climatology products and services ranging from standard climatology summaries to customer specific tailored products. These include:

- Forecast Aids (24 hour Conditional Climatology, Seasonal Predictions)
- Point and Spatially Oriented Climate Summaries (Standard and Tailored)
- Descriptive Climatology (Regional and Point Specific)
- Historical Weather Observations
- AF Weather Technical Library Services

Products may be utilized from the strategic/operational level down to the tactical level for daily operations/combat support.

Many products and services are directly available from the web site while others are built on demand. Refer to the product description list available on the 14 WS web site for a comprehensive list of products and services.

Other product examples (see web page for more details):

- Atmospheric profiles
- Atmospheric stability summaries
- Climatic briefs
- Climatic summaries
- Cloud data summaries
- Cloud-free/visible clear line-of-sight (CFLOS/VCLOS) probabilities
- Crosswind summaries
- Daily temperature/precipitation summaries
- Engineering design and construction data
- Graphical visualizations including Google Earth displays
- Heating and cooling days
- library services
- Lightning climatology
- Low-level route climatology
- Modeled climatology (Advanced Climate Modeling and Environmental Simulations [ACMES])
- Modeled diurnal curves
- Post-event analyses
- Pavement temperature summaries
- Point/small area; large/intermediate area; & regional descriptive climatology (static--no longer built)
- Precipitation summaries
- Pressure reduction ratios
- Rain rate analyses
- Range reference atmospheres

- Ray-trace diagnostic models
- Simulation support
- Space weather climatology
- Temperature/dew point summaries
- Temperature duration summaries
- Upper air climatology
- Vector wind models
- Wet-bulb globe temperature climatology
- Wind duration analyses
- Wind-stratified conditional climatology

14 WS Contact Information

NIPRnet: https://www.afccc.af.mil ; Email: 14WS_CustomerSVC@afccc.af.mil
Contact Webmaster: webmaster@afccc.af.mil

SIPRnet: http://afccc.asheville.af.smil.mil ; Email: fdoo@asheville.af.smil.mil

JWICS: http://www.afccc.ic.gov/SCIS - EMAIL - ccdoo@afccc.ic.gov

To request support, click "Request Search and Rescue (SAR) - PAIS" on the main menu, then "Request Support (SAR)". Complete the form. Send questions or comments to the Customer Service section at 14WS_CustomerSVC@afccc.af.mil.

Telephone/FAX numbers

DSN (312) 673-9004 / comm (828) 271-4291
Secure DSN/STU-III (312) 673-9003
Fax: DSN (312) 673-9024 / comm (828) 271-4334

Mailing Address

14 WS/WXCP
151 Patton Ave Rm 120
Asheville, NC 28801-5002

Observing Forms Address

Send electronic Form 3803 as an attachment to 14 WS at observation_3803@afccc.af.mil. One form per e-mail please.
Send Form 3813 (NTFS generated) as the body of the e-mail to 14 WS at observation_3813@afccc.af.mil.

14 WS/WXD
151 Patton Ave Rm 120
Asheville, NC 28801-5002

After Hours Contact (NORMAL DUTY HOURS: Monday - Friday, 1230 - 2130Z OR 0730 - 1630L EST)

Call the AFWA 24-Hour Ops Center/GDO at DSN (312) 271-2586 or COMM (402) 294-2586. Your request will be relayed to the appropriate 14 WS personnel.

(3) 23 WS Products and Services

The 23 WS at Hurlburt Field FL provides products and services to fulfill contingency operations requests for SOF operations. This is no longer done by AFWA. See section 1.5.5 below for contact information.

(4) Operational Weather Squadrons (OWS) Products and Services

Each OWS supports its theater by providing regional and theater weather guidance for the planning and execution of Air Force and Army operations in their supported Combatant Commands AOR. Specifically, they provide 24/7, regional-scale terrestrial and space weather support to operational units assigned within and/or deployed into its AOR. Products include:

- Military Operational Area Forecast (MOAF)
- Regional/theater forecast discussion bulletins
- 5-day Forecasts
- TAFs
- Upper Air Analyses/Prognosis
- Horizontal weather depictions
- Surface weather analyses
- Cloud Forecasts
- Satellite
- Radar
- Lightning
- Point Weather Watches/Advisories/Warnings
- Flight Hazards Advisory (Thunderstorms, Turbulence, Icing)
- Visualization forecast products for the theater that support weather flight mission execution forecasts (*e.g.*, air refueling, drop zone, low-level routes)
- Flight weather briefings
- Meteorological Watch (METWATCH)

(a) OWS Contingency Flight

The OWS Contingency Flight is the primary forecast center for classified operations in the AOR--as such, they produce theater guidance, discussions, Joint Operational Area Forecasts (JOAF), mission-tailored products for contingency operations, and tactical decision aid forecasts in addition to classified versions of the OWS products listed in the previous paragraph.

(b) Weather Flight products and services

The weather flight's primary role is to integrate accurate environmental threat information into operations to ensure it can be exploited at every decision point during planning, execution, assessment and sustainment of military operations. To that end, weather flights supported by their respective OWS use OWS guidance and products, their own access to highly perishable, real-time weather observational data and intimate knowledge of their supported units' operational mission parameters to develop mission-specific environmental threat-mitigation planning/execution tools and maintain a constant meteorological watch of missions in execution. They may also provide surface and upper air observations (as required) at their location to implement the collection strategy coordinated with the OWS/JMO. Weather flights are capable of providing the following products:

- Mission planning forecasts (provided at key decision points throughout mission planning process)
- Tactical Decision Aids (TAWS, weather threat assessments, course of action (COA) decision matrices)
- Mission execution forecasts (launch, enroute, target, and recovery)
- Surface observations (as required)
- Upper air observations (as tasked)
- Supervisor of Flying (SOF) support
- Flight weather briefings
- Staff weather briefings
- Mission Watch
- "Eyes Forward" METWATCH
- PMSV. The weather flight provides PMSV7 for all missions in execution. This is their highest priority below emergency war orders.

g. Key Air Force METOC Organizations Contact List

The *Air Force Observer* magazine publishes an annual Almanac that provides phone numbers, fax numbers and Email addresses for most Air Force weather organizations. Contact AFWA Public Affairs (DSN 272-8166 / comm (402) 232-8166, observer@afwa.af.mil, or look on the AFWA/PA homepage, for a copy of the latest issue.

(1) USAF MAJCOM Weather Staffs

*Air Combat Command (**ACC/A3W**)—Langley AFB VA*
DSN 574-8452/8456 / comm (757) 764-8452/8456; secure 574-3603
Email: acc.xow@langley.af.mil
Website: https://do.acc.af.mil/dow

*Air Force Global Strike Command (**AFGSC/A3W**)—Barksdale AFB LA*
DSN 781-2818

*Air Mobility Command (**AMC/A3W**)—Scott AFB IL*

DSN 779-7713 / comm (618) 229-7713
Email: amc.a3w@scott.af.mil
Website: https://amc.af.mil/a3/a3w/a3w.htm

*Air Force Materiel Command (**AFMC/A3W**)—Wright-Patterson AFB OH*
DSN 986-0063 / comm (937) 656-0063
Email: afmc.a3o.workflow@wpafb.af.mil
Website: https://afkm.wpafb.af.mil/ASPs/CoP/OpenCoP.asp?Filter=OO-OP-MC-66

*Air Force Space Command (**AFSPC/A3FW**)—Peterson AFB CO*
DSN 692-2483/5979 (24 hr) / comm (719) 554-5979
Email: afspc.a3fw.wf@peterson.af.mil

*Air Force Special Operations Command (**AFSOC/A3W**)—Hurlburt Field FL*
DSN 579-2200 / comm (850) 884-5640
Email: afsoc.a3w@hurlburt.af.mil

*Pacific Air Forces (**PACAF/A3AW**)—Hickam AFB HI*
DSN 315-448-1475 / comm 808-448-1475
Email: pacaf.a3w@hickam.af.mil
Website: https://sps.hickam.af.mil/sites/weather/default.aspx

*US Air Forces Europe (**USAFE/A3W**)—Ramstein AB GE*
DSN 314-480-7001/7564 / comm 011-49-06371-47-7001/7564
Email: usafe.a3w@ramstein.af.mil

(2) USAF Mission-/Function-specific Weather Production Centers with Global Scope

***AFWA**—Offutt AFB NE*
Global Duty Officer (GDO)/Customer Service 24-hour POC:
24-hr contact DSN (312) 271-2586 / comm (402) 294-2586
Secure DSN (312) 272-2467 / comm (402) 232-2467. This phone is not monitored, so call GDO number above first.
Unclass fax: DSN (312) 271-5872 / comm (402) 294-5872
Secure fax: DSN (312) 272-5426 / comm (402) 232-5426
Email: afwaops@offutt.af.mil
Websites: http://www.afweather.af.mil/; https://weather.afwa.af.mil/jaawin/index.jsp

***2 WS**—Offutt AFB NE*
24-hr contact DSN 271-2586 (24 hr) / comm (402) 294-2586
Email: 2ws.cc@offutt.af.mil
Website: http://www.afweather.af.mil

***14 WS** (*formerly Air Force Combat Climatology Center*)—Asheville NC*

DSN 673-9000/9004 / secure DSN 673-9003 / (24 hr) comm (828) 257-0680; Email: dooall@afccc.af.mil
Website: https://notus2.afccc.af.mil/SCIS/ (CAC required)

16 WS (Modeling Squadron; formerly AFWA/DNX*)—Offutt AFB NE*
DSN 271-9774 / comm (402) 294-9774

23 WS—Hurlburt Field FL
24-hr contact DSN (312) 579-3824/1929
Secure DSN (312) 579-4348
Email: 23wsops@afsoc.af.smil.mil; 23wsops@hurlburt.af.mil
Website: http://137.13.75.216/; http://23ws.hurlburt.af.smil.mil

618 TACC/XOW [18 AF (AFTRANS) AOC]--*Scott AFB IL*--provides weather mitigation ops for all strategic airlift, air refueling, and aeromedical evacuation missions flight-managed by the 618 TACC worldwide.
24-hr contact DSN 779-3343 / comm (618) 229-3343 / comm 1-800-AIR-MOBL; Email: tacc-xow-exec@scott.af.mil
Website: https://tacc.scott.af.mil/?action=xow

ACC AOS/AOSW*—Langley AFB VA*—provides worldwide CORONET mission support
24-hr contact DSN 574-2007/2008; secure DSN 574-4434
Comm (757) 764-2007/2008
Email: aos.aow@langley.af.mil; accaow@langley.af.smil.mil
Website: https://afkm.wpafb.af.mil/ASPs/CoP/OpenCoP.asp?Filter=AC-OP-03-04

432 OSS/OSW--*Creech AFB NV—provides global weather mitigation ops for ACC UAS operations*
24 Hr. Contact DSN 384-1320
DSN 384-0339 / Comm (702) 404-0339
DSN Fax 384-1287 / Comm Fax (702) 404-1287
Emal:l predatorcwt@nellis.af.mil
Website:
https://wwwmil.nellis.af.mil/units/757oss/weather/757%20OSS%20Weather.htm

3 SOS/WX--*Cannon AFB NM—provides global weather mitigation ops for AFSOC UAS operations in conjunction with 23 WS*
DSN 681-0395
Comm (505) 784-0395
Email: 3SOSWX@cannon.af.mil

(3) USAF Operational Weather Squadrons and Regional Support

15 OWS (NE CONUS hub and potential USTRANSCOM/ United States Navy Northern Command (USNORTHCOM) support provider*)—Scott AFB IL*
24-hr contact DSN 576-9699 / comm (618) 256-9520

Email: 15OWS.CC@scott.af.mil
Website: https://ows.scott.af.mil/

17 OWS (USPACOM hub)--Hickam AFB HI
24-hr contact DSN 315-449-4127 / comm (808) 449-4127
Email: pacaf.a3w@hickam.af.mil
Website: https://sps.hickam.af.mil/sites/weather/default.aspx

21 OWS (USEUCOM/USAFRICOM hub)*—Sembach Kaserne*
24-hr contact DSN 314-496-6114/6116 / comm 011-49-06302-67-6116; secure 314-496-6151/6190
Email: ows.ops@sembach.af.mil; usafe.ows@ramstein.af.smil.mil
Website: https://ows.sembach.af.mil/

25 OWS (Western CONUS hub and potential USNORTHCOM support provider)*—Davis-Monthan AFB AZ*
24-hr contact DSN 228-228-7655 / comm (520) 228-7655
Email: 25ows.wxa@dm.af.mil; mailto:25OWS@davismonthan.af.smil.mil
Website: https://ows.dm.af.mil

26 OWS (SE CONUS and potential USNORTHCOM support provider)*—Barksdale AFB LA*
24-hr contact DSN 781-3024 / comm (318) 456-3024
Email: 26ows@barksdale.af.mil
Website: https://ows.barksdale.af.mil/

28 OWS (USCENTCOM hub)*—Shaw AFB SC*
24-hr secure contact DSN 965-0489 / comm (803) 895-0489
Email: 28ows.cc@shaw.af.mil
Web Site: https://28ows.shaw.af.mil

612 SPTS/OWF ***(USSOUTHCOM AOC/hub)****—Davis-Monthan AFB AZ*
24-hr contact DSN 228-1977 / comm (520) 228-1977
Secure DSN 228-3292; Fax DSN 228-1284
Email: AFSOUTH.Weather@dm.af.mil; 25ows@davismonthan.af.smil.mil
Website: https://ows.dm.af.mil/index.cfm?fuseaction=main&userfunction=M&BW=L&aor=1

(4) Army Support Weather Squadrons

1 WS*—Fort Lewis WA*
24-hr contact DSN 357-4363 / comm (253) 967-4363

3 WS*—Fort Hood TX*
24-hr contact DSN 738-9400/9620 / comm (254) 288-9400/9620 (Weather Operations Center, Robert Gray AAF)
Email: 3weather@hood.army.mil
Website: https://wwwmil.acc.af.mil/cas/3ws/

7 WS—*Heidelberg GE*
24-hr contact DSN (314) 370-5393 / comm 011-49-171216-5393
Email: swodo@eur.army.mil
Website: https://afkm.wpafb.af.mil/7WS/

18 WS—*Fort Bragg NC*
24-hr contact DSN 236-7100 / (910) 396-7414
Email: 18ws-css@conus.army.mil
Website: http://www.bragg.army.mil/www-wx

607 WS—*Yongsan, Korea*
24-hr contact DSN (315) 724 -2144 / comm 011-822-7915-2144
Email: Email 607wscc@usfk.korea.army.mil; 607ws@emh2.korea.army.mil

(5) Special Operations Support Weather Squadrons

10 CWS—Hurlburt Field FL
24-hr contact (CC BB) 850-797-0900 / (Ops Super BB) 850-797-0898
Website:
http://www2.hurlburt.af.mil/library/factsheets/factsheet.asp?id=6857

23 WS—Hurlburt Field FL
24-hr contact DSN (312) 579-3824/1929
Secure DSN (312) 579-4348
Email: 23wsops@afsoc.af.smil.mil; 23wsops@hurlburt.af.mil
Website: http://137.13.75.216/; http://23ws.hurlburt.af.smil.mil

(6) Space and/or Top Secret Support Weather Squadrons

2 WS—Offutt AFB NE
24-hr contact DSN 271-2586 (24 hr) / comm (402) 294-2586
Email: 2ws.cc@offutt.af.mil
Website: http://www.afweather.af.mil

30 WS—Vandenberg AFB CA
24-hr contact DSN 276-8022
Email: vafb.weather@vandenberg.af.mil
Website: http://vafb.af.mil/organizations/30SW/30og/ws/index.html

45 WS—Patrick AFB FL
24-hr contact DSN 467-8484/5/6 / comm (321) 494-8484/5/6
Email: 45wsccv3@patrick.af.mil
Website: http://www.patrick.af.mil/shared/media/document/AFD-070606-012.pdf

(7) Test and Evaluation Support Weather Squadron

46 WS—Eglin AFB FL
24-hr contact DSN 872-4800 / comm (850) 882-4800
Email: 46ws.do.46wsworkflow@eglin.af.mil
Website: http://www.eglin.af.mil

(8) Weather Systems Support Units

2d Combat Weather Systems Squadron (2 CWSS)*--Hurlburt Field, FL;* DSN 641-5700/5702 / comm (850) 881-5700/5702
Email: afcwc.cc@hurlburt.af.mil
Website: https://www.hurlburt.af.mil/milonly/afcwc/

2d Systems Operations Squadron (2 SYOS)*—Offutt AFB NE*
24-hr contact DSN 271-2586 / (402) 294-2586
Email: 2syos.cc@offutt.af.mil
Website: http://www.afweather.af.mil

Weather Support Systems Cadre – Southwest Asia (WSSC-SWA)—*Al Udeid Air Base, Qatar*
Travels throughout United States Central Command *(USCENTCOM) and Horn of Africa (HOA) AORs*
24-hr contact DSN (318) 437-5337
Email: edward.puttbrese@auab.afcent.af.mil , edward.puttbrese@auab.afcent.af.smil.mil

2. USA METOC

This chapter describes U.S. Army organizational structure, command relationships, and support capabilities and requirements, including typical Army METOC and communications equipment.

In accordance with the National Defense Act of 1947, which split the Air Force Away from the Army, the Air Force maintained responsibility to provide weather support to the US Army.

a. Background and Overview

U.S. Army surgeons began recording weather observations regularly in the early 1800s as part of the Army's medical studies. In 1870, Congress directed the Secretary of War to establish a weather service for the nation. Thus, the Army's first organized military weather service was established in the U.S. Army Signal Corps; however, this service waned after Congress authorized the creation of the U.S. Weather Bureau, today's National Weather Service, in 1890.

Today's Air Force Weather directly traces its history to the re-emergence of a meteorological section within the U.S. Army Signal Corps in 1917. By the mid-1930s, the Army Air Corps was consuming the majority of the weather data the Signal Corps produced. On July 1, 1937, the Army Air Corps Weather Service, under the leadership of the Chief of the Weather Section in the Office of the Chief of the Army Air Corps, assumed responsibility for all Army weather services from the Signal Corps.

The Army Air Forces Weather Service grew to global proportions during World War II. During World War II, the Army Air Forces Weather Service girdled the globe with weather stations. The thousands of newly trained weather personnel fine honed the art and science of military weather services. They armed World War II commanders with vital decision-making tools. Many of the war's critical operations were predicated upon weather forecasting.

By inter-service support agreement since 1949, the AF provides weather support to US Army air and ground combat units and select support units. Currently, the AF habitually aligns standing combat weather teams (CWT) with Army service component commands, corps, divisions, armored cavalry regiments, separate and enhanced brigades, Stryker BCTs, aviation brigades and with select US Army special operations forces.

The Army is changing how it presents forces to Global Command and Control System GCCS as it transforms from a total force built around 18 large, standing divisions to one centered around 70 smaller, autonomous, highly capable brigade combat teams (BCT). Additionally, in 2010 two higher headquarters replaced existing divisions, corps, and echelons above corps. The primary warfighting headquarters, Division, directs operations of subordinate BCTs. Regionally focused Army theater-level headquarters consolidate most functions performed by today’s corps and Army service component commands into a single operational echelon.

As the Army becomes more modular and the number of separate brigades (i.e., BCTs) increases, the AF will be unable to continue to provide weather support using today's echelon-aligned, standing combat weather team (CWT) approach without a significant increase in AFW manpower authorizations. In response, AFW developed a new and innovative approach to Army weather support that will better meet Army requirements while minimizing, although not eliminating, the required manpower plus-up. This new approach leverages reachback capabilities enabled by advances in information technology and relies on the implementation of other doctrine, organization, training, materiel, leadership and education, personnel, and facilities (DOTMLPF) solutions for total success.

b. Army METOC Organization

(1) METOC Support by Size of Army Organization

Doctrinally, task-organized Army units are currently being allocated weather personnel and equipment commensurate with the scope and duration of the mission for the Army organizations described below. See the operational unit diagram below for basic army organization.

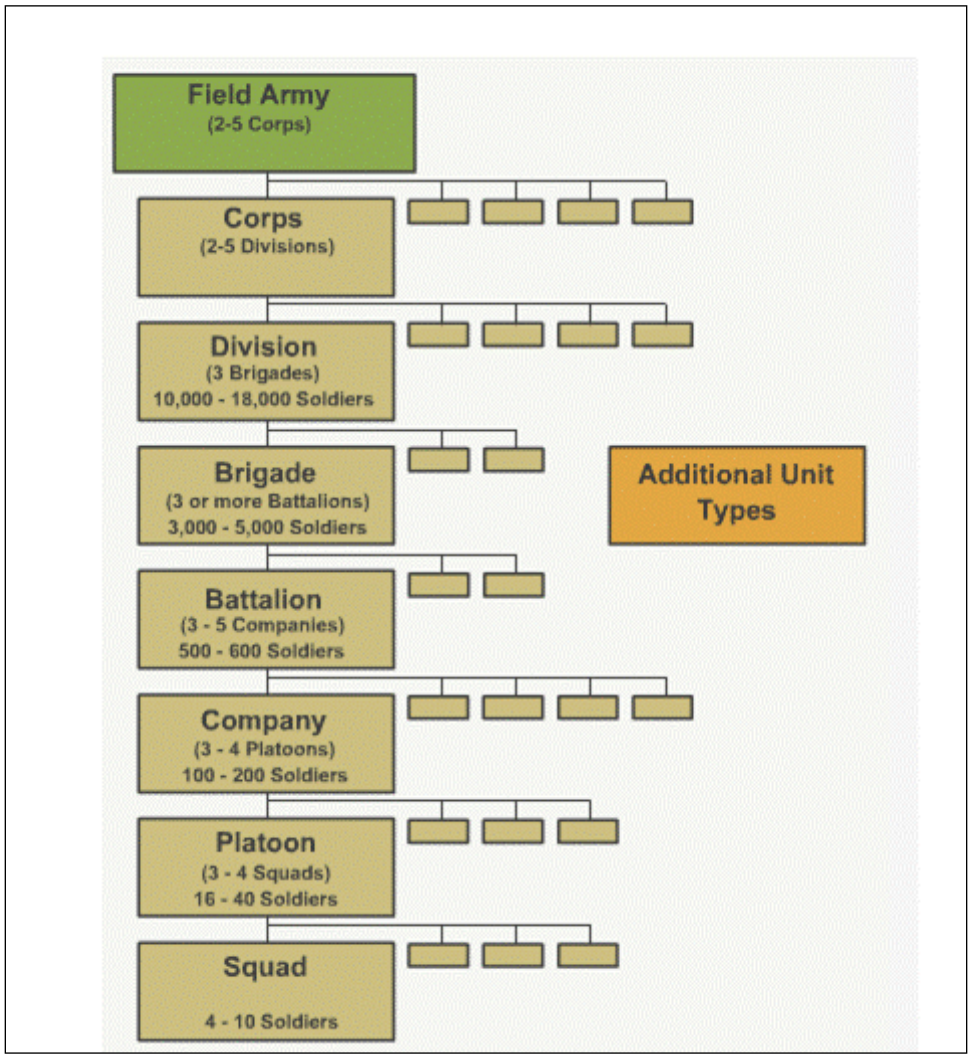

Figure 6: Army Operational Unit Diagram (from army.mil)

(2) Army Forces (ARFOR) Weather Support by Echelon

- Army Service Component Commands (ASCC) (2/4)
- Corps (2/4), Divisions (2/4)
- Combat Aviation Brigades (CAB*) (2/12) (assumes the CAB has 4 AVN BNs)
- Brigade Combat Teams (BCT) (0/3)
- Battlefield Surveillance Brigade (BfSB) (0/3)
- Special Operations Aviation Regiments (SOAR) (0/2)
- Armored Cavalry Regiments (ACRs) (0/3) (WMP will be updated to reflect the ACR no longer has AVN assigned)
- Special Forces Groups (SFGs) (2/4)
- Ranger Regiments (2/4)

c. METOC in the Army Tactical Structure

The US Air Force provides the bulk of weather support required by the Army. This includes direct support to Army garrisons provided by OWSs in accordance with AFI 15-128, Air and Space Weather Operations - Role and Responsibilities, and AFMAN 15-129, Air and Space Weather Operations - Processes and Procedures. Air Force Army weather support BWTs provide operational weather support to assigned Army operators during exercises, training, contingencies, and war. In addition to the weather services listed above, the Army has the organic capability to measure or observe some weather conditions. The following represents the most significant sources of weather data within the Army tactical structure: artillery meteorology (ARTYMET) sections, air traffic service (ATS) units, engineer units, ground reconnaissance and surveillance elements, imagery interpretation elements, brigade and battalion intelligence personnel, aviation squadrons/brigades, and T-UAV limited observations from take-off and landing sites.

Each Army element possesses a limited measuring capability designed to meet its own immediate needs. Consequently, their weather observing capabilities are supplemental to their primary mission. They should not be viewed as a replacement or substitute for USAF BWT support. USAF weather observation responsibility ends at the division Command Post (CP).

(1) Artillery Meteorological Sections

ARTYMET sections provide meteorological data for artillery firing units, including Target Acquisitions Systems. They also provide upper-air observations and artillery limited surface observations (ALSOs) to Air Force CWT.

ARTYMET: Each Fires Brigade and Brigade Combat Team (BCT) has an assigned ARTYMET team. Their mission involves providing meteorological data to the Field Artillery, which is used to increase cannon, rocket, and Target Acquisitions Systems accuracy, and to provide data to assist with munitions selection over the target area. The ARTYMET team transmits the meteorological data to AFATDS, which in turn passes the data through the AFATDS network to the unit requiring the data. In addition to its importance in ballistic calculations, knowledge of the vertical profile of the atmosphere is an invaluable forecasting tool for deployed CWTs.

ARTYMET sections are located where they can best provide meteorological (MET) coverage for the field artillery on the battlefield. The section is located within field manual (FM) radio communications range of AFATDS, the MET Section gateway for transmitting data. Local sounding data can be passed to the Integrated Meteorological System (IMETS)/ Distributed Common Ground System – Army (DCGS-A) via AFATDS for further release to the weather community as well. Considerations in selecting the position for a meteorological section are:

- Prevailing winds
- Location of artillery units
- Communications facilities and capabilities
- Administrative support
- Local security

ARTYMET sections are equipped to perform electronic and visual upper-air observations employing a balloon-sounding method, and are equipped with a surface sensor.

ARTYMET sections sound the atmosphere to heights of 98,424 feet (30,000 meters), day or night, and in all types of weather. A limiting factor is time required for a sounding balloon to reach a required height. Where high altitude soundings and several types of messages are required, ARTYMET sections are capable of sounding the atmosphere every 4 hours. An ARTYMET section in position is capable of producing a ballistic message for light artillery 30 minutes after releasing the balloon. The minimum time required to produce a maximum height fallout message is about 2 hours. If electronic equipment fails, sections have an alternate, but limited, method of measuring upper-air winds by observing pilot balloons (PIBALs). Upper-air densities and temperature are computed by using climatological tables with the current surface values of each element (assuming there is no low cloud cover).

The legacy ARTYMET system, the AN/TMQ-41 Meteorological Measuring Set (MMS) is an upper air meteorological system that uses a balloon borne radiosonde subsystem to take vertical profiles of the atmosphere.

The AN/TMQ-52 and AN/TMQ-52A Meteorological Measuring Set Profiler is a suite of MET sensors and associated processing equipment. The Profiler increases the range of meteorological coverage, and decreases the staleness of data from the MMS, while providing a new capability to provide MET over the target area. The Profiler receives real-time data from a balloon-borne sensor, a surface sensor, the Navy Operational Global Atmospheric Prediction System (NOGAPS) data, and regional observations in World Meteorological Organization (WMO) format, and inputs this information into the mesoscale atmospheric model (MM5) to produce the required battlefield MET. The Profiler replaces the AN/TMQ-41 Meteorological Measuring Set (MMS).

All ARTYMET sections are trained to produce:

- Ballistic meteorological messages
- Computer meteorological messages
- Fallout messages

- Upper-air data for transmission to automated weather network (AWN) / MIST
- Target acquisition meteorological messages
- Limited surface weather observations
- Target Area MET message (Profiler only)

(2) Air Traffic Service (ATS) Units

ATS units may have weather-observing instruments to measure surface pressure, temperature, and surface wind velocity. In addition, aircrews, flight operations personnel, and control tower operators visually estimate horizontal visibility and obstructions to visibility, as well as observe and report such special phenomena as lightning, thunderstorms, and tornadoes. Control tower operators assigned to ATS units are trained by Air Force weather personnel to take limited weather observations.

(3) Engineer Units

Engineer elements can measure surface pressure, temperature, humidity, and precipitation to determine the effects of weather on the terrain. The engineers can provide stream flow measurements and predictions of river stages and floods.

(4) Ground Reconnaissance and Surveillance Elements

Cavalry units provide the corps and division principal ground reconnaissance capability. Cavalry and maneuver battalions have organic ground reconnaissance capability that may be used to obtain information related to weather, terrain, and overall environmental conditions requested by the G2 or S2. In addition, long-range surveillance units (LRSUs) at division and corps may be required to take weather observations deep across the forward line of own troops based on specific weather requirements meeting the given situation.

(5) Imagery Interpretation Elements

These units can provide information on visibility, cloud cover, traffic-ability, and flooding.

(6) Armored Cavalry Intelligence Personnel

The Army G2 tasks armored cavalry regiment (ACR), brigade, battalion, and squadron intelligence officers to provide weather observations as part of the Forward Area Limited Observation Program (FALOP). The frequency of observations depends on the intelligence preparation of the battlefield (IPB) process, which identifies critical areas where adverse weather may have a major impact on Army weapons, personnel, and tactics. High priority must be placed on these messages to transmit them immediately to the SWO at the division main CP.

(7) Combat Aviation Brigades

Aircrews provide en route pilot reports via radio to ATS units and/or USAF BWTs; or, upon return from the flight, to the USAF BWT operating location for inclusion in their forecast products.

(8) Tactical Unmanned Aerial Vehicle (T-UAV)

T-UAV operators will provide limited observations back to the BWT via an automated observing sensor. T-UAV operators will not manually send observations back to BWT's. At the same time, BWT's will not be co-located with the T-UAV operators so a communication link needs to be established to send forecasts from the BWT and receive the limited observations from the T-UAV operators.

(9) SAF Battlefield Weather Teams (BWT) and Special Operations Weather Teams (SOWT)

The following represent the most significant sources of METOC data provided by USAF BWTs attached to Army organizations:

- Army Service Component Commands (ASCC)
- Corps
- Division
- Combat Aviation Brigades
- Armored Cavalry Regiments
- Ranger Regiment
- Special Forces Groups and Battalions
- Special Operations Aviation Regiment
- Transportation GP/BN (Group/Battalion)
- PSYOPS GP/BN

METOC data produced or collected by these units include surface weather observations, upper air observation produced by Army units, pilot reports, and mission execution forecasts.

Communications procedures: Since Army units are mobile, locations must be included as part of the METOC report; consequently, the Army requires these reports to be classified and transmitted over secure communications channels. Within the Army structure, secure METOC communications are passed from IMETS over MCS, MSE, or secure local area networks (LANs) within the battalion or brigade TOC) or CP. IMETS transmits to the JMO or OWS using SIPRNET through the MSE connection. IMETS also provides connectivity with Army C2 systems.

d. Army METOC Capabilities: Personnel and Equipment

(1) Army METOC Personnel

Army BWTs will typically be manned with personnel holding the Air Force Specialty Code (AFSC) 15W3 (O2-O3 with 2 to 10 years experience), 1W071 (E6-E8 forecaster with 6 to 20

years of experience, sometimes E-5), and 1W051 (E4-E5 forecasters with 3 to 10 years of experience).

Army personnel may provide METOC observations in the case of ARTYMET and FALOP, as described below.

ARTYMET sections, which do not include Air Force personnel, provide meteorological data for artillery firing units, including target acquisitions systems. They also provide upper-air observations and artillery limited surface observations (ALSOs) to Air Force CWT.

Army G2 (Intelligence) tasks ACR, brigade, battalion, and squadron intelligence officers to provide weather observations as part of the FALOP. FALOP observations can come from critical areas where adverse weather may have a major impact on Army weapons, personnel, and tactics.

(2) Army METOC Equipment and Hardware

The Army provides:

- Table of Organization and Equipment (TOE) equipment (including vehicles, radios, protective masks, and NVG's).
- Logistical items such as tents, field tables, cots, heaters etc.
- Distributed Ground Communication System-Army (DCGS-A)

The Air Force provides:

- All tactical meteorological (TACMET) sensing equipment.
- Individual Equipment and weapons (provided by Battlefield Airmen Initiative)

(3) Army METOC Software

Integrated Weather Effects Decision Aids (IWEDA): IWEDA uses observed and forecast weather data fields such as MM5 from AFWA or a nowcast application called Weather Running Estimate (WRE), a segment on IMETS. IWEDA applies operational rules to build graphic overlays of GO (green), MARGINAL (Amber), and NO-GO (Red) weather conditions based on the mission. In the event of a communications failure, the BWT can run its own very short-range (temporal) forecast to support IWEDA.

Target Acquisition Weather Software (TAWS) is the electro-optical decision aid software provided, TAWS applies physics-based rules to observed and forecast weather data sets to compute identification and lock-on ranges for electro-optic weapons. It can be used to exploit capabilities/limitations of friendly electro-optical weapons systems. Modules include target acquisition ranges for visual & IR systems, thermal crossover times, and target to background contrast information.

(4) METOC Communications and Computers

Currently, AFWA and the OWSs transmit weather data and some satellite imagery to the BWTs primarily over common user communications. BWTs can use MSE and MCS to move weather products to non-collocated operators, and other deployed BWTs.

Below are most of the METOC communications and computers used by BWTs:

- Army operations are primarily conducted on SIPRNET
- Army support units access and display weather data on SIPRNET and/or NIPRNET via webpages.
- GCCS-A (Army Global Command and Control System). Army components use GCCS or Command Post of the Future (CPOF) to display weather data.
- MSE. Army multi-channel communications network. Weather teams use it primarily for phone and fax communications. MCS. Sub-component of MSE for command and control. Terminal equipment and software used to connect with other elements of the MSE.
- TROJAN SPIRIT (Special Purpose Integrated Remote Intelligence Terminal). A high-mobility multipurpose wheeled vehicle (HMMWV) -based processing and dissemination system, which uses C-band and Ku-band Satellite Communications (SATCOM) connectivity for worldwide service to deployed and split-based operations. TROJAN SPIRIT provides all source dissemination capabilities as well as secure voice, fax, and data. TROJAN SPIRIT is an Intel system and access is usually very limited.
- Blue Force Tracker is another source to communicate directly with Aircrew (sending PIREPS, WWA, etc).
- BGAN is a commercial satellite based communications system for first-in and on the move communications used to pass and access weather data until the common user communications are in place.

e. Battlefield Weather Teams (BWT)

In line with the Army transformation, BWTs align with their Army warfighter's from the echelon above CORPS down to the Brigade Combat Team (BCT) level. BWTs normally operate in the warfighter's command post or tactical operations center (TOC) to provide surface observations and integrate weather effects into the warfighter's mission planning and execution process. The size of BWTs range from a 2/12 for a Combat Aviation Brigade down to a 0/3 for a BCT.

f. Army METOC Products

(1) Army METOC Centralized Products

Army METOC organizations produce no "centralized" products. They receive strategic weather products from AFWA, 14TH WS, or FNMOC.

(2) Army METOC Theater Products

METOC theater products are produced by the supporting OWS. METOC theater products typically include graphical products, such as horizontal weather depictions and military weather

advisories. These products are produced on a daily basis. Other special METOC theater products needed from an OWS must be pre-coordinated as part of the typical exercise or crisis planning functions.

(3) Army BWT Products

Army BWTs produce operator-oriented, mission execution forecasts and briefings used directly by their operator. These can include but are not limited to drop zone forecasts, aircrew briefings, METOC impacts to operations briefings, staff briefings, and wind/stability data used by the nuclear/biological/chemical unit to produce chemical downwind messages (CDMs).

g. Key Army METOC Organization Contact List

Key Army organizations that may form the core for Joint Task Forces:

XVIII Airborne Corps - 18th Weather Squadron, Pope AFB, NC
DSN 424-8605/8608 / comm (910) 394-8605/8608

III Corps - 3rd Weather Squadron, Ft Hood TX
DSN 738-1313/7397 / comm (254) 288-1313/7397

I Corps - 1st Weather Squadron, Ft Lewis WA
DSN 357-1420/3328 / comm (253) 967-1420/3328

U.S. Army Europe (USAREUR) - 7th Weather Squadron, Heidelberg GE
DSN (314) 370-8653/8579 / comm +49 6221 57 8583/8579

US Forces Korea/Eighth US Army - 607th Weather Squadron, Yongsan, ROK
DSN (315) 725-3517/7822 / comm 011-822-7915-3517/7822

Key Army staff METOC organizations:

Forces Command (FORSCOM)--2nd Weather Flight, Ft McPherson GA
DSN 367-5403/6023 / comm (404) 464-5403/6023
Army Weather Planner: DSN 367-5433

Training and Doctrine Command (TRADOC)--Ft Monroe VA.
DSN 680-2319 / comm (757) 788-2319

U.S Army Intelligence Center (USAIC)--Ft Huachuca AZ
DSN 879-6472/6493 / comm (520) 538-6472/6493

U.S. Army Combined Arms Center (CAC)--Ft Leavenworth KS
DSN 552-4056 / comm (913) 684-4056

3. USN METOC

This chapter describes U.S. Navy METOC organizational structure, command relationships, and support capabilities and requirements, including typical Navy METOC and communications equipment.

a. Background and Overview

The Naval Meteorology and Oceanography Command (NMOC) serves as the operational arm of the Naval Oceanography Program. Headquartered at the Stennis Space Center in Mississippi, Commander, NMOC (CNMOC) is a third echelon command reporting to Commander Fleet Forces Command (CFFC). CNMOC's claimancy is globally distributed, with assets located on larger ships (aircraft carriers, amphibious ships, command and control ships), shore facilities at fleet concentration areas, and larger production centers in the U.S.

CNMOC is focused on providing critical environmental knowledge to the warfighting disciplines of Anti-Submarine Warfare; Naval Special Warfare; Mine Warfare; Intelligence, Surveillance and Reconnaissance; and Fleet Operations (Strike and Expeditionary), as well as to the support areas of Maritime Operations, Aviation Operations, Navigation, Precise Time, and Astrometry. The Oceanographer of the Navy works closely with the staff of Commander Naval Meteorology and Oceanography (CNMOC) to ensure the proper resources are available to meet its mission, to act as a liaison between CNMOC and the Chief of Naval Operations, and to represent the Naval Oceanography Program in interagency and international forums.

b. Navy METOC Organization

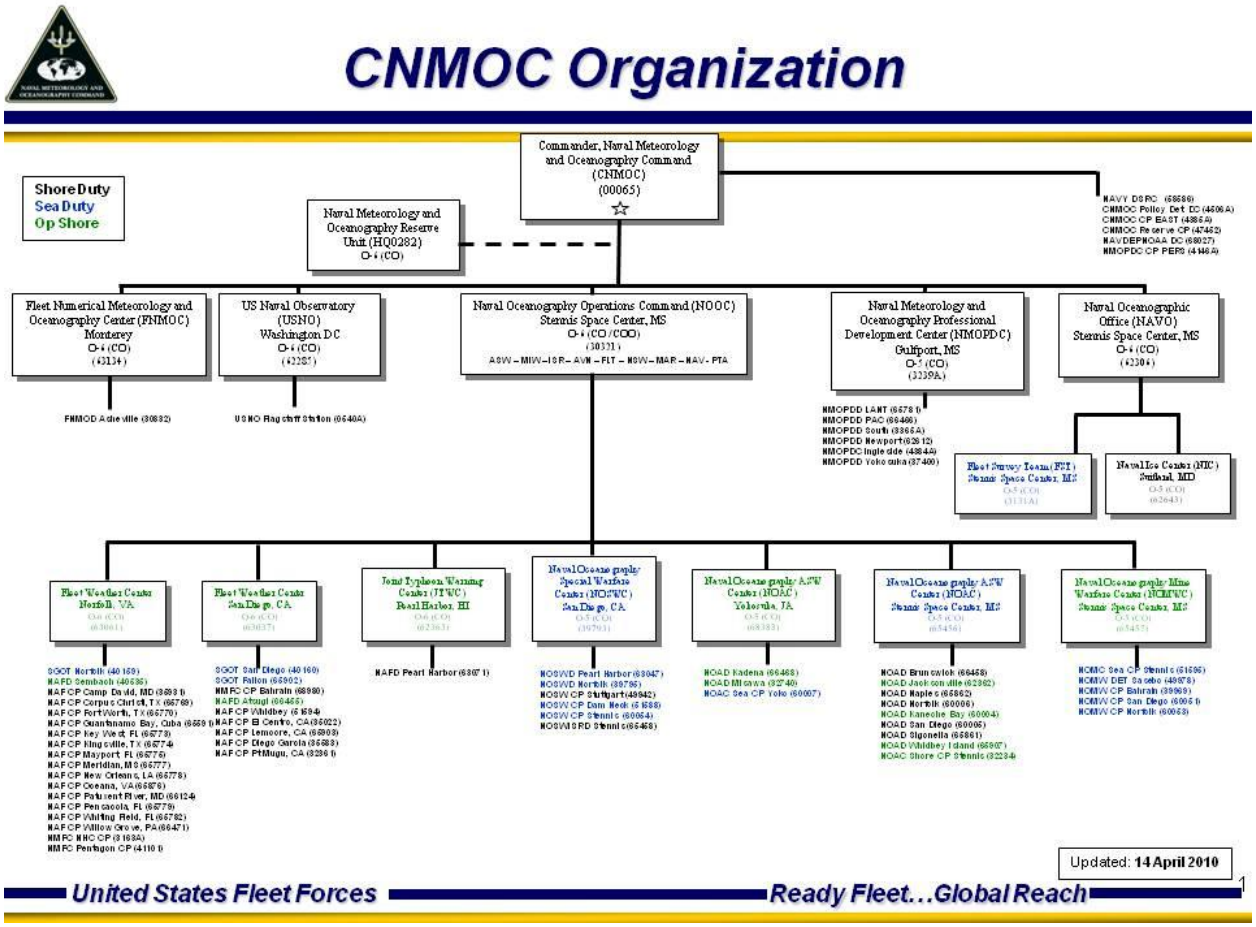

Figure 7: Navy METOC Organization

Figure Key:
NAF – Naval Air Facility
CP – Component
NMFC – Naval Maritime Forecast Center
NHC – National Hurricane Center
SGOT – Strike Group Oceanography Team
NAFD – Naval Aviation Forecast Detachment
COO – Chief of Oceanographic Operations
Fleet Numerical METOC Center (FNMOC)
NOSWD – Naval Oceanography Special Warfare Detachment
NOSWISRD – Naval Oceanography Special Warfare Intelligence, Surveillance & Reconnaissance Detachment
NOAD – Naval Oceanography ASW (Anti-submarine Warfare) Detachment
NOAT – Naval Oceanography ASW Team
Center for Naval Aviation Technical Training Unit (CNATTU)

(1) Navy METOC Organization for Operational Support

Navy METOC is organized to support forces afloat worldwide and their associated Navy air, surface, subsurface, special warfare, and amphibious forces. To do this, Navy forward deploys METOC personnel aboard large-deck aviation-capable units in teams designated as Strike Group Oceanography Teams (SGOTs) or part of organic (ship's company) Operations Aerology (OA) Division personnel. These ships include Nuclear Aircraft Carriers (CVN), Amphibious Assault Ships (LHA, LHD), and Command Ships (LCCs).

Reach-back support for numerical wind and sea modeling; tropical weather prediction/avoidance; Optimum Track Ship Routing; and tailored Anti-Submarine, Strike and Special Warfare products are provided by various shore-based production and forecast centers (Fleet Numerical METOC Center, the Naval Oceanographic Office, the Joint Typhoon Warning Center, and Navy Weather Centers). Navy METOC shore activities also provide support to various combatant commanders (CCDRs) as requested.

METOC personnel deployed on ships provide support to associated forces deployed or operating in company, and are capable of performing as a METOC staff for a JTF. The Navy also provides Mobile Environmental Teams (MET) to smaller Navy surface ships and in support of specialized independent operations and joint operations. These METs provide a full range of tactical support and are scaled (staffed) on a mission basis.

(a) Shipboard weather offices

Shipboard weather offices conduct:

- Operations Area Battle Group/Task Force (BG/TF) Forecasts
- Sea and surf conditions, current and forecast
- Local area severe weather warnings/advisories
- Continuous surface weather observation program
- Upper atmospheric soundings
- TAF for the ship's flight deck and the local area along track
- Climatological, astronomical, and tidal data
- PMSV on authorized radio frequencies
- Aviation weather briefs as required by OPNAVINST 3710.7
- Electro-Optic Tactical Decision Aids (EOTDAs) for mission planning and weapons system optimization
- Electro-magnetic effects products such as Integrated Refractive Effects Prediction System (IREPS) or Advanced Refractive Environmental Prediction System (AREPS) for mission planning and optimization of Electronic Warfare Support (ES), Electronic Attack (EA) and Electronic Protection (EP)
- Target area, en route, mission, and staff weather briefings
- Acoustic propagation and non-acoustic forecasts to support undersea warfare (USW)
- Tailored support to submarines included in or operating with the Strike group

Amphibious ships (or carriers when amphibious ship's weather office is not available) provide amphibious objective area forecasts that include flight weather, surf conditions, and refractive conditions for the littoral area where amphibious operations will be conducted

(b) OA Division/SGOT

Personnel:
- Division Officer (1 x O-3/O-4)
- Leading Chief (1 x E-7/E-8)
- Forecasters (2-3 x E-6)
- Enlisted Operators/Techs (7-10)

Equipment/software:
- Navy Integrated Tactical Environmental Subsystem (NITES)
- SMQ-11 satellite receiver
- UMQ-12: Mini Rawinsonde System (MRS)
- HF radio receivers
- Geophysics Fleet Mission Program Library (GFMPL) on desk top/lap top computer systems
- Most ships with a METOC Division use SIPRNET, e-mail, IRC chat and Joint METOC Viewer (JMV) for data acquisition

(c) Mobile Environmental Team

Afloat or ashore
- Officer and/or enlisted - typically 1-3 members
- METOC communications are limited at times (especially when embarked on ships), but they usually have NIPRNET/SIPRNET capability
- HF receiver (fax and/or RATT)
- 75 wpm AWN (receive only)
- AUTODIN (or Defense Messaging System (DMS), when available)
- Limited number of satellite receivers/INMARSAT sets
- Lap tops with GFMPL and JMV

(2) Navy METOC Shore-based Organizations

(a) Naval Oceanographic Office (NAVOCEANO, NAVO)

NAVO Organization
Navy-controlled, named organization assigned to the Commander, Naval Meteorology and Oceanography Command (CNMOC).

NAVO Mission
NAVO is the primary oceanographic production center for the Department of Defense. Operational support includes ocean forecasts, near real-time oceanographic products, safety of

navigation, and tailored ASW/USW/MIW analysis/guidance to operational forces deployed around the world.

NAVO Products and Services

- Analyzed imagery of littoral areas
- Analysis displayed as image overlay, graphic, or short text write-up
- Analysis information fused with oceanographic database
- Annotated imagery typically produced on 1:50000 or 1:25000 scale
- Image can be transmitted via JDISS, classified email, SIPRNET, FTP, or classified PC bulletin board system
- Full resolution file size 100-300 MB, although screen capture and compression techniques (with decrease in clarity) reduce size to 1 MB or less
- Environmental Support Packages (ESP)
- Describes nearshore oceanographic conditions by providing available, evaluated data on nearshore hydrography, tides, currents, marine life, water clarity, etc.
- Can complement annotated imagery, or be a stand-alone product
- Images analyzed to extract oceanographic parameters
- Images obtained from LANDSAT, USGS, aerial, SPOT, or National Technical Means (NTM)
- Special Support. Examples of WSC-CSB support includes:
- Detailed analysis of water density and currents at a specific location
- Analysis of the suitability of beach landing zones
- Summary of oceanographic conditions in support of new technology deployments
- Users should submit requests via defense message system (DMS) message and call POCs for product availability
- STOIC: NAVOCEANO can produce 3 ft by 4 ft product on high quality printer, a Special Tactical Oceanographic Information Chart (STOIC)
- 1:25000 scale 8 nm x 8 nm special purpose chart depicting nearshore hydrographic conditions with oceanographic data tailored for mine warfare, amphibious operations, or special operations (*e.g.*, tides, currents, bottom sediments) displayed along the chart border
- Produced for fleet operations, exercises or mission planning purposes
- Available hard copy or on the SIPRNET
- Land portion of chart may consist of an image, when appropriate
- Time series oceanographic and geophysical data correlated with seasons, tidal cycles, and atmospheric forcing
- Image is geo-rectified and latitude-longitude scale is applied
- Oceanographic information displayed on such charts includes:
- Any detected obstructions, reefs, or shoals
- Estimate of nearshore currents during ebb and flood tides
- Turbidity plumes
- Location of any sewage outfalls
- Typically expected sea surface temperatures
- Any available data on water clarity
- Hazardous biological marine life

NAVO Product Strengths and Limitations
Strengths:

- Oceanographic products based upon imagery significantly increases the warfighters' battlespace awareness
- Analysis of oceanographic features based upon remote sensing is frequently the only way to qualitatively or quantitatively describe specific near-shore oceanographic conditions for a beach or harbor
- Recent remote sensing data updates oceanographic surveys taken years or decades ago

Limitations:

- Much of METOC data directly derived from remote sensing is qualitative
- NRL and Navy tactical exploitation of national capabilities program (TENCAP) are engaged in quantitative analysis of such parameters; when quantitative analysis techniques are validated, they will be considered operational
- High resolution imagery equates to small areas
- LANDSAT and SPOT products typically cover an area no larger than 40 nm by 50 nm
- Images based on NTM imagery describe smaller areas
- STOIC chart normally describes an area 8 nm by 8 nm

NAVO Product Dissemination
NAVO products are available from a variety of means:

- Some image products are available from the NAVOCEANO SIPRNET homepage or can be downloaded
- Overnight mail (when time allows)
- Shipped via regional METOC center for further transfer (overseas/afloat units)
- Sent via JDISS, SOCRATES, classified PC-PC BBS, or automatic digital network (AUTODIN) (products requiring quicker transmission)
- NAVO will work with the customer and local METOC centers to determine best method

NAVO Request Procedures

Submit routine requests to the regional METOC centers by record message (preferred) or via telephone. Info NAVOCEANO Stennis Space Center MS//Customer Support//

Submit short fused requests to NAVOCEANO (info the appropriate regional METOC center)

Requests requiring higher levels of classification may be received via "backchannel" traffic

- Requests should contain the following information:
- Command requesting the product
- Name of exercise or operation
- Location of request (be as specific as possible; a latitude-longitude box is preferred)
- Forces being supported (*e.g.*, amphibious, SOF, mine, etc.). Include description of intended use of the product to ensure product is tailored to the specific operation
- Required date to receive product.
- Desired transmission method of product (*i.e.*, JDISS, mail, etc.).

- Name and telephone number for a POC.

NAVO Points of Contact
NAVO Battle Watch Captain: (228) 688-5200., DSN 828-5200
Unclassified Products Home Page: https://www.navo.navy.mil/ops.htm
Classified Products Home Page: www.navy.navy.smil.mil

(b) Fleet Numerical METOC Center (FLENUMMETOCCEN, FNMOC)

FNMOC Organization
Navy-controlled, named organization assigned to the Commander, Naval Meteorology and Oceanography Command.

FNMOC Mission
FNMOC performs as an operational reachback center for forward deployed forces. Fleet Numerical Meteorology and Oceanography Center (FNMOC) produces the Department of Defense automated numerical meteorological and oceanographic guidance, manned 24 hours/day.

FNMOC Products and Services
FNMOC and the National Center for Environmental Prediction (NCEP) are the only global production centers (*i.e.*, run models to produce global METOC forecasts) in the U.S. and act as mutual backup. As well as running the Navy's own suite of models, FNMOC also provides selected NCEP products along with those produced by two other global production centers; the European Center (ECMWF) and the Japanese Center (JMA). FNMOC has a suite of "state of the art" oceanographic and meteorological models. Products are in the form of satellite images, satellite derived data (special sensor microwave imager or SSMI), and numerical fields, which users can display using JMV, or as input into GFMPL or joint maritime command information system (JMCIS) to run tactical decision aids (TDAs). A standard list of products is updated twice daily with special high resolution products and Data Request Products (DRPs) available on request.

Navy Operational Global Atmospheric Prediction System (**NOGAPS**) 4.0 utilizes 239 spectral waves (56 km resolution) in the horizontal and 30 vertical atmospheric levels in sigma coordinates. Forecasts are run 4 times daily out to 6-days in the future. NOGAPS uses:

- The Navy Atmospheric Variational Data Assimilation System (NAVDAS) assimilates satellite-derived measurements, raw satellite radiances, and myriad conventional observations (both classified and unclassified) to produce a global or regional analysis field as input to FNMOC forecast models.
- Multi-Variate Optimal Interpolation (MVOI) assimilates observations, model forecasts, and climatology to produce stratospheric global and regional analyses fields.
- Cressman (moisture) analysis of dew point depression including synthetic moisture soundings consistent with SSM/I precipitable water samples.
- Improved, Emanuel cumulus parameterization scheme.

Coupled Ocean / Atmosphere Mesoscale Prediction System (**COAMPS**) is a globally re-locatable mesoscale numerical weather prediction model:

- Incorporates non-hydrostatic physics, explicit moisture and MVOI data assimilation
- Supports nested grids with resolutions decreasing by order of 3, typically 54/18/6km
- Provides for a fully interactive two-way coupling between the ocean and atmosphere
- Arakawa C-grid, vertically and horizontally staggered with split explicit time integration
- Explicit moist physics for horizontal grid resolutions less than 9 km.
- Silhouette topography from 1 km U.S. Geological Survey (USGS) Global Land One-kilometer Base Elevation (GLOBE)
- NOGAPS data used for the boundary conditions

Wavewatch III (**WW3**)

- Replaced legacy Wave Model, WAM
- Based on wind stresses from either NOGAPS or COAMPS
- Produces wave forecasts out to 144 hours for the following parameters: Peak wave direction and period, secondary wave direction and period, significant wave height, white cap coverage, sea and swell direction, period and height
- Run on a global 0.5 degree spherical grid with 15 degree angular resolution for directional spectra, using a 20 minute propagation and source term time step

Thermodynamic Ocean Prediction System (**TOPS** 4.0)

- Predicts response of upper thermal structure of ocean to local atmospheric forcing and provides surface currents for Search and Rescue applications (WEBSAR).
- Synoptic mixed-layer model consisting of conservation equations for temperature, salinity, and momentum in the upper ocean
- Forced by heat flux and wind stress predicted by NOGAPS
- Includes horizontal advection of temperature and salinity due to wind drift and geostrophic components of the current

Navy Coupled Ocean Data Assimilation (**NCODA** 1.0):

- Produces SSTs on a global basis and a surface to bottom analysis of temperature and salinity in two western boundary current regions
- Optimum interpolation data assimilation scheme which incorporates real-time observational data and makes use of bogus front and eddy features provided by NAVOCEANO
- Computes SST, ice concentration, and 3-D temperature and salinity analyses
- Resolution: T239 Gaussian grid (~ ½° grid; ¼° grid provided to AFWA), 34 layers from surface to 5000 meters below sea level
- 3-D analyses (Global, WATL, and WPAC) used by Thermal Ocean Prediction System (TOPS) to produce currents for webSAR application
- Noted improvements in representation of warm and cold eddies and front and eddy interaction events
- Grid mesh of 0.2 deg. latitude by 0.2 deg. longitude

- In Atlantic, western boundary region includes entire coastal and littoral environments with bogus routine providing the Florida Loop Current, Gulf Stream, North Atlantic Current, and the Shelf-Slope frontal system
- In Pacific, model includes Sea of Okhotsk and area east of Kamchatka, with bogus providing Kuroshio, Oyashio, Soya, Kuril, and east Kamchatka Currents

Aerosol Modeling
- Global: Navy Atmospheric Aerosol Prediction System (NAAPS) and Regional: Coupled Oceanographic Atmospheric Meso-scale Prediction System (COAMPS) aerosol model.
- Outputs include aerosol, dust, smoke, and sulfate concentrations plus electro-optical atmospheric properties for use by TDAs such as TAWS and JMV.
- Models run twice daily at one degree resolution (global) and 18 km (regional).
- Useful for event forecasts, visibility, lock-in range and cloud screening for SSTs.

CAAPS (Centralized Atmospheric Analysis and Prediction System (**CAAPS**):
- Provides the COAMPS model to customers as a reach-back service over the web
- COAMPS-OS application software runs on an IBM Linux cluster at FNMOC
- Uses Java-based, web-enabled GUI to configure the location, resolution, dimensions, and duration of a COAMPS forecast
- COAMPS projects can be set up and run on the system within 30 minutes
- Available on NIPRnet, SIPRNet, and joint worldwide intellengence communication system (JWICS) networks
- Provides graphical visualization products to include meteograms and forecast soundings and GRIB encoded files on a web server
- Web GUIs allow customers to download project gridded forecast data formatted for input to the AREPS, HPAC, and VLSTrack applications
- Can also run the VLSTrack dispersion model for a location in a project area
- Stores project grids in a TEDS database accessible for download using Metcast client
- Provides an automated forecast verification to summarize project performance and skill

Special FNMOC Products
Special high resolution forecast fields can be produced on request.

Tailored Data FNMOC Products
Ballistic Wind and Density (**BALW**) - The BALW product is designed to support Naval and artillery gunfire operations. Navy messages provide surface-to-surface predictions for 5"/76mm projectiles in U.S. Navy standard or North Atlantic Treaty Organization (NATO) Ballistic message formats. Artillery messages provide surface-to-air (Type 2) or surface-to-surface (Type 3) predictions in Computer Met or in Ballistic Met for the 155mm Howitzer or the 81mm Mortar. Artillery messages can be generated in tactical fire or standard met formats. The Variable Message Formats (either Package 11 or Reissue 3+) are suitable for ingest into the Advanced Field Artillery Tactical Data System (AFATDS). The product provides wind (direction and speed), temperature and air density for up to 26 altitude zones. The product is derived from the NOGAPS or COAMPS atmospheric analysis and forecast data fields or from a radiosonde sounding.

Bathythermograph Data Extract (**BTXT**) - The Bathythermograph Data Extract (BTXT) provides bathy observations extracted from FLENUMMETOCCEN synoptic data bases. This product is an alphanumeric product which is a listing of bathythermograph (BT) observations in standard World Meteorological Organization (WMO) JJVV or JJYY formats. This request is a more concise way to request a spot data product for Bathys

Field Extract (**FEXT**) - The Field Data Extract product provides environmental data extracted from FLENUMMETOCCEN data grids for selected geographic areas as a text message.

Mobile Met-Oc Support (**MMOS**) - Mobile Meteorology and Oceangraphy Support product (MMOS) provides environmental products to DOD units via standard telecommunication and circuits. Processing and display takes place on PC hardware using the Joint Metoc Viewer (JMV).

Ocean/Met Grid Data Extract (**OMDAT**) - The Grid Data Extract product provides environmental data extracted from FLENUMMETOCCEN data grids for selected geographic areas as an ocean-met data alphanumeric OTH-T message (OMDAT).

Point Data Extract (**PNTDT**) - Shuttle support - The Point Data product provides selected environmental data extracted from FNMOC data grids at selected point positions. Special wind, wind shear, and wind difference profiles may be included in this alphanumeric message.

Refractive Information - The Refractive Information by Station (**RIBS**) product provides decoded upper air data from selected upper air reporting stations or from all stations within a geographic area defined by a circle or rectangular region. The information is provided in a tabular alphanumeric format.

Search and Rescue (**SAR**) - SAR is a search and rescue (SAR) planning support product that provides a summary of the SAR situation, target location maps, search recommendations, and a summary of environmental conditions at the requested times. Probability maps are produced using Monte Carlo simulation. In addition, initial target uncertainty, drift due to wind and current, and unsuccessful search parameters are accounted for while generating the target locations, maps and search recommendations.

Spot Output (**SPOUT**) - The spot output product provides conventional and satellite observations in an easy-to-read alphanumeric format or in WMO Bufr format. Up to 72 hours prior to the current date-time-group may be extracted.

Sound Focusing (**SNDFO**) - The sound focusing product provides atmospheric sound focusing (for bomb blasts and sonic bombs) at selected altitudes and bearing using character to represent loss magnitude.

FNMOC Product Dissemination

Joint METOC Viewer available on SIPRNET / NIPRNET.
A selection of products is available via JDISS, SIPRNET, and NIPRNET.

FNMOC Request Procedures

Standard product requests:
- Products available via the FNMOC NIPRNET, SIPRNET, and JWICS websites
- Model data and products are available via METCAST on the SIPRNET/NIPRNET
- Mobile Meteorology and Oceanography Support (MMOS) products available from FNMOC via DMS or email

Special FNMOC product requests:
- Special areas can be produced within 7-10 days
- Early liaison essential to meet customer needs
- Send request via letter or message to FNMOC (ATTN: OPS Officer)
- Send short notice requests to Command Duty Officer via telephone (DSN 878-4325, COMM 831-656-4325) or e-mail (cdo@fnmoc.navy.smil/mil)

Tailored FNMOC product requests
Tailored Data products should be requested by DMS message, email, or telephone to FNMOC.

FNMOC Points of Contact
Products on SIPRNET, NIPRNET, JWICS
DSN 878-4219
SIPRNET homepage: http://www.fnmoc.smil.mil
Unclass email: cdo@fnmoc.navy.mil
NIPRNET Home Page: http://www.fnmoc.navy.mil
JWICS Home Page: http://www.fnmoc.ic.gov

(c) U.S. Naval Observatory (USNO)

USNO Organization

Navy-controlled organization assigned to the Commander, Naval Meteorology and Oceanography Command

USNO Mission

The USNO mission is to determine the positions and motions of celestial bodies, motions of the Earth, and precise time; to provide astronomical and timing data required by the Navy and all other components of the Department of Defense for navigation, precise positioning, space operations, and command, control, communications, computers, intelligence, surveillance, and reconnaissance (C4ISR); to make these data available to other government agencies and to the general public; to conduct relevant research; and perform such other functions as may be directed by higher authority.

USNO Products and Services

USNO provides a wide range of practical astronomical data and timing products. The products are available as hardcopy publications, stand-alone computer applications, and data services accessible via the Internet and other sources. Additionally, USNO is responsible for establishing, maintaining, and coordinating the astronomical reference frame(s) for celestial navigation and orientation of space systems. USNO is responsible for Precise Time and Time Interval (PTTI) for all DoD services, agencies, contractors, and related scientific laboratories, and for coordinating DoD timing capabilities, analysis, evaluation, and monitoring of R&D and operational PTTI systems. USNO is responsible for Earth orientation parameters (EOP) predictions for all DoD services, agencies, and contractors, as well as the international community, and is the only organization making EOP predictions operationally.

USNO Standard Products

Practical astronomical data for operational applications:

STELLA (system to estimate latitude and longitude astronomically): stand-alone PC software available directly from USNO; provides basic almanac data for navigational bodies, full sight planning and reduction, times of twilight, sunrise, sunset, moonrise, and moonset for fixed sites or vessel underway, and moon illumination.

Nautical Almanac: annual hardcopy publication distributed by the Defense Supply Center Richmond (DSCR) that provides basic almanac data for use in marine navigation and other applications

Air Almanac: annual hardcopy publication distributed by Defense Supply Center Richomnd (DSCR) provides basic almanac data for use in air navigation and other applications

Data services and astronomical information available on the USNO Astronomical Applications website, http://aa.usno.navy.mil/AA/

SLAC (solar lunar almanac core): source-code product that is the de facto DoD standard source for Sun and Moon positions and illumination information. Widely used in DoD tactical decision aids, missions schedulers, and simulators, including the solar lunar almanac program (SLAP).

Information on astronomical standards, star catalogs, and astronomical reference frames available at the Astrometry Department website, http://aa.usno.navy.mil/ad/

Precise time--dissemination of USNO Master Clock time (DoD's time reference)

Two-Way Satellite Time Transfer (TWSTT): USNO time can be transferred to specially equipped, high end users via geostationary communications satellites to an accuracy of 1 nanosecond

Global Positioning System: USNO time can be acquired from GPS satellites. Precise Positioning Service (PPS) GPS timing receivers can receive time to an accuracy of about 30 nanoseconds and Standard Positioning Service (SPS) GPS timing receivers can receive time to

an accuracy of about 200 nanoseconds, provided the receivers have been calibrated and certified at USNO.

Network Time Protocol (NTP): USNO is the sole provider of NTP for DoD. Network time can be acquired via the NIPRNET and SIPRNET to an accuracy of about 10 milliseconds

Time via telephone modem: USNO time can be acquired via telephone modem to an accuracy of about 1/100 of a second

Telephone time voice announcer: USNO time can be acquired via telephone time announcer to an accuracy of about 1/10 of a second

USNO Master Clock time data and personnel contact information is available on the Time Service website, http://tycho.usno.navy.mil

Earth orientation – Ties the celestial reference frame to the terrestrial reference frame for precise positioning, navigation, targeting, and C4ISR.
International Earth Rotation Service (IERS) Bulletin A: reports of the latest determinations and predictions for polar motion, UT1-UTC, and nutation offsets at daily intervals are distributed weekly by email; subscription form is available at http://maia.usno.navy.mil/
Earth orientation files: updated daily and available by anonymous ftp; full descriptions available at http://maia.usno.navy.mil

Leap seconds: announcements made in international earth rotation service (IERS) Bulletin C, available at http://maia.usno.navy.mil

DUT1: these course values for (UT1-UTC) are transmitted with timing signals and announced in IERS Bulletin D, available at http://maia.usno.navy.mil

EOP data are provided to the GPS Master Control Station via NGA.
Information on Earth orientation parameter data, predictions, and conventions and standards is available at the Earth Orientation Department website, http://maia.usno.navy.mil

USNO Point of contact
Scientific Director
Address:

US Naval Observatory
3450 Massachusetts Ave., NW
Washington DC 20392-5420

DSN: 762-1513
Secure: DSN 762-1513
Facsimile: DSN 762-1461
PLA: NAVOBSY WASHINGTON DC//SD//
Email: johnston.kenneth@usno.navy.mil

c. Navy METOC Capabilities: Personnel and Equipment

(1) Navy METOC Personnel Information

There is no Navy enlisted classification code (NEC) assigned to weather observers; however, all Aerographer's (abbreviated AG) attend AG-A School (observer). Navy Quartermasters, enlisted navigation specialists, are required to attend annual METOC refresher training provided by Aerographers and they provide the ship-based observations in the absence of AGs.

The NEC of 7412 indicates a graduate of Aerographer's C School (forecaster). NEC 7412 is required for advancement of an Aerographers Mate (AG) to Chief; therefore, all E-7s and above have been to forecasting school.

The Navy uses a four-digit Designation number to indicate officer specialty paths. The Navy METOC Officer designator is 1800 for line officers and 6460 for Limited Duty Officers (LDOs). Typically, 1800-designated O-3s and senior have attended Naval Postgraduate School and hold a Master of Science degree in Meteorology and Physical Oceanography or Geospatial Information Services (GIS). LDOs were enlisted Aerographers, a minimum of E-6, before attaining their commission. LDOs are designated 6462 from their selection through promotion to O-3 (typically four years), when they change to 6460. Officer designators of all types ending in 5 are reservists.

Additionally, all Navy O4-and-senior billets have a sub-specialty code of 6401P which signifies graduate level education in Physical Oceanography and Meteorology, or 6401D which signifies PhD-level education. This is a 2+ year course of study at the Naval Postgraduate School and is normally accomplished at the 6-9yr point in a career. JMDs that include Navy-specific SMOs or JMOs will normally be for an 1800 designator with 6401P subspecialty.

(2) Navy Reserve METOC Personnel

Navy METOC reservists include commissioned officers designated as 1805 (Restricted Line), LDOs designated as 6465, and Aerographer's Mates. Management of Navy Reserve METOC Officers formerly fall under the cognizance of NAVRESFOR.

The Naval Meteorology and Oceanography Command manages the NAVRESFOR METOC personnel. Those officers and enlisted selected reservists (SELRES) drill in 8 Naval METOC Reserve Activities (NMORAs) that provide contributory support to gaining commands within the Naval Meteorology and Oceanography Command. A typical NMORA consists of 3 -5 officers and 20 -25 enlisted members.

The NAVRESFOR METOC personnel assigned to surface fleet units are typically assigned to staffs and other units that the Navy Reserves manages. They are not managed by the Naval Meteorology and Oceanography Command and requests for any personnel assigned in one of those units should go to the appropriate Navy Operational Support Center (NOSC).

Qualified observers and forecasters can augment shipboard personnel during underway (deployed) periods, or serve at a Joint METOC Coordination Center (JMCC) during a joint exercise or operation. To inquire about qualified augmentees for a specific exercise, the Senior METOC Officer can contact CNMOC (Code N434) at:

Commander, Naval Meteorology and Oceanography Command
Attn: Code N434
1020 Balch Blvd.
Stennis Space Center, MS 39529-5005
DSN 485-4531

Information on the Navy Reserve is available at http://navyreserve.navy.mil.

(3) NAVY METOC Hardware

AUTODIN/Defense Messaging System (DMS)
The Navy relies quite heavily on AUTODIN/Defense Messaging System (DMS) communications.

HF radio receivers
HF radio receivers for fax and/or Radio Teletype (RATT) installed in ships.

MOSS
MOSS (Mobile Oceanographic Support System) and the Interim MOSS (IMOSS), installed on desktop/laptop computers, are used by Mobile Environmental Teams when deployed at sea and ashore. Generally includes communications software to connect to INTERNET/SIPRNET. Also contains GFMPL and EOTDA software.

MRS
UMQ-12: Mini Rawinsonde System (MRS) is installed in Operations Aerology (OA) Division staffed ships.

NITES
Navy Integrated Tactical Environmental Subsystem (NITES) is a UNIX workstation based system that is connected to SIPRNET via ship's router and super high frequency (SHF) satellite communications. NITES provides a modular, interactive METOC analysis and forecasting system to receive, process, display, and disseminate METOC data.

NITES is installed at primary afloat sites, including 30 capital ships which have an OA division embarked. Receives and processes onboard METOC sensor data (winds, temps, vis, etc.), AWN/MIST data, and AN/SMQ-11 imagery including DMSP, geostationary satellite, and POES data. Details on the software suite in NITES are contained in the user manual.

NITES is also installed at some Navy METOC shore commands to provide the link to move METOC information from NITES to the Global Command and Control System - Maritime

(GCCS-M) system. NITES is connected via a gateway to the ship's tactical local area network (LAN) and via ship's communications to the SHF tactical IP network for SIPRNET connectivity.

SMQ-11 satellite receiver
SMQ-11 satellite receiver

XBT
Expendable Bathythermograph Recorder (XBT) installed in ships and carried by METs.

(4) NAVY METOC Software

GFMPL
Unclassified Geophysical Fleet Mission Program Library (GFMPL) and Secret GFMPL (SFMPL)

HF Prophet
HF Prophet

IREPS/AREPS
IREPS/AREPS (Advanced Refractive Environmental Prediction System)

Joint METOC Viewer (JMV)
Joint METOC Viewer downloads "thumbnails" that include gridded METOC data fields, permitting the user to view data fields of choice

TAWS
Electro-optical decision aid software - Target Acquisition Weather Software (TAWS)

(5) Navy METOC Information Systems

(a) Global Command and Control System - Maritime (GCCS-M) and the Joint Maritime Communications System (JMCOMS).

The Navy, through architectural initiatives such as the joint maritime command information system (JMCIS) and joint maritime communications system (JMCOMS), is standardizing its C4I applications and services within the defense information infrastructure (DII) Common Operating Environment (COE). JMCIS is the maritime command and control (C2) program that supports U.S. Navy and Coast Guard operational units. JMCOMS supports the transfer of C2 information in a manner transparent to the user. The Navy has identified seven information functional categories that encompass a number of operational needs: (1) plan operations, (2) manage readiness, (3) manage the battlespace, (4) fuse intelligence/sensor information, (5) correlate information, (6) command forces, and (7) support C4I system operations. In order to satisfy these functional needs the Navy has established a number of system requirements for JMCOMS. Although not listed here, these requirements are allocated to the various applications within DII, COE and communications. GCCS-M uses plug-and-play software to define functionality and to

provide access to common services. Plug-and-play components enable the user, according to his/her privileges, to access the following:

- Briefing Support
- Communications interface
- Core Systems Services
- Cryptologic Support
- Employment scheduling
- Imagery
- Joint Intelligence
- LAN/WAN
- Logistics Support
- Messaging
- METOC
- NATO Support
- Remote Access
- Status of Forces
- Systems/Resource Mngmt Utilities/Tools
- Tactical/Track Management
- Training
- Undersea Warfare Systems
- USMC Support
- Warfare Applications

The Navy has transitioned to the Global Command and Control System – Maritime. The GCCS-M software has a METOC segment known as NITES II. The NITES II METOC segment enables the GCCS-M user to ingest gridded field, observational, and imagery data. Gridded fields (available via joint METOC viewer (JMV) 3.0 and FLENUMMETOCCEN) are displayed as contours (standard and color filled) and wind barbs. A threshold feature enables GCCS-M users to view areas of potential hazards (high winds and seas), plus imagery and METOC status boards (stop light displays). The user can display bathythermograph, radiosonde, and surface observations, as well as atmospheric refractivity and acoustic conditions.

(b) TBMCS/JDISS

Command ships and selected aircraft carriers are capable of supporting the commander joint task force (CJTF) and functional component commanders. These ships routinely host the Theater Battle Management Core System (TBMCS). Existing GCCS workstations can easily be configured for joint staffs by installing additional segments for joint planning. These ships also host the Joint Deployable Intelligence Support System (JDISS).

(c) Satellite Communications Systems

Naval forces located at sustaining bases and command centers ashore, use the DII Defense Information System Network (DISN) for information push and pull. The DISN provides a seamless web of high capacity communications networks, computer databases, applications, and

other information processing and transport. Naval forces not at sustaining bases and command centers transfer information via the Copernicus Architecture pillars known as Tactical Data Information Exchange System (TADIXS) and Battlecube Information Exchange System (BCIXS). The TADIXS and BCIXS rely upon RF media. This requires the efficient utilization and networking of communications resources at all available frequency bands (*i.e.*, ELF, VLF/LF, HF/VHF, UHF, HF, EHF). Commercial SATCOM systems used by the Navy include the GTE SpaceNet, International Maritime Satellite System (INMARSAT), and Challenge Athena.

Table 1: Military SATCOM Attributes

Attribute	**UHF**	**SHF**	**EHF**
Service	Ship-to-Shore Shore-to-Ship Ship-to-Ship	Ship-to-Shore Shore-to-Shore Shore-to-Ship	Ship-to-Shore Ship-to-Ship Shore-to-Ship
Probability of Intercept	High	Low	Low
Threat Protection	None	Limited Anti-Jam (AJ)	High AJ and Scintillation Protection
Missions	Tactical	Tactical/Strategic	Tactical/Strategic
Platforms Connectivity	Surface Ships, Submarines, Airborne Terminals	Major Combatants and Selected Surface Ships, Airborne Terminals	Major Combatants and Selected Surface Ships, Submarines, and Airborne Terminals
Frequency Band	0.3 to 3.0 GHz	3 to 30 GHz	30 to 300 GHZ
Interoperability	Joint/Allied/Non-DOD	Joint/Allied	Joint
Operations Supported	Netted (multi-user), Half-duplex Services, Broadcast	Netted, Point-to-Point, Full-duplex, Broadcast	Netted, Point-to-Point, Half-duplex, Full-duplex, Broadcast
EMP Hardened	No	Selected Terminals	Yes
Polar Coverage	5 kHz chnls only	None	Potential/Not implemented
Ongoing Performance Upgrade	DAMA, Auto-DAMA, Quad-DAMA	DAMA Mode, Broadcast, Mode, Improved AJ	MDR Mode (increase from 2.4 to 1544 Kbps planned)

d. Navy METOC Operations / Employment

The following represent the most significant sources of METOC data within the Navy tactical structure: Strike Force Surface Ships, Carrier Air Wing, Maritime Patrol Aircraft, and Submarines. METOC observations taken by these units consist of surface weather, upper air, PIREPs, and bathythermograph data.

(1) Strike Force Surface Ships

All Strike Force/Group surface combatants (aircraft carriers, cruisers, destroyers, frigates, amphibious, mine warfare, and logistics support ships) provide METOC surface weather observations every six hours while at sea. These reports are submitted on the synoptic hours of 0000Z, 0600Z, 1200Z, and 1800Z. If visibility is less than 1 NM, winds exceed 35 knots, or the seas exceed 12 feet, the reporting rate increases to every three hours until the condition(s) improve. All ships at sea are required to take regular observations, but when ships are steaming in company or in close proximity the Officer in Tactical Command (OTC) may designate one ship to report for the group.

All anti-submarine warfare (ASW) ships (cruisers, destroyers, and frigates) collect bathythermograph (BT) data by dropping an expendable temperature sensor into the sea. The collection rate of BT data is driven by operational requirements.

Upper-air observations are regularly collected by those Navy vessels with a permanently assigned METOC division (OA Division) or embarked Mobile Environmental Team (MET). Upper-air observations are taken at the synoptic times of 0000Z and 1200Z, as operations permit.

(2) Carrier Air Wing

Aircrews provide meteorological observations, PIREPs, as specified by their mission, or when required in areas of sparse data (*e.g.*, oceanic, target weather). PIREPs are submitted via radio or upon return from the flight to the carrier weather office (or shore-based weather office, if the aircraft recover ashore).

(3) Maritime Patrol Aircraft

Aircrews provide meteorological observations as specified by their mission, or when required in areas of sparse data (*e.g.*, oceanic). Aircraft observations are transmitted when radio contact is made, or are delivered, along with observations of unexpected en route weather, to the NAVMETOCCOM activity at the air station at which the aircraft lands. Sonobuoy-equipped aircraft take airborne expendable bathythermograph (AXBT) observations in open ocean areas where depths exceed 100 fathoms. A minimum of one BT observation is taken during each ASW flight, which uses sonobuoys. Collected data is submitted to the NAVMETOC activity at the air station at which the aircraft lands.

(4) Unmanned Aerial Vehicles (UAVs) and Unmanned Underwater Vehicles (UUVs)

UAVs and UUVs are an increasingly important source of weather and oceanographic information in the battlespace near strategic and tactical locations. METOC data are made available via the C2 systems used for piloting and reconnaissance imagery.

(5) Submarines

Submarines are exempted from these requirements only when operational requirements preclude the taking of observations. They are capable of collecting surface weather and bathythermograph observations and can be tasked with this mission.

(6) Aegis cruisers

Selected Aegis cruisers will have a new capability, tactical environmental processor (TEP), in which the phased array radar on an Aegis cruiser acts as a weather sensor. Among the capabilities are refractivity profiling and acting as doppler weather radar.

e. METOC Data Communication Procedures

Navy METOC data are classified at the same level as the platform mission (often to protect operating location). METOC observations collected by the Navy are forwarded to the Naval Oceanography Forecast Center in Norfolk, VA; the Naval Pacific METOC Center in Pearl Harbor, HI; Fleet Numerical METOC Center in Monterey CA; the Naval Oceanographic Office at the Stennis Space Center, MS; and the Air Force Weather Agency, Offutt AFB NE for use in their forecast models and for further distribution to all Navy fleet units requiring observation data.

Other Sources of METOC Data:

- Fleet Multichannel Broadcast - (channel 8/15) 300 bits per second (bps) AWN / meteorological information standard terminal (MIST) data broadcast tailored by the Theater METOC Center for their AOR
- HF Facsimile broadcast – The USN no longer broadcasts, but many foreign countries still do.
- SEALS – SEALS can provide surf observations, beach survey data
- Drifting buoys - automated weather observations, ocean temps at surface and at depths, sea height and period
- Deployed Mobile Environmental Teams with MRS
- PIREPs
- Special Weather Intelligence (SWI)
- Internet activities. Both government and commercial activities (e.g., National Weather Service or Weather Channel)

f. Key Naval METOC Centers and Facilities Contact List

Navy METOC production centers, working through the various Directors of Oceanographic Operations can provide some or all of the following products:

- Prog blends - charts and messages/bulletins that merge the various models to determine the best regional forecast
- Sea height analysis and forecasts - sea height analysis based on ship observations and buoy information; high sea forecast areas are derived from projected tracks of low pressure systems, tropical systems, and/or significant wind gradients
- OPAREA forecasts - forecasts for designated fleet operating areas, including synoptic weather and 24-hour forecasts
- WEAX - enroute forecasts to ships operating at sea

- OTSR (Optimum Track Ship Routing) - keeps ships out of destructive weather that would adversely impact their operations
- Tropical weather forecasting
- Satellite imagery
- Oceanographic analysis and support
- JOAFs or point forecasts until the JTF HQ METOC cell is established.
- Mobile Environmental Team (MET) deployment
- Quality control and overview of Navy afloat or joint operations area forecast (JOAF) forecasts
- GCCS data - NITES can provide METOC overlays to include various warnings such as high wind and sea, tropical, special weather advisories, Gulf Stream and ice edge data for specific areas of interest (*e.g.*, Joint Operational Area)

The Naval Enterprise Portals for Oceanography are:

NIPR PKI: https://nepoc.oceanography.navy.mil

SIPR: http://nop.oceanography.navy.smil.mil

NIPR Public Facing: http://www.usno.navy.mil/

Commander, Naval METOC Center (CNMOC) Watch Officer -Stennis Space Center MS
e-mail: coow.fct@navy.mil / coow_sipr.fct@navy.mil.mil
DSN: 828-4019 / comm. (228) 688-4019 or (228) 342-1449

Naval Oceanographic Office (NAVO)—Stennis Space Center MS
DSN 828-4357 / comm. (228) 688-4357

Fleet Numerical METOC Center (FNMOC), Monterey CA
e-mail: fnmoc.cdo@navy.mil
DSN 878-4302/4325 / comm. (831) 656-4302/4325

Commander, Oceanographic Operations, Stennis Space Center, MS
DSN 828-5003 / comm. (228) 688-5003

Fleet Weather Center, Norfolk
e-mail: cdo.fltwxcen.norfolk.fct@navy.mil
DSN: 564-7583 / comm. (757) 444-7583

Fleet Weather Center, San Diego
Coming soon

Joint Typhoon Warning Center (JTWC), Pearl Harbor HI
e-mail: tdo.nmfc_jtwc@navy.mil
DSN (315) 474-2320 / comm. (808)474-2320

4. USMC METOC

This chapter describes U.S. Marine Corps (USMC) organizational structure, command relationships, capabilities, equipment, and support requirements.

a. Overview

The Marine Corps METOC Support System is flexible, scalable, and designed to readily deploy and operate in an austere expeditionary environment. The primary objective of the Marine Corps METOC Support Systems is to provide accurate, timely, and comprehensive METOC support that enhances the Marine Air Ground Task Force (MAGTF) mission through tactical exploitation of the environment. It is intended to provide comprehensive METOC support to all elements of a MAGTF, as well as to the bases and stations of the supporting establishment. This system is designed to maximize the support available from Naval, Joint, and other METOC sources. The system will be augmented by data that is observed, collected, modeled, and reported by organic Marine Corps METOC assets.

b. USMC METOC Organization

USMC METOC 68XX OccFld: 35 Officers, 320 Enlisted

- Supporting Establishment 31%
- Operational Forces 69%
  - Command Element 25%
  - Aviation Element 42%
  - Ground Combat Element 1%
  - Logistics Element 1%

(1) Operational Force METOC Structure

The structure of the operational forces or Fleet Marine Forces (FMF) is shown in the figure below.

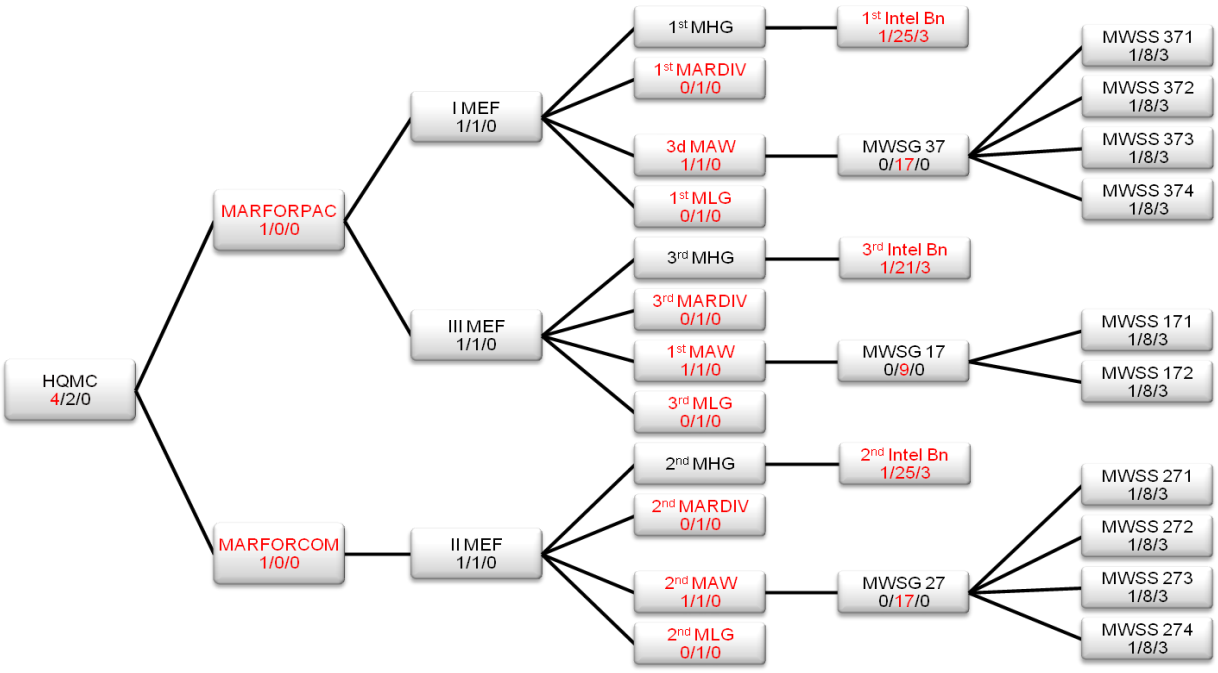

Figure 8: Location of Fleet Marine Force Activities

(2) FMF METOC Command Relationships and Responsibilities

(a) MEF Staff METOC Officer

Each MEF has (1) METOC Officer and (1) METOC Forecaster per staff. These Marines serve in the G-2 section under the cognizance of the Intelligence Operations Officer and provide METOC support to the MEF Commanding General and his staff. As such, they serve as the Subject Matter Expert (SME) on all METOC related issues, ensuring that relevant, timely and accurate METOC support is provided throughout the MAGTF. Additionally, the MEF SWO maintains liaison with other Service counter-parts and represents the Commanding General at Joint Service METOC meetings.

(b) Marine Air Wing (MAW) METOC Officer

Each MAW has (1) METOC Officer per staff. This Officer serves in the G-2 section under the cognizance of the Intelligence Operations Officer and provides METOC support to the MAW Commanding General and his staff. The MAW METOC Officer is responsible for coordinating all METOC personnel and assets to meet support requirements within the MAW.

(c) Marine Wing Support Group (MWSG) METOC Chief

Each MWSG has (1) Senior METOC Forecaster per staff. This forecaster serves in the S-3 section under the cognizance of the Operations Officer and provides METOC support to the MWSG Commanding Officer and his staff. The MWSG METOC Chief is responsible for coordinating all METOC personnel and assets to meet support requirements within the MWSG.

(d) Marine Wing Support Squadron (MWSS) METOC Element

The MWSS METOC Element is the primary METOC support element for the MAGTF. Manning at the MWSS consists of (1) METOC officer, (8) METOC forecasters, and (3) meteorological equipment technicians. The MWSS METOC Element can provide:

- An in-theater METOC production and processing facility using the AN/TMQ-44A MetMF(R), as a central hub to maintain a common METOC database.
- A continuous surface observation program
- Doppler radar observations/imagery
- DMSP, GOES, GMS and METEOSAT satellite imagery
- Two (2) remote weather sensors for surface observations
- Upper atmospheric soundings
- Terminal Aerodrome Forecasts for airfield and local area (25 NM radius)
- Local area METOC watches/warnings/advisories
- Climatological, astronomical, and tidal data
- Sea and surf conditions, current and forecast
- Secure and Non-Secure PMSV
- Aviation METOC briefs as required by OPNAVINST 3710.7
- Electro-optic TDAs TAWS for Mission Planning and weapons system optimization
- AREPS for mission planning and optimization of ES, EA, and EP
- Target area, enroute, mission, and staff METOC briefings

The MWSS is the primary source for surface and upper air observations for the MAGTF. Aviation operations conducted at expeditionary air fields will be supported by MWSSs, which are equipped with MetMFRs. These facilities can operate semi-autonomously or participate in a METOC network.

Basic observational capabilities of the MWSS include temperature, dewpoint, wind speed/direction/character, present weather, pressure (altimeter settings, sea level pressure and station pressure), cloud height/amounts and upper air data types,

(e) Intelligence Battalion (Intel Bn)

The Intel BN METOC Element has the second largest contingency of METOC personnel in the MAGTF. Manning at the Intel BN consists of (1) METOC officer, (25) METOC forecasters, and (3) meteorological equipment technicians. The Intel BN is a task-organized to provide direct support to elements of the active component MEFs, MARDIVs, MLGs and MEUs at the Command Element level. The number of personnel deployed is based on the operational battle rhythm expected during the operation and anticipated METOC requirements.

The Intel BN has a limited stand-alone capability and relies on NIPRNET/SIPRNET connectivity in order to ingest required METOC products from the MetMF(R), regional centers, and HHQ METOC elements. Intel Bn's organic equipment includes the NITES IV. Each Intel BN has the capability to provide:

- A continuous surface observation program
- 24 – 96 hour Forecasts
- Severe METOC watches/warnings/advisories
- Climatological, astronomical, and tidal data
- Sea and surf conditions, current and forecast
- Electro-optic TDAs TAWS for mission planning and weapons system optimization
- AREPS for mission planning and optimization of ES, EA, and EP
- Target Board, impact, amphibious objective area (AOA), and staff METOC briefings
-

(3) USMC METOC Production Centers

The US Marines have no centralized METOC facility; instead, METOC organizations use theater and centralized US Navy and US Air Force support.

c. USMC METOC Capabilities: Personnel and Equipment

(1) USMC METOC Personnel Information

The USMC uses a four-digit Military Occupational Skills (MOS) code. USMC METOC military occupation specialty (MOS) include:
MOS 6877 - (Secondary MOS) Weapons and Tactics Instructor (WTI)
MOS 6821 - METOC Observer (will be phased out by 2013)
MOS 6842 - METOC Forecaster
MOS 6852 – METOC Impacts Analyst
MOS 6493 - Meteorological Equipment Technician
MOS 6802 - METOC Service Officer

All 6802s are prior enlisted (Warrant Officers or Limited Duty Officers).

d. USMC METOC Hardware

(1) AN/TMQ-44(V) Meteorological Mobile Facility Replacement [MetMF(R)]

(a) MetMF(R) Overview

Each MWSS is equipped with a MetMF(R). The MetMF(R) is a transportable system designed to provide tactical METOC support to the MAGTF. It is a fully integrated system capable of automatic data acquisition from communication channels providing METOC data, meteorological satellite down links, and local and remote meteorological sensors. The MetMF(R) is capable of disseminating METOC data and products via communication links. The MetMF(R) consists of nine (9) sub-systems: Processing Sub-system (PCS), Communications Sub-system (CMS), Meteorological Satellite Sub-system (MSS), Rawinsonde Sub-system (RWS), Local Sensor Sub-system (LSS), Remote Sensor Sub-system (RSS), Meteorological RADAR Sub-system (MRS), Portable Meteorological Subsystem (PMS), and Shelter Subsystem (SSS).

(b) MetMF(R) Subsystems

MetMF(R) Processing Sub-system (**PCS**): The PCS is a modular, software-intensive system designed to process METOC data and produce METOC products. The PCS consists of a resident master database and receives raw and processed data from local and remote meteorological sensors, meteorological satellites and meteorological radar. It will be compliant and compatible with evolving joint communication and METOC architectures.

MetMF(R) Communications Sub-system (**CMS**): Two-way communications are accomplished through existing Marine Corps communication infra-structure, normally the SIPRNET and the CSS components. The CMS enables the MetMF(R) to transmit and receive secure and non-secure METOC data from the SIPRNet and NIPRNet. The CMS will have interoperable connectivity between the various other sub-systems of the MetMF(R), the Marine Air Ground Task Force (MAGTF) C^4I LAN.

MetMF(R) Meteorological Satellite Sub-system (**MSS**): The MSS receives both high and low resolution meteorological imagery from polar orbiting satellites and low resolution meteorological imagery from geostationary satellites.

MetMF(R) Rawinsonde Subsystem (**RWS**): The RWS collects upper air soundings and will automatically be ingested by the PCS.

MetMF(R) Local Sensor Sub-system (**LSS**): The LSS is installed within close proximity of the MetMF(R) (within 150 feet) shelter and collect METOC parameter measurements for automatic ingestion into the PCS. The LSS will be a "METOCPak" sensor suite designed to measure and report: surface wind direction and speed, surface air and dew point temperature, liquid precipitation rate, cloud height, visibility, atmospheric pressure and altimeter setting.

MetMF(R) Remote Sensor Sub-system (**RSS**): The RSS consist of two sets of sensors capable of being installed at separate sites located up to 200 nautical miles from the MetMF(R). Each set of "METOCPak" sensors measures and reports: surface wind direction and speed, surface air and dew point temperature, liquid precipitation rate, atmospheric pressure and altimeter setting. The RSS transmits its measurements to the MetMF(R) by use of Meteorburst (VHF) communications.

MetMF(R) Meteorological Radar Sub-System (**MRS**): The MRS (AN/TPS-76) provides real-time surveillance and advanced warning of potentially hazardous atmospheric conditions in the vicinity of the MetMF(R). The doppler METOC radar measures rainfall intensities and predicts the likelihood of hazardous activity, such as: hail, potential flooding, and the interrogation of convective activity. The MRS has a maximum conventional radar range of 200 nm with a Doppler radar range of 60 nm.

MetMF(R) Portable Meteorological Subsystem (**PMS**): The PMS will consist of one (1) Navy Integrated Tactical Environmental Subsystem (NITES) Variant IV systems networked with the MetMF(R) PCS through the MAGTF C^4I LAN and SIPRNet/NIPRNet. METOC data and

products received will be obtained from deployed MetMF(R)'s, Navy shipboard OA divisions, or directly from METOC regional centers.

MetMF(R) Shelter Subsystem (**SSS**): The SSS consist of an Electromagnetic Interference (EMI) International Organization for Standards (ISO) shelter, a Joining Corridor (8ft X 8ft X 10ft) to provide the forecaster with a work/briefing area, two (2) Environmental Control Units, a power distribution system, and a grounding system.

MetMF(R) Communications Requirements: Approval must be granted for primary and secondary frequencies in the following frequency bands:

Table 2: MetMF(R) Frequency Requirements

Band	Equipment	Description	Range	Transmitting Power
HF	RT 7000	Transceiver	1.6- 29.999 MHz	125 watts
UHF	AN/GRC-171B(V)4	METRO	200-399.999 MHz	50 watts
VHF	MCC-520B	Meteor Burst Master Station	41.7 MHz (fixed)	250 watts
	MCC-545A	Meteor Burst Remote Terminals	41.7 MHz (fixed)	100 watts
	AN/VRC-90A	SINCGARS	30-87.975MHz	50 watts
SHF	AN/TPS-76	SWR	5.3-5.7 GHz	250 KW

(c) MetMF(R) communications security (COMSEC) Equipment

KG-175	SIPRNet	Secure Data
KY-58	UHF LOS	Secure Pilot to Forecaster METRO
KG-44	DMSP	Meteorological Satellite Imagery
USC-43(V)1	NDVT	Secure Voice
SECTEL 1100	AT&T STU III w/Key	Secure voice/data, landline

(d) MetMF(R) Site Considerations

- Sensor Placement - location must be free of obstructions which might block or alter wind flow.
- High Energy Emissions - due to high-energy radio frequency emissions from the complex, ordnance, fuel, and personnel areas must be located a minimum of 100 yards away.
- Radio Frequency Interference - other high-energy radiation sources must be placed at least 1/2 mile away from the complex. This includes active powerlines.
- Signal Blocking - a clear line of sight must be maintained for the operation of the METOC radar and satellite receivers.

- Security - communications security (COMSEC) equipment and classified material storage require tactical security measures to provide protection for Secret materials.
- Power - requires 120/208 VAC, 3 phase, 60 HZ Class L Power from either a commercial source or dedicated generators(s) (100amp).
-

(2) Naval Integrated Tactical Environmental Sub-System - Variant IV (NITES IV)

NITES was the result of a program to upgrade the hardware and software of the obsolete IMOSS and the MIDDS-T with modern information system technology. The NITES IV is the primary man-portable deployable asset utilized by the Marine Corps during tactical operations.

NITES IV suites are the table of equipment for the METOC Support Teams (MST) operating in the fleet. Two suites are issued to each team. In addition, each Marine Wing Support Squadron (MWSS) is equipped with one full NITES IV suite to support operations. The NITES IV is a portable system that is easily forward deployed and can be setup, operated, and maintained by one person or the entire MST.

(a) NITES IV System Configuration

The NITES IV suite consists of three laptops with several miscellaneous peripherals, each designed to perform a different function but all three are loaded with the same software and can each perform the tasks of another. Because of this redundancy, the NITES IV is often not deployed as an entire suite. Mission requirements, network availability, and embarkation space will dictate how best to employ the NITES IV.

(b) NITES IV Capabilities

The NITES IV requires SIPNET/NIPRNET connectivity for continuous data ingestion. The NITES IV provides the forward deployed METOC forecasters and observers with SIPNET/NIPRNET connectivity for data ingestion. The NITES IV system also utilizes an Automated Weather Observation System (AWOS), INMARSAT, and the KESTRAL 4000 as unique capabilities in the provision of METOC support. Not all NITES IV suites are configured identical.

The NITES IV is equipped with the current versions of METOC software and is capable of operating in either a classified or unclassified environment based on customer needs. Because of the redundancy in software on each laptop, there will be no loss of data ingestion should a laptop fail.

(c) NITES IV Hardware

NITES IV is a portable, lightweight, scalable, ruggedized, flexible system allowing deployment of the minimum subsystem hardware and software configuration needed to support each mission, without degraded performance

NITES IV Workstations: Ruggedized laptops serve as forecaster workstations for the processing and displaying of TDA outputs, environmental data and products. The laptop is designed to withstand physical and environmental impacts of employment/deployment to hostile areas such as shipboard, deserts and jungles. Peripheral computer equipment including a multimedia projector, uninterruptible power supply, ethernet hubs and a printer enable autonomous operations.

NITES IV Handheld Environmental Sensor: Pocket-sized instrument that assists METOC personnel in providing real-time on-scene weather data – including temperature, dew point, barometric pressure, humidity, wind speed, wind chill and heat index.

NITES IV Global Positioning System: Provides current position and time.
INMARSAT Transceiver and the capability to conduct remote communications for METOC voice and data via satellite.

NITES IV Automated Weather Observation System (AWOS): Provides monitoring capability for temperature, wind speed and direction, humidity, surface pressure and precipitation accumulation.

e. USMC METOC Operations / Employment

(1) MAGTF

Marine Corps METOC is structured to support the MAGTF. The MAGTF is a task organization consisting of a Ground Combat Element (GCE), an Aviation Combat Element (ACE), a Logistics Combat Element (LCE), and a Command Element (CE). A MAGTF will vary in size based on the mission. The Marine Corps has four structured MAGTFs which include a MEF built around a Division, a Marine Expeditionary Brigade (MEB) built around a reinforced Regiment, a Marine Expeditionary Unit (MEU) built around a reinforced Battalion, and a Special Purpose MAGTF (SPMAGTF) that is task organized to accomplish specific missions.

(a) MAGTF Employment

Upon the employment of a MAGTF, tactical METOC support will transition from garrison-based to on-scene METOC support. The support package is task organized and can range from either a MetMF(R), when a full MWSS is deployed, or a NITES IV, when a MEF Weather Support Team (MST) is sufficient. These tactical METOC elements will forward deploy by attaching to the MAGTF elements as required.

The MetMF(R) is a highly capable METOC facility, supported from the regional offices (maritime theater centers), the large production centers (FNMOC, NAVOCEANO, AFWA), and any other available sources (foreign facsimile, force METOC). They are organic to the MWSS and normally deploy in direct support of the ACE.

The MST is generally a five (2 to 5) Marine METOC team, task organized to the mission with limited stand-alone capability. The MST is organic to the Intel BN and is normally deployed to

support the Command Elements of a MEF, MEB, or MEU, as well as the GCE and LCE. When attached, the MST is organized within the Intelligence Section (S/G-2) of the supported command and provides staff level METOC support for mission planning and operational execution.

(b) Theater Products

The following products are produced at the discretion of the senior METOC officer when not provided by higher headquarters or to provide greater detail:

MAGTF WEAX: Includes the current METOC situation, 24 hour forecast, and 48 hour outlook. Astronomical data and radiological fallout data is appended as required

Tactical Atmospheric Summary (TAS): Includes an atmospheric refractive summary, tactical assessment, electromagnetic sensor performance predictions, infrared sensor detection range predictions, and communication range predictions

Amphibious Objective Area (AOA) forecast: Includes meteorological situation, 24-hour forecast for objective area, surf forecast for target beaches, tactical assessment, abbreviated atmospheric summary, and astronomical data

Strike forecast: Provides a coordinated forecast whenever multiple strike (OAAW/SEAD/DAS) platforms are operating as an integrated force under one tactical commander

Assault forecast: Provides a coordinated forecast whenever multiple assault support platforms (VMGR/HMH/HMM/HMLA) are operating as an integrated force under one commander

f. USMC METOC Contact List

Deputy Commandant for Aviation (APX-33A), USMC METOC OccFld Sponsor - HQMC, Pentagon, Washington DC
DSN 223-9787 / comm (703) 693-9787
Email: No billet e-mail address. Currently donald.bohannon@usmc.mil

USMC Director of Intelligence (DIRINT) / Marine Corps Intelligence Agency (MCIA) METOC Officer - Navy Annex, Washington DC
DSN 224-0832 / comm (703) 614-0832
Email: No billet e-mail address. Currently david.j.burns@usmc.mil

Marine Aviation Weapons & Tactics Squadron One, METOC Officer - MCAS Yuma, AZ
DSN: 269-7116 / comm (928) 269-7116
NIPRNet e-mail: No billet e-mail address. Currently james.reusse@usmc.mil

Marine Corps Forces Pacific (MARFORPAC), METOC Requirements Officer - Camp H.M. Smith, HI
DSN (315) 477-8462 / comm (808) 477-8462

Email: No billet e-mail address. Currently jay.brewer@usmc.mil
NIPR Webpage: https://mfpportal.mfp.usmc.mil/OrgAreas/G2/METOC/default.aspx
SIPR Webpage: http://mfpportal.mfp.usmc.smil.mil/G2/METOC/default.aspx

Marine Corps Forces Command (MARFORCOM), METOC Requirements Officer - Norfolk, VA
DSN 836-2781 / comm (757) 836-2781
Email: No billet e-mail address. Currently david.fulton@usmc.mil

Marine Corps Installations - East (MCI-E), Regional METOC Center (RMC) (Covers Marine Corps Bases (MCB's) east of the Mississippi river)
24-hr contact DSN 582-2523 / comm (252) 466-2523 / Toll Free 1-866-925-2523
Email: No billet e-mail address. Currently kye.williams@usmc.mil
Website: https://mcie.metoc.cherrypoint.usmc.mil/usmc_web/
http://www.marines.mil/unit/mcieast/weather/Pages/Default.aspx

Marine Corps Installations - West (MCI-W), Regional METOC Center (RMC) (Covers MCB's west of the Mississippi river)
24-hr contact DSN 267-4030 / comm (858) 577-4030
Email: No billet e-mail address. Currently Kevin.vicinus@usmc.mil

I Marine Expeditionary Force (I MEF) - Camp Pendleton, CA
DSN: 361-2576 / comm. (760) 763-2576
Email: No billet e-mail address. Currently juan.julien@usmc.mil
Website: SIPR: http://www.imef.usmc.smil.mil/intel/metoc/default.aspx

3rd Marine Aircraft Wing (3rd MAW) METOC Officer - MCAS Miramar, CA
DSN 267-4504 / comm (858) 577-4504
Email: No billet e-mail address. Currently Christopher.kaiser@usmc.mil
Website: NIPR: https://sps.3maw.usmc.mil/g2/metoc/

II Marine Expeditionary Force (II MEF) - Camp Lejeune, NC
DSN 312-751-9778 / comm (910) 451-9778
Email: No billet e-mail address. Currently douglas.schofield@iimeffwd.usmc.mil

2nd Marine Aircraft Wing (2nd MAW) METOC Officer
DSN / comm (252) 466-5031
Email: No billet e-mail address. Currently aaron.s.johnson2@usmc.mil
Website: NIPR: http://158.237.56.114:6005/g2/metoc/default.aspx

III Marine Expeditionary Force (III MEF) - Camp Courtney, Okinawa Japan
DSN: (315) 622-9566 / comm 011-81-611-722-9566
Email: No billet e-mail address. Currently dennis.s.rice@usmc.mil
Website: NIPR: https://portal.mce.iiimef.usmc.mil/staff/G2/METOC/default.aspx
SIPR: http://portal.mce.3mef.usmc.smil.mil/sites/G2/metoc/default.aspx

1st Marine Aircraft Wing (1st MAW) METOC Officer - MCAS Futenma, Okinawa Japan
DSN (315) 645-3792 / comm 011-81-611-722-3792
Email: No billet e-mail address. Currently ann.lassiter@usmc.mil

Marine Corps Air Station (MCAS) Futenma - Weather Office, Okinawa Japan
DSN: (315) 636-3177/3437 - comm 011-81-611-736-3177/3437
Email: No billet e-mail address. Currently lanny.parker@usmc.mil

Marine Corps Air Station (MCAS) Iwakuni - Weather Office, Iwakuni Japan
DSN: (315) 253-4435/3005 - comm 011-81-827-79-4435/3005
Email: No billet e-mail address. Currently Duane.gumbs@usmc.mil

Marine Corps Base Hawaii (MCBH) METOC Officer - MCAS Kaneohe Bay, HI
DSN (315) 457-0404 / comm (808) 257-0404
Email: No billet e-mail address. Currently tony.e.bieren1@usmc.mil
Website: NIPR: https://www.mcbh.usmc.mil/mcaf/metoc/weather.htm

N2/N6F51M, Marine Corps Requirements, Naval Oceanography Programs Branch, Oceanographer of the Navy, Naval Observatory, Washington D.C.
DSN 762-0609 / comm (202) 762-0609
Email: No billet e-mail address. Currently jeffrey.wooldridge@navy.mil

USMC Liaison/Curriculum Developer, Naval Meteorology & Oceanography Professional Development Center (NMOPDC) - NCBC Gulfport, MS
DSN 868.3386 / comm (228) 871.3386
Email: No billet e-mail address. Currently kari.hubler@navy.mil

METOC Training Analyst, USMC Training and Education Command (TECOM), Aviation Training Branch - MCB Quantico, VA
DSN 378-0744 / comm (703) 432-0744
Email: No billet e-mail address. Currently victor.turosky@usmc.mil
Website: NIPR:
https://www.intranet.tecom.usmc.mil/hq/branches/atb1/AGT%20Pages/METOC.aspx

Marine Corps Liaison, Naval Oceanography Operations Command- Stennis Space Center, MS
DSN 828-4803 / comm (228) 688-4803
Email: No billet e-mail address. Currently james.h.glass1@navy.mil

5. Special Operations Forces (SOF) METOC

This chapter describes U.S. Special Operations Command (USSOCOM) organizational structure, command relationships, and support capabilities and requirements, including SOF METOC and communications equipment.

a. SOF METOC Organization

The US Special Operations Command (USSOCOM) is unique in that it has both operational and "service-like" responsibilities. The USSOCOM mission is twofold: to plan, direct, and execute special operations in the conduct of the War on Terrorism in order to disrupt, defeat, and destroy terrorist networks that threaten the United States, its citizens, and interests worldwide; and to organize, train, and equip SOF provided to Geographic Combatant Commanders (GCCs), American Ambassadors, and their Country Teams.

SOF METOC professionals are highly skilled, adaptable, and trained in a host of tactical and technical procedures; making them multi-faceted assets. SOF METOC personnel are sourced from each of the Services and establish and maintain relationships with their associated Service SOF units. METOC personnel support planning, preparation, and conduct of special operations, civil affairs, and psychological operations in support of GCCs. Incorporating SOF METOC requirements early in the planning process is critical to ensure the success of these missions.

(1) AFSOC

Weather Flight (WF) – Weather forecasters supporting AFSOC aviation operations are conventional forecasters assigned to AFSOC units. Once they arrive on station they are task qualified to support the various AFSOC airframes. They may also complete Joint Special Operations University courses such as Introduction to Special Operations, Dynamics of International Terrorism. They deploy similar equipment as a conventional Weather Flight; however, they also have high resolution satellite receivers (MOD-III), tactical weather radar, and digital upper air sounding equipment.

Each Special Operations Wing and the two overseas Special Operations Groups have an organic Weather Flight which provides staff and operational METOC services. These personnel are well versed in AFSOC aviation specialized support requirements, are capable of provided base operating support services in a bare base environment. 27 SOW has an additional Weather Flight organic to its UAS unit (3 Special Operations Squadron). The 3 SOS WF provides specialized support to all AFSOC UAS missions. The AFSOC Weather Flights deploy with the supported unit and do not have to be requested separately.

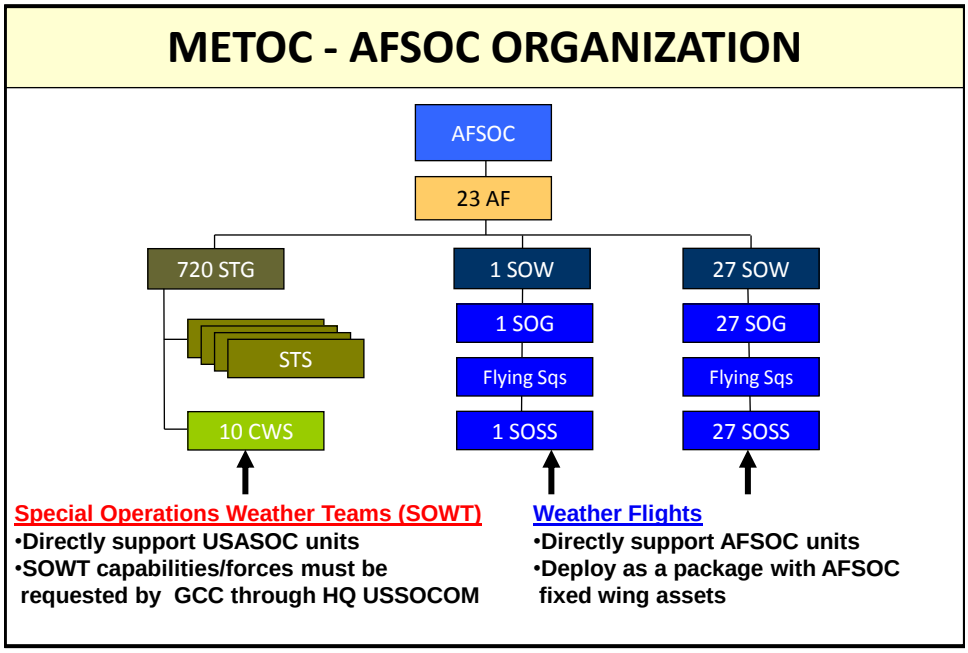

Figure 9: METOC-AFSOC Organization

(a) Combat Weather Squadron (10CWS)

10 CWS is a subordinate squadron of 720 Special Tactics Group consisting of specially trained weather forecasters called Special Operations Weather Teams (SOWT). There are approximately 100 SOWT personnel worldwide that provide direct support to United States Army Special Operations Command (USASOC) Special Forces Groups, 75th Ranger Regiment, and the 160th Special Operations Aviation Regiment. SOWT are trained to conduct the entire spectrum of weather operations ranging from Environmental Special Reconnaissance, upper air observing, base operations and staff support. Also, SOWT are organic to special tactics squadron (STS) in EUCOM and PACOM. These SOWT provide support to 1st Battalion 1st SFG (A) and 1st Battalion 1st BN 10th SFG (A). SOWT must be specially requested by the GCC through SOCOM.

SOWT – SOWT are volunteers to support Army SOF ground and aviation units. They are all airborne qualified and have completed AFSOC Special Tactics Advanced Skills Training. During this training they become experts on the various SOF infiltration methods to include foot, static line, Military Free Fall (if qualified), riverine and coastal over the beach, and are qualified on the various specialized SOF vehicles. SOWT are also qualified to conduct avalanche hazard and riverine assessments. Their specialized equipment includes high resolution satellite receivers (MOD-III), tactical weather radar, digital upper air sounding equipment, Field Riverine Assessment Kits (FRAK), Avalanche Assessment Kit, and Satellite Communications Radios with data transfer capability.

(2) Naval Oceanography Special Warfare Center (NOSWC)

METOC personnel provide direct support to Naval Special Warfare forces. Personnel receive comprehensive training on mission support requirements, enhanced training in understanding the littoral and riverine environment. Additionally, they receive field skills, SERE, and advanced tactical training. Personnel are embedded into SEAL and SBT units during the train up phase of an operation and they are experts in providing detailed operational support. Additionally, they are developing a unique environmental reconnaissance capability to characterize littoral and riverine areas using both mini-UAVs, Unmanned Underwater Vehicles (UUV), as well as, side scan sonar. Any additional Navy SOF METOC support sourced from NAVSPECWAR must be requested through conventional Fleet Forces Command.

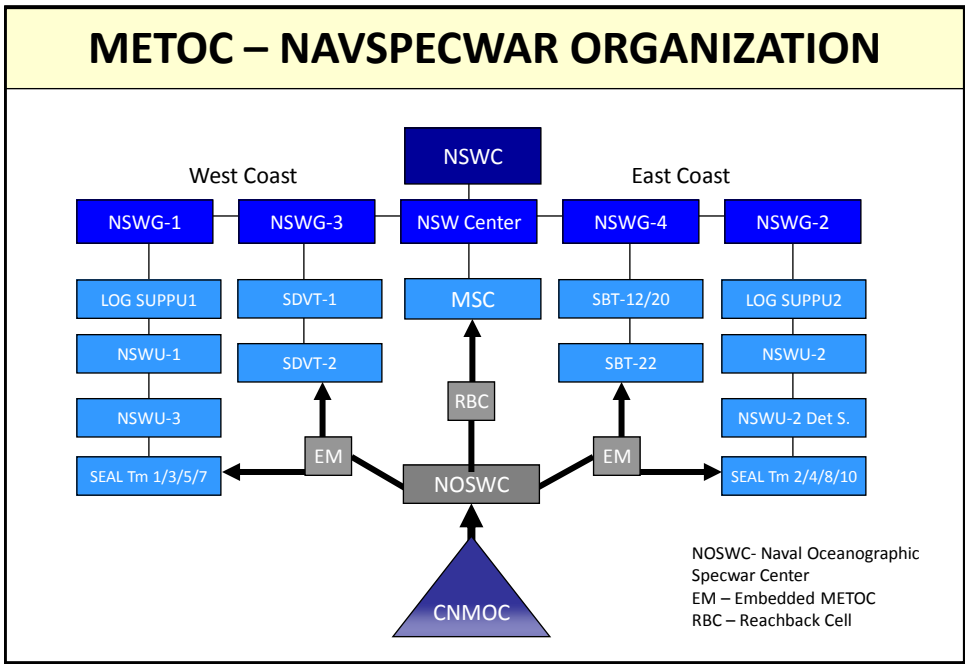

Figure 10: METOC-NAVSPECWAR Organization

(a) Embedded METOC (EM)

Personnel are on a temporarily assigned duty to Naval Special Warfare Command (NSWC) components within the operations, training, or intelligence elements to provide environmental characterization and forecasts for target development, sensor emplacement, mission planning, and execution. EM officers embed within NSWG and NSWU staffs and forecasters (Aerographer's Mates (AG) with the 7412 NEC) and weather technicians embed with Special Boat Teams (SBT), Seal Delivery Vehicle Teams (SDVT), and Seal Team/Support Activities to provide tactical support to NSW surface mobility units throughout the Inter-deployment Training Cycle (IDTC).

(b) Environmental Reconnaissance (ER)

Personnel are usually dual- hatted as EM personnel and employ METOC sensors and leverage NSW TSR sensor/platforms to characterize the physical environment. ER personnel apply

METOC knowledge to optimize NSW sensor emplacement and employment. METOC sensors and equipment include the NITES and hand-held riverine sensing kits; NSW TSR sensors/platforms include UAV, UUV, and unattended ground sensors (UGS)

(3) MARSOC

Currently does not have an organic SOF METOC capability.

b. SOF METOC Production Centers

While Regional/theater forecasts centers provide the framework for SOF METOC support, AFSOC's 23rd Weather Squadron and NSW's Mission Support Center provide specialized support to SOF operations. In addition to what the conventional centers provide, the 23rd Weather Squadron provides specifically tailored support to Air Force SOWT and other SOF assets and NOSWC Mission Support Center (MSC) provides specialized support to NOSWC METOC. For example, Navy Seals acquire meteorological and oceanographic information from embedded NOSWC METOC personnel or reach back support from the NOSWC MSC METOC Cell. These SOF centers may act as a JMCC in support of sensitive SOF-lead operations.

c. SOF METOC Operations / Employment

(1) Joint Special Operations Task Forces (JSOTF)

A JSOTF is a deployed special operations headquarters providing command and control for all theater SOF. SOF METOC Forces are *"chopped" to CCDRs* for alignment under JTF Structure. JSOTF manning is tailored to the mission. Normally for a large operation, contingency, or exercise, a joint USAF and USN team is formed. The joint weather team provides support for air, land, and sea operations normally conducted in the deep battlefield environment.

Special Operations Command Central Command (SOCCENT), Special Operations Command Europe (SOCEUR), and Special Operations Command Africa Command (SOCAFRICA) have a permanently assigned METOC officer and the Navy provides a METOC officer to support Special Operations Command Pacific Command (SOCPAC) . All other theater Special Operations Command (SOC) METOC support is provided or arranged on an additional duty basis by theater METOC assets.

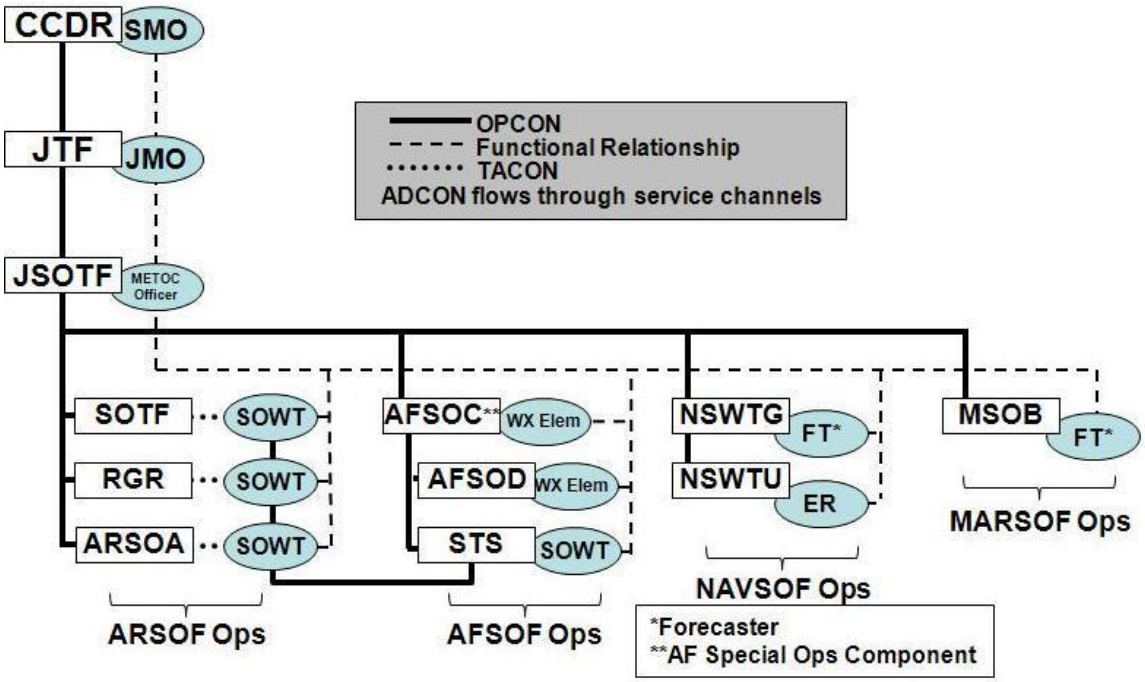

Figure 11: Special Operations Forces (SOCOM M115-2)

d. SOF METOC Data Sources

All deployed weather personnel and assets work together to support a theater sensing strategy and SOF METOC assists by collecting information from data sparse locations. AFSOC WF collect weather observations at forward operating bases (FOBs) and SOWT, 23WS and NOSWC forecasters collect surface and hydrographic observations from both FOBs and forward operating areas. Due to the sensitive nature of SOF operations it may be necessary to coordinate receipt of data with JSOTF.

e. Key SOF METOC Staff Organization Contact List

USSOCOM METOC/AFSOC/A3W: DSN: 312 579-1541

23d Weather Squadron: DSN 312 271-3072

NAVSPECWAR Force Oceanographer: DSN 312 577-5196

Naval Oceanography Special Warfare Center: DSN 312 253-2857

Theater SOCs

SOCCENT
Staff Weather Officer, U.S. Special Operations
Command Central Command

MacDill AFB, FL
DSN 312 968-4026

SOCEUR
Staff Weather Officer, U.S. European Command
Stuttgart, GE
DSN 314 480-7110

SOCPAC
Staff Weather Officer, U. S. Pacific Command
Honolulu, HI
DSN 315 477-2580

SOCSOUTH
Staff Weather Officer, U.S. Southern Command,
Miami, FL
DSN 312 567-3904

SOCAFRICA
Staff Weather Officer, U. S. Africa Command
Stuttgart, GE
DSN 314 430-7850

6. Joint METOC Staffs – Joint Staff, Combatant Commands

a. Combatant Commands (CCMD)

The National Security Act of 1947 and Title 10 of the U. S. Code provide the basis for the establishment of Unified CCMDs. A CCMD has broad, continuing missions and is composed of forces from two or more military departments. The Unified Command Plan (UCP) establishes the missions, responsibilities, and force structure for CCDRs, as well as their general geographic AORs and functions (see Figure 12 for Geographic Combatant Command (GCC) boundaries).

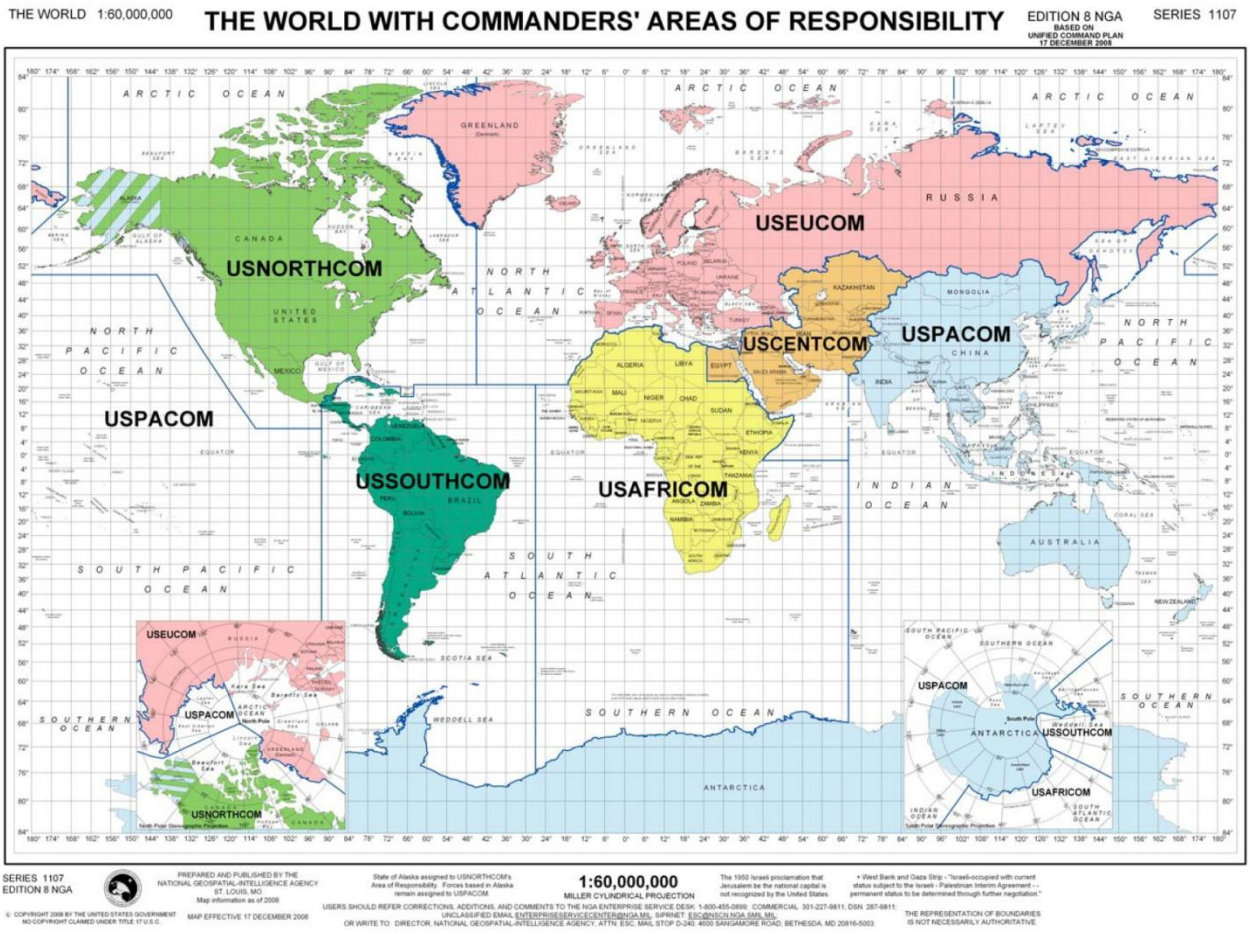

Figure 12: Geographic Combatant Commands Area of Responsibility (AOR) (From UCP 2008)

Combatant Commanders (CCDRs) will exercise combatant command (COCOM) over forces assigned or reassigned by the President or SecDef. Forces will be assigned to such commands by the Secretary of Defense's memorandum entitled "Forces for Unified Commands." Except as otherwise directed by the President or the Secretary of Defense, all forces operating within the geographic area assigned to a Combatant Command shall be assigned or attached to the CCDR.

Per Commander Joint Chief of Staff Instruciton (CJCSI) 3810.1, all CCDRs should have a Senior METOC Officer (SMO) assigned to provide and arrange support for the command and its

operations. Some Commands have reduced or eliminated in-house METOC support and the SMO may be assigned to a Service Component and support the CCMD on a part-time basis. Each Combatant Command has Service Components that provide forces to the command as described in the UCP. In many instances, each component has a supporting METOC organization.

The following sections describe the METOC Organizations at each of the Combatant Command and the Joint Staff. Telephone numbers are listed in most cases, but for specific email point of contact (POC) information it is recommended that you go to the JMB web site as personnel (and email addresses) change frequently.

b. Joint Staff

(1) Joint Staff Mission

The Chairman of the Joint Chiefs of Staff (CJCS) is the head of the Joint Chiefs of Staff and the senior-ranking member of the Armed Forces and the principal military advisor to the President. The CJCS does not exercise military command over any combatant forces. The CJCS functions within the chain of command by transmitting communications to the CCDRs from the President and Secretary of Defense.

The Joint Chiefs of Staff consist of the Chairman, the Vice Chairman, the Chief of Staff of the Army, the Chief of Naval Operations, the Chief of Staff of the Air Force, and the Commandant of the Marine Corps. The Joint Chiefs of Staff, supported by the Joint Staff, is the immediate military staff of the Secretary of Defense. The Joint Chiefs of Staff have no executive authority to command Combatant Command forces.

The Joint Staff assists the CJCS with strategic direction, strategic planning, and joint operation planning. The CJCS organizes joint planning and execution for joint operations by establishing the Supported and Supporting command relationships between the Combatant Commands.

(2) Joint Staff METOC Staff

The Joint Staff currently has two METOC billets, though both are "dual-hatted" and have additional duties outside of METOC. Joint Chief of Staff (JCS) METOC personnel will occasionally stand watch when a Crisis Action Team (CAT) or Crisis Response Cell (CRC) is activated, and will deal with METOC issues involving international organizations (*e.g.*, WMO, NATO). Neither has an operational (forecasting) responsibility for the staff and they typically use weather briefings from the Air Force Operations Group's (AFOG) Weather Division at (SIPR) http://www.a3a5.hq.af.smil.mil/a3o/a3oo/a3oow/index.htm. AFOG weather can be contacted at DSN 227-1638. Currently assigned:

Joint Staff J3 DDGO ROD (Air Force O-5 billet – currently Lt Col Mark LaJoie (mark.lajoie@js.pentagon.mil). Deputy Director Global Operations, Reconnaissance Operations Division

DSN: 227-1237 SECURE: 225-0581 COMM: 703-697-1237 FAX: (UNCLAS) 224-6690 FAX: (SECURE) 227-8042 MSG: JOINT STAFF J3 DEP-DIR GLOBAL OPS	MAIL: Joint Staff J-38/ROD Pentagon Room 2D921G-6 Washington DC 20318-3000

Joint Staff J-33/JOD (Navy O-5 billet)

DSN: 225-2995 SECURE: 225-2995 COMM: 703-695-2995 FAX: (UNCLAS) 225-3792 FAX: (SECURE) 225-0988 MSG: JOINT STAFF J3 JOINT OPS DIV	MAIL: Joint Staff J-33/JOD Pentagon Room 2B885 Washington DC 20318-3000

c. USAFRICOM

(1) USAFRICOM Mission

USAFRICOM, in concert with other U.S. government agencies and international partners, conducts sustained security engagement through military-to-military programs, military-sponsored activities, and other military operations as directed to promote a stable and secure African environment in support of U.S. foreign policy.

Unlike traditional CCMDs, USAFRICOM will focus on war prevention rather than warfighting. USAFRICOM intends to work with African nations and organizations to build regional security and crisis-response capacity in support of U.S. efforts in Africa.

(2) USAFRICOM Components

USAFRICOM has traditional service components, but most of these staffs are currently smaller then traditional CCMD Components. 6th Fleet, which is the to Unitied States European Command (USEUCOM) Navy component to (NAVEUR), will also be the Navy component to USAFRICOM (NAVAF). The other components are USARAF, MARFORAF, AFAFRICA (17th AF), and SOCAF.

(3) USAFRICOM METOC Staff

- HQ USAFRICOM: 1 X USAF O-5; 1 X USN O-4
- HQ USARAF (all USAF): 1 X O-3; 2 X E-6; 2 X E-5
- HQ NAVAF: 1 X O-5; 1 X E-7; 1 X Civilian (+3 pers on sub ops)
- HQ SOCAF: 1 X O3/4, USAF, TDY for 365 until SOCAF is FOC (Oct 09)
- HQ AFAFRICA/17 AF: 1 X O-3; 1 X O-2
- HQ CJTF-HOA: 1 X O-3 (USN); 1 X E-7 (USN); 3 X E-6 (2 X USN; 1 X USAF) – all personnel deployed

Senior METOC Officer: Lt Col Karen Darnell (karen.darnell@africom.mil)

DSN: 314-421-3134 (JOC Floor) SECURE: 314-421-4554 (STE) COMM: 00-49-711-729-3134/4427 MSG PLAD: AFRICOM JOC OPS	Mail: OPLOG/CAB/METOC United States Africa Command Unit 29951 APO AE 09751

d. USCENTCOM

(1) USCENTCOM Mission

With national and international partners, U.S. Central Command promotes cooperation among nations, responds to crises, and deters or defeats state and nonstate aggression, and supports development and, when necessary, reconstruction in order to establish the conditions for regional security, stability, and prosperity.

(2) USCENTCOM Components

Component support:

AFCENT	Shaw AFB, SC	Staff Weather Officer
ARCENT	Ft McPherson, GA	Staff Weather Officer
MARCENT	MacDill AFB, FL	No METOC Staff
NAVCENT	NSA, Bahrain	Staff Oceanographer
SOCCENT	MacDill AFB, FL	Staff Weather Officer

Supporting theater METOC forecast centers:
28th Operational Weather Squadron (28 OWS), Shaw AFB SC

(3) USCENTCOM METOC Staff

USCENTCOM has one METOC billet (1 AF O-5) and five component commands: U.S. Central Command Air Forces (AFCENT), U.S. Army Forces Central Command (ARCENT), U.S. Marine Forces, U.S. Central Command (MARCENT), U.S. Naval Forces Central Command (NAVCENT), and SOCCENT.

Senior METOC Officer: Maj Mike Holmes (michael.holmes@centcom.mil)

DSN: 651-1527 SECURE: 302-529-3011- COMM: 813-827-1527 MSG: USCENTCOM CCJ3-O	Mail: U.S. Central Command/CCJ3-OW 7115 South Boundary Blvd MacDill AFB, FL 33621-5101

e. USEUCOM

(1) USEUCOM Mission

Maintain ready forces to conduct the full range of military operations unilaterally or in concert with multinational partners; enhance transatlantic security through support of NATO; promote regional stability and advance U.S. interests in Europe, Africa, and the Middle East.

(2) USEUCOM Components

Component support:

USAFE	Ramstein AB, GE	Director of Weather
USAREUR	Heidelberg, GE	Staff Weather Officer
MARFOREUR	Boeblingen, GE	II MEF Staff Weather Officer
NAVEUR	London, UK	Staff Oceanographer
SOCEUR	Stuttgart, GE	No METOC staff

Supporting theater METOC forecast centers:
21st Operational Weather Squadron (OWS), Sembach, GE https://ows.sembach.af.mil/index.asp

(3) USEUCOM METOC Staff

USEUCOM has no dedicated METOC billets; USAFE provides, under written agreement with USEUCOM, staff METOC support. NAVEURMETOCCEN provides a Navy METOC liaison officer to round out the METOC staff for EUCOM. EUCOM has five component commands: U.S. Air Forces Europe (USAFE), U.S. Army Forces Europe (USAREUR), Marine Forces Europe (MARFOREUR), Naval Forces Europe (NAVEUR), and SOCEUR.

Note: There is a USN 1800 Officer on EUCOM staff, the GIS Officer in J2.

EUCOM SMO (USAFE Liaison Officer)- Lt Col Dave Schiffert (David.Schiffert@eucom.mil)

DSN: 314-430-6398/8195 SECURE: 314-430-6398/8195 COMM: 011-49-711-680-6398/8195 FAX (unclass): 314-430-8451 FAX (secure): 314-430-4287 MSG: EUCOM J3 DIRECTORATE	Mail: HQ USEUCOM J33-WE Unit 30400 Box 1000 APO AE 09128

Note: if unable to contact the EUCOM SMO at any of the numbers listed, please contact USAFE/DOW at DSN 314-480-7001/7564 / Comm (49) 6371-47-7001/7564.

f. USNORTHCOM

(1) USNORTHCOM Mission

United States Northern Command conducts homeland defense, civil support, and security cooperation to defend and secure the United States and its interests.

(2) USNORTHCOM Components

-AFNORTH	Tyndall AFB,FL	Staff Weather Officer
-ARNORTH	Ft Sam Houston, TX	Staff Weather Officer
-USFF	Norfolk, VA	Oceanography, Navigation & Targeting
-MARFORNORTH	New Orleans, LA	None

Supporting METOC forecast centers:
1st Weather Group, Offutt AFB, NE
AFWA, Offutt AFB, NE
Fleet Weather Center, Norfolk, VA
NMOC, Stennis Space Center, MS
Other Air Force Operational Weather Squadrons
Other Navy METOC Centers
Civil Support Mission Partners in the National Oceanic and Atmospheric Administration

(3) USNORTHCOM METOC Staff

USNORTHCOM has 4 METOC billets (1 AF O-5 & 3 DAFCs). NORTHCOM employs the forces of MARFORRES, Second Fleet (merging with USFF in August 2011) and ACC through its Component Commands.

Senior METOC Officer: Lt Col Jim Rickman (james.rickman@northcom.mil)

DSN: 834-8310 SECURE: same COMM: 719-556-8310 FAX (unclass): DSN 692-7207 FAX (secure): MSG: N-NC CMD	Mail: 250 Vandenberg St., Suite B016 Peterson AFB, CO 80914-3805

g. USPACOM

(1) USPACOM Mission

U.S. Pacific Command protects and defends, in concert with other U.S. Government agencies, the territory of the United States, its people, and its interests. With allies and partners, U.S. Pacific Command is committed to enhancing stability in the Asia-Pacific region by promoting security cooperation, encouraging peaceful development, responding to contingencies, deterring aggression, and, when necessary, fighting to win.

(2) USPACOM Components

Component support:

PACAF	Joint Base Pearl Harbor-Hickam	Director of Weather
USARPAC	FT Shafter	Staff Weather Officer
MARFORPAC	Camp H.M. Smith	Officer ADDU fm MCAF
PACFLT	Joint Base Pearl Harbor-Hickam	Staff Oceanographer
SOCPAC	Camp H.M. Smith	Staff METOC Officer
ALCOM	Joint Base Elmendorf-Richardson	Staff Weather Officer
USFJ	Yokota Air Base	Staff Weather Officer
USFK	Yongsan Army Garrision	Staff Weather Officer

Supporting theater METOC forecast centers:
Fleet Weather Center (FWC), NAS North Island, CA https://www.usno.navy.mil/ ; https://nepoc.oceanography.navy.smil.mil
Joint Typhoon Warning Center (JTWC), Joint Base Pearl Harbor-Hickam, HI
https://www.usno.navy.mil/jtwc ; https://nepoc.oceanography.navy.smil.mil
17th Operational Weather Squadron, Joint Base Pearl Harbor-Hickam, HI
https://17ows.hickam.af.mil/ ; https://17ows.hickam.af.smil.mil

(3) USPACOM METOC Staff

USPACOM has one METOC billet (1 Navy O-5) and four component commands: Pacific Air Forces (PACAF), U.S. Army Forces Pacific (USARPAC), Marine Forces Pacific (MARFORPAC), and Pacific Fleet (PACFLT), as well as four subordinate unified commands: Alaska Command (ALCOM), U.S. Forces Japan (USFORJAPAN), Special Operations Command Pacific (SOCPAC), and U.S. Forces Korea (USFORKOR).

Senior METOC Officer: CDR Ron Shaw (ronald.r.shaw@pacom.mil; ronald.r.shaw@pacom.smil.mil)

DSN: 315-477-9449 SECURE: 315-477-9449 COMM: 808-477-9449 FAX (unclass): 315-474-3602 FAX (secure): N/A MSG: HQ USPACOM J3	Mail: USPACOM/ J3319 Box 64013 Camp H. M. Smith HI 96861-4013

h. USSOUTHCOM

(1) USSOUTHCOM Mission

We are a going and interagency organization supporting US national security interests, and with our partners, improving security, stability and prosperity in the Americas. USSOUTHCOM has three standing task forces: Joint Interagency Task Force – South (JIATF-South), which coordinates the US effort in drug interdiction, Joint Task Force – Bravo (JTF-B), which provides support for joint and combined humanitarian relief missions, counter-narcotic operations, and training exercises involving active and reserve components, and Joint Task Force Guantanamo (JTF-GTMO), which supports USSOUTHCOM in the detention and interrogation of terrorism suspects.

(2) USSOUTHCOM Components

Component support:

-AFSOUTH	Davis-Monthan AFB, AZ	CAOC WX TEAM
-USARSO	Ft Sam Houston, TX	Staff Weather Officer and NCO
-MARFORSOUTH	Miami, FL	No METOC Staff
-NAVSOUTH	Mayport, FL	Staff METOC Officer & NCO
-SOCSOUTH	Homestead, FL	No METOC Staff

Supporting Theater METOC forecast centers:
25th OWS USSOUTHCOM CELL, Davis-Monthan AFB, AZ
Fleet Weather Center, Norfolk, VA

(3) USSOUTHCOM METOC Staff

USSOUTHCOM has a civilian METOC billet and five component Commands: U.S. Southern Air Forces (USSOUTHAF), U.S. Army Forces South (USARSO), Marine Forces South (MARFORSOUTH), U.S. Navy South (USNAVSO), and Special Operations Command South (SOCSOUTH).

Senior METOC Officer: Ms. Zena Tucker (zena.tucker@hq.southcom.mil)

DSN: 567-3904 SECURE: 567-3904 COMM: (305) 437-3904 FAX (unclass): 567-0543 E-mail: ombbsmetoc@hq.southcom.smil.mil MSG: HQUSSOUTHCOM J3	Mail: USSOUTHCOM SCJ33 METOC 9301 NW 33rd ST Miami, FL 33172

i. USJFCOM

(1) USJFCOM Mission

Provides mission-ready Joint capable forces and supports the development and integration of Joint, Interagency, and Multinational capabilities to meet the ***present*** and ***future*** operational needs of the Joint Force.
NOTE: USJFCOM is disestablishing in August 2011.

(2) USJFCOM Components

		Component support:
ACC	Langley AFB, VA	Director of Weather/A3O-W
FORSCOM	Ft McPherson, GA	Staff Weather Officer
MARFORCOM	Norfolk, VA	II MEF Staff Weather Officer
FLTFORCESCOM	Norfolk, VA	Staff Oceanographer N37/38
SOCJFCOM	Norfolk, VA	NA

Supporting theater METOC forecast centers:
Naval Maritime Forecast Center-Norfolk, VA http://www.usno.navy.mil/NOOC/nmfc-n

(3) USJFCOM METOC Staff

USJFCOM has one METOC billets (1 Navy O-5) and five Component Commands: USAF ACC, USA Forces Command (FORSCOM), USN Fleet Forces Command (FFC), and USMC Marine Forces Command (MARFORCOM), and Special Forces, Joint Forces Command (SOCJFCOM).

Senior METOC Officer: CDR Christy Cowan (Christy.cowan@jfcom.mil)

DSN: 836-7851 COMM: 757-836-7851 SECURE: 836-7851 FAX (unclass): 836-7617 FAX (secure): 836-5483 MSG: JFCOM	Mail: U.S. Joint Forces Command Senior METOC Officer/Code J33CO72 1562 Mitscher Ave, Suite 200 Norfolk, VA 23511-2488

j. USSOCOM

(1) USSOCOM Mission

Prepare special operations forces to successfully conduct worldwide special operations, civil affairs, and psychological operations in peace and war and in support of the GCCs, American ambassadors and their country teams, and other government agencies.

(2) USSOCOM Components

Component support:

AFSOC	Hurlburt AFB, FL	Command Meteorologist
USASOC	Ft Bragg, NC	Staff Weather Officer
NSWC	NAB Coronado, CA	Staff Oceanographer
JSOC	Ft Bragg, NC	Staff Weather Officer

Supporting METOC forecast centers:
23 WS, Hurlburt Field, FL
AFWA, Offutt AFB, NE
FNMOC, Monterey, CA
NAVOCEANO, Stennis Space Center, MS
Theater Operational Weather Squadrons (AF) and METOC Centers (Navy), as appropriate

(3) USSOCOM METOC Staff

USSOCOM has divested METOC functions and has tasked AFSOC/A3W to assume all USSOCOM METOC responsibilities.

Senior METOC Officer: Lt Col Donald Shannon (donald.shannon@socom.mil). Division Chief, AFSOC/A3W is dual-hatted as the SOCOM Senior METOC Officer .

DSN: 312-579-1541/2200 Red Line (VOSIP): 579-1241 COMM: 850-884-1541 SIPR E-mail: afsoc.a3w@afsoc.af.smil.mil NIPR E-mail: afsoc.a3w@hurlburt.af.mil	Mail: USSOCOM METOC 100 Bartley St, Suite 153W Hurlburt Field, FL 32544-5273

k. USSTRATCOM

(1) USSTRATCOM Mission

Provide the nation with global deterrence capabilities and synchronized DoD effects to combat adversary weapons of mass destruction worldwide. Enable decisive global kinetic and non-kinetic combat effects through the application and advocacy of ISR; space and global strike operations; information operations; integrated missile defense and robust command and control.

(2) USSTRATCOM Components

Joint Functional Component Command (JFCC):

JFCC SGS	Offutt AFB, NE	JFCC SGS METOC Branch
Global Integration Cell, Cruise Missile	Offutt AFB NE	JFCC SGS METOC Branch
Support Activity	Pearl Harbor HI	No METOC Staff
JFCC ISR,	Bolling AFB, MD	Staff METOC
JFCC IMD,	Shreiver AFB, CO	No METOC Staff
JFCC NW,	Fort Meade MD	No METOC Staff

Service component

AFSPC,	Petersen AFB CO	Branch Weather Officer
ARSTRAT,	Arlington VA	No METOC Staff
MARFORSTRAT,	Offutt AFB NE	No METOC Staff
FFC,	Norfolk VA	Staff Oceanographer

Task Forces (TF):

Aerial refueling	Scott AFB IL	TACC Weather
Airborne Comms	Tinker AFB OK	No METOC Staff
SSBN	Norfolk VA	Staff Oceanographer
SSBN	Pearl Harbor HI	Staff Oceanographer
Strat bomber & recon	Barksdale AFB LA	8th AF SWO
ICBM	F.E. Warren AFB WY	90 OSS/OSW

Supporting METOC forecast centers:
AFWA, Offutt AFB, NE
FLENUMMETOCCEN, Monterey, CA
14th Weather Squadron, Asheville, NC
FLENUMMETOC Det, Asheville, NC
Theater Operational Weather Squadrons (AF) and METOC Activities (Navy), as appropriate

(3) USSTRATCOM METOC Staff

USSTRATCOM has delegated responsibility for oversight, coordination, and execution of USSTRATCOM METOC operations to Joint Functional Component Command Space and Global Strike (JFCC SGS). JFCC SGS is assigned the METOC function for the operations, planning and execution of all METOC support for JFCC SGS and USSTRATCOM command

center elements. USSTRATCOM has additional METOC billets in the J2 and J8 directorates with responsibility for Geospatial Information & Services (GI&S), and METOC capability and resource integration respectively

Senior METOC Officer: CDR Cyndi Morgan (morgancy@stratcom.mil)

DSN: 271-5333 / 2510 SECURE: 271-8050 COMM: 402-294-5333 FAX (unclass): 271-2820 FAX (secure): 271-9170 MSG USSTRATCOM OFFUTT AFB NE//J3//	Mail: USSTRATCOM/JFCC SGS J302 901 SAC Blvd Suite L125 Offutt AFB NE 68113-6300

USSTRATCOM organizational structure is comprised of JFCCs, Service Components, Task Forces, Centers and HQ Staff. JFCCs are responsible for the day-to-day planning and execution of primary mission areas: space and global strike (SGS); ISR; network warfare (NW); integrated missile defense (IMD). Service specific component commands fulfill the role of training, equipping and resourcing the forces necessary to carry out USSTRATCOM's global missions. AFSPC is the Air Force Component. Army Space and Missile Defense Command / Army Forces Strategic Command (SMDC / ARSTRAT), is the Army service component. U.S. Marine Corps Forces, U.S. Strategic Command (MARFORSTRAT) serves as the U. S. Marine Corps service component. FFC, Va., is the Navy supporting commander. USSTRATCOM continues to rely on various task forces for the planning and execution of its traditional global missions. Several USSTRATCOM centers function as supporting organizations providing advisory or consultative services to operational Commanders.

l. USTRANSCOM

(1) USTRANSCOM Mission

Provide global air, land and sea transportation to meet national security objectives by maintaining command and control of lift forces and logistical infrastructure, setting operational lift policy, providing crisis planning for force deployment and sustainment, providing Joint Operations Planning and Execution System (JOPES) training worldwide, and advocating improvements to the common user mobility systems.

(2) USTRANSCOM Components

Component support:

AMC	Scott AFB, IL	Director of Weather
SDDC	Scott AFB, IL	No METOC staff
MSC	Bayonne, NJ	No METOC staff

Supporting METOC forecast centers:
AFWA, Offutt AFB, NE
FLENUMMETOCCEN, Monterey, CA

NAVOCEANO, Stennis Space Center, MS
All Air Force Operational Weather Squadrons
All Navy METOC (METOC) Centers

(3) USTRANSCOM METOC Staff

USTRANSCOM has no indigenous METOC personnel assigned. TRANSCOM's METOC support is divided between AMC/A3W staff for routine staff issues, and the 618 AOC (TACC)/XOW for day-to-day METOC briefings and queries. USTRANSCOM has three component commands: AMC, Military Surface Deployment and Distribution Command (SDDC), and Military Sealift Command (MSC).

Senior METOC Officer (AMC/A3W): Col John Knowles (John.Knowles-02@scott.af.mil)

DSN: 779-7713 SECURE: 576-5391 COMM: 618-229-7713 FAX (unclass): 576-5392 FAX (secure): N/A MSG: USTRANSCOM J3 OPERATIONS	Mail: HQ AMC /A3W 102 W. Losey St. Scott AFB IL 62225-5206

7. Joint METOC Organization

a. The Senior METOC Officer (SMO)

The CCDR designates a Senior METOC Officer (SMO), who normally works through the Operations Director (J3), to coordinate all METOC operations within the AOR. SMOs should liaison with the CCDR's component commands' staff METOC officers to facilitate this coordination. Section 7.1 describes, in general, job requirements for a SMO.

(1) SMO Billet requirements

A Top Secret (TS) clearance is required. Additionally, some Combatant Commands require sensitive compartmented information (SCI) access as well. Checking the Joint Table of Distribution (JTD), the manning document for CCMDs, will provide information on the SMO billet. Navy personnel will generally be for 1800-designated officers with a 6401P subspecialty code, and those coded for Air Force personnel would probably list the Air Force Specialty Code 15W4.

Navy PME or Air Force Intermediate/Senior Developmental Education (IDE/SDE) is highly desired and required for some joint billets. SMO billets should all be on the Joint Duty Assignment List (JDAP) and provide points in the new (2007) Joint Qualification System (JQS) towards eventual designation as a Joint Qualified Officer. In most cases, Service schools provide Phase I of JPME and the Joint Forces Staff College (JFSC) is Phase II.

(2) The SMO Branch

The METOC Branch at each Combatant Command has a small number of assigned personnel (the actual number varies) to provide all METOC support to the commander and staff. A METOC officer may not be directly assigned at some CCMDs, and support may be provided by METOC liaison officer(s) from a Service/Functional Component or another METOC agency. This support ranges from providing daily METOC update briefings and climatology, to developing annexes to OPLANs and OPORDs, to designing and implementing the entire METOC support force for a theater contingency or large-scale (multi-service or multi-national) exercise.

Each CCMD has Service components assigned by the Unified Command Plan that provide forces to joint operations. Most components will have a SWO or oceanographer who becomes the JMO or component METOC officer if required. Additional METOC forces that are not available in theater can be requested through the Joint Staff using procedures described later in this handbook.

(3) The SMO "Job Description"

The duties of a SMO are listed in CJCSI 3810.01, Joint Pub 3-59, the CJCS Master Training Guide, and the Universal Joint Task List (UJTL). Some primary tasks are described below.

As the CCDR's executive agent for METOC, the SMO develops and oversees execution of a METOC concept of operations that integrates with and complements the Combatant Commands concept of operations.

The SMO must provide or arrange for all METOC support to the CCDR and his staff. This includes daily briefings, environmental impacts to operations, climatological support, specialized forecasts, METOC-based research, and METOC expertise in Command projects and programs.

The SMO must assist the JMO and service components in the development and execution of JTF METOC operations within the Combatant Commands AOR. This includes the coordination and validation of personnel, equipment, data, and product requirements for exercises and operations.

Through the contingency and crisis action planning and execution cycles, the SMO must ensure an Annex H is developed for each CCMD OPORD, OPLAN, and concept plan (CONPLAN) as appropriate.

The SMO should expect to augment the CCDR's Joint Operations Center (JOC) or Joint Operations and Intelligence Center (JOIC) as required.

Working with USSOCOM, the SMO must provide/arrange theater SOC/JSOTF METOC augmentation and support.

(4) Helpful SMO hints

The following list of hints and is based on input received over the years. A more complete list will be provided on the planned SMO Collaboration Website, but this should suffice as a kind of "top items" list for now. Chapter 8 also includes a list of actions for a SMO during planning processes. Items are not prioritized and have been loosely organized into the DOCO construct:

(a) Doctrine/Documents

The Commander's Integrated Priority List (IPL) is a valuable tool for METOC officers to annually list their unfilled METOC requirements or to ask for resources to satisfy the operational mission. Component METOC officers should coordinate their inputs, through their component staff, to the SMO. The SMO can facilitate this recommendation at the Combatant Command level by promoting entry onto the CCMD IPL. SMOs should coordinate with the appropriate staff action officer to learn the process.

Review current Joint Strategic Capabilities Plan List (JSCP) for OPLANs and CONPLANs required for your CCMD. Maintain file/knowledge of all current Annex Hs for OPLANs, CONPLANs, FUNCPLANs, OPORDs, and any applicable standard operating procedures (SOPs).

Review Joint Center for Operational Analysis (JCOA) for and Lessons Learned (LLs) and After Action Reports (AARs). Know your CCDR's internal process for submitting and reviewing JCOA lessons learned and AARs. Submit and review lessons learned after each

operation/exercise if appropriate. Contact the Joint Staff for any lessons learned that have been tasked out. Distribute METOC AARs to components for distribution to tactical units.

Review your Combatant Commands METOC sensing strategy. The 2008 edition of JP 3-59, *Meteorological and Oceanographic Operations*, now requires a SMO to Developing a METOC sensing strategy that leverages Department of State, Department of Commerce, and other federal departments and agencies, as necessary. The SMO must also produce an initial METOC collection plan, based on the sensing strategy, during operation and contingency planning.

(b) Organization

Know Coalition METOC Services/organizations, including NATO, that have roles in your AOR. Review documentation designating Joint METOC Coordination Organizations for your CCMD.

Know your manning: reserves and augmentation personnel. Obtain/review copy of your Joint Table of Distribution (JTD), Joint Table of Mobilization and Distribution (JTMD), and the JMD of elements below the CCMD level. Establish a working relationship with your J1 and get to know the basics of manning from JP 1-0, *Personnel Support to Joint Operations*.

Have a broad knowledge of Time Phased Force and Deployment Data (TPFDD)/List (TPFDL) and some of the key personnel/equipment Unit Type Codes (UTCs) by service. See Chapter 8 for further discussion of Service TPFDD information. Liaison with your J3/J4/J5 to learn how your CCMD validates/manages TPFDD and TPFDL. Liaison with USTRANSCOM to get the schedule of upcoming scheduling conferences and attend one if possible. Liaison with TRADOC and ACC/A3W concerning contingency manning requirements.

(c) Capabilities

Know your available communications and systems; *e.g.*, GCCS, SIPRNET, NIPRNET, JWICS, GBS, JAAWIN, etc. Liaison with your J6 and component command METOC Officers to understand available communication paths, compatibility of component communications, and viable methods to interface component METOC forces in joint operations. Learn the various communication pathways to obtain METOC data via homepage or bulletin boards within your division and at the command center. Learn how to display METOC products on GCCS.

Review the universal list of METOC equipment. Refer to the Office of the Federal Coordinator for Meteorology (OFCM) weather equipment manual. Review/learn METOC software applications available from all Services. Obtain the necessary hardware to support the various software applications. Some of the programs you may need are a solar/lunar program, NITES, and a tropical storm tracking program. Review/learn other software that you may be required to use and support like ARCVIEW, FALCONVIEW, command and control personal computer (C2PC) and other GIS-based software.

(d) Operations

Review/understand the various planning processes that apply to your CCMD. Use Joint Pub 5-0, and your CCDR's instructions. Know your responsibilities to the Commander when a crisis response cell (CRC) or crisis action team (CAT) is established.

Review/learn the climatology of your area of responsibility (AOR). Develop and maintain climatology for your OPLANs and CONPLANs. Maintain climatology reference publications for AOR. Use 14TH WS, FNMOD Asheville, and NAVOCEANO as necessary

b. The Joint METOC Officer (JMO)

The Joint Force Commander (JFC) designates the JMO. The JMO is the senior METOC officer assigned to the JFC staff. The CCMD SMO could also be the JMO, if the CCDR is also the JFC, or absent other qualified personnel. The JMO billet must be identified on the JMD. There are no specific JMO billet requirements.

(1) The SMO/JMO Relationship

The relationship between SMO and JMO is one of close coordination--it is not a direct senior-subordinate relationship. Each is a member of their respective staff (whether pre-existing or ad-hoc) and, as such, reports within that organization. The SMO is the expert on how the CCDR prefers METOC support within the AOR and should ensure that these preferences are communicated to the JFC and his staff. When the JFC is named, his staff METOC officer will normally assume JMO responsibilities. If there is no staff METOC officer assigned, the SMO needs to discuss with the JTF Staff (usually the J3) whether or not there is a need for a JMO. A close SMO/JMO relationship should continue as staff planning at both the CCMD and JFC levels continues until the OPORD/OPLAN is complete. The SMO, with established resources and organizational ties, provides a significant wealth of knowledge, experience and support, which the JMO should draw upon as plans shifts into execution.

(2) The JMO Branch

The JMO is usually a member of the JTF J3 (USAF/USN organizational lines) or J2 organizations (USA/USMC organizational lines). During the execution phase, the JMO should be collocated with the JOC or Joint Operations Intelligence Center (JOIC).

The JMO coordinates with the SMO for augmenting personnel and equipment and for Joint METOC Coordination Center (JMCC) support to the operation. However, the actual requests should come via the normal processes (Joint Individual Augmentees for a JMD, or a Request For Forces (RFF)).

(3) The JMO "Job Description"

The duties of a JMO are listed in Joint Pub 3-59, CJCSI 3810, the CJCS Master Training Guide, and the Universal Joint Task List (UJTL). Some primary tasks are described below.

Per JP 3-59, *Meteorological and Oceanographic Operations*, the JMO plays a critical role in preparing for the success of the joint force mission by supporting all aspects of planning, deployment and employment. The JMO interacts with all the JFC's staff, the components of the joint force, regional and coalition (North Atlantic Treaty Organization [NATO]) METOC units, and the SMO to optimize METOC operations.

JMO Duties include:

- Assembling the JFC's METOC staff and equipment.
- Advising the JFC on whether to request or establish a JMCO and additional needed METOC capabilities.
- Assisting the JFC in developing and executing METOC roles and responsibilities in operational plans and procedures.
- Establishing and publishing information requirements and formats, and coordinating METOC operations for the joint force.
- Communicating with the SMO and Services for specific METOC capabilities required by deploying forces so they arrive equipped and ready for operational employment.
- Overseeing JOAF development.
- Coordinating with the SMO and joint staff on updates to the various annexes supporting the OPORD.
- Coordinating with the SMO to ensure all available METOC information and resources, as well as host nation assets, are properly considered and made available for use by joint forces.
- Ensuring that all METOC personnel and equipment are included in the TPFDD and coordinating with the SMO to ensure that METOC TPFDD requirements are validated.
- Developing, updating, and implementing a METOC collection plan to identify all sources of METOC data across the JOA, using the OPLAN's METOC sensing strategy and initial collection plan as a baseline.
- Actively monitoring and evaluating the planning and execution of the operation, and working METOC issues that arise.
- Providing feedback on the overall performance of the METOC operation effort.
- Providing after actions reports and lessons learned to SMO.

Recall that the JMO does not command the METOC forces in theater and does not specifically task how the Service components perform service-specific or unique tasks.

The rank structure within JTF METOC can be "out of whack". It can happen that the JMO will be junior in rank to SWOs on component staffs -- this is more likely when a MEF forms the core of a JTF, with a Numbered Air Force (NAF) and a Navy fleet serving as AFFOR and NAVFOR. Remember the JMO works for the JTF Commander, not another staff METOC Officer. Positional authority comes with the job.

(4) JMO Helpful Hints

The following list of hints and is based on input received over the years. A more complete list will be provided on the planned SMO Collaboration Website, but this should suffice as a kind of

"top items" list for now. What is the overarching theme? Coordinate! Items are not prioritized. Chapter 8 also includes a list of actions for a JMO during planning processes.

(a) General

Be aware of possible challenges resulting from the various Service cultures:

The Army and Navy widely uses SIPRNET, the USAF/use NIPRNET for peacetime/garrison operations.

USAF/Army use emails and formal memos, while the Navy tends to use messaging (DMS) via classified routing (typically available on ships).

USAF/Army typically issue detailed instructions in Letters of Instruction (LOIs), because each deployment's missions vary and must be synchronized; the Navy's mission and operations are largely the same each time out, with much less detailed guidance promulgated.

Planning cycles may differ: USAF/Army plan exercises and set requirements often with a 1-2 year lead time, using Initial, Mid, and Final Planning Conferences; Navy METOC often takes a look at what the Fleet is doing, and develops supporting requirements at the last minute.

Air operations: the USAF likes the Joint Force Air Component Commander (JFACC) concept, and uses the Air Tasking Order (ATO) to centralize air operations planning. AF weather must look out 3-5 days to support the air taskin order (ATO) cycle. Navy carrier operators (who want to reserve part of the air assets for Fleet defense, as do the Marines for Air-Ground Task Force defense) typically require much shorter-term outlooks.

(b) Planning

Get involved in the JTF planning process. The SMO may have already gathered and provided much of the information required during this planning process. The formats for Intelligence Estimate, Commander's Estimate, and OPORD annexes are the same for the CCMD as for the JTF staff.

Contact the SMO for review of developments and the Commander's Intent. Get turnover of any climatology or METOC staff planning to date. Discuss possible JTF component (Service or Functional Component) structure.

Identify specific staff directorates, components, and Boards, Bureaus, Centers Cells, and Working Groups (B2C2WG) that require METOC support

Review JTF HQ joint manning documents, update and modify as necessary, ensuring that METOC personnel required to support the HQ are reflected in the TPFDD. Consider composition, skills, experience levels, and service mix of JTF HQ METOC personnel.

Obtain SIPRNET/NIPRNET access identification numbers and passwords, as required.

Identify METOC communications requirements; coordinate with the J6 (through J-2/3 if appropriate). This includes communications at the JTF HQ (telephones, comm circuits, *etc*.) and for connection to the components.

From components, determine requirements for KQ identifiers to include data types for the KQs (SA, UJ, SD, *etc*.). Note: Obtain the KQ identifiers from AFWA, as appropriate.

Ensure customers/components have plans to accommodate natural disasters (*e.g.*, hurricanes, tornados, volcano eruptions, *etc.*).

Use Joint Doctrine, Instructions and SOP; leave Service Tactics, techniques and Procedures to the components.

(c) Coordination

Identify the need for a JMCC and coordinate with the JMCO Commander and SMO.

Determine what products are required from the JMCO/JMCC. Coordinate with SMO if necessary to discuss theater strategy and use of global and in-theater METOC resources.

Contact the JTF Service and Functional Component METOC officers. Discuss initial METOC CONOPS and establish lines of communication. Solicit input for their CONOPS. Continue to coordinate throughout the operation. Update the components as often as necessary, depending on the situation. Identify any of their unit shortfalls and required products and services as early on as possible.

Understand CCMD, JTF, and subordinate Battle Rhythms – to include briefing requirements for the JTF commander and staff, JFACC, JTCB, J3/5, etc.

Collect/verify METOC impacts from JTF/components.

Coordinate with all AOR METOC personnel their roles in strategic, operational, and tactical-level forecasting.

- Ensure components focus on tactical level forecasting (*e.g.*, bombs on target, DZ/LZ forecasts, Air Refueling (AR) forecasts) and provide significant impacts to the JFC as required.

Determine who issues advisories and weather warnings (*e.g.*, locally-issued advisories for airfields versus area weather warnings).

Detail/refine JTF HQ METOC-produced bulletins/forecasts (*e.g.*, the JOAF), to include information for components without organic weather support. Consider use of existing bulletins for designation as the JOAF.

Determine METOC information required to satisfy requirements for, or data required from:

- Observations and soundings.
- TAFs and other forecasts.
- Ocean, space, and atmospheric model output.
- Radar and satellite imagery.
- Climatology and oceanographic data.
- Hydrologic data.
- Non-METOC and/or non-traditional sources (seismic, volcanic, etc.).
- ARTYMET reports.
- Weather reconnaissance missions.
- SOF special reconnaissance missions.
- Trafficability forecasts.

Establish indigenous weather reporting networks.

If the JMO does not issue the JOAF, determine how the JMO will approve it prior being released.

Coordinate use of bulletin boards, broadcasts, homepages, *etc*.

Encourage coordination among component staff weather officers and oceanographers. Also coordinate for strategic airlift and tanker mission METOC support with deployed air mobility elements or the Air Mobility Command functional manager and with the appropriate numbered Fleet METOC officer and Military Sealift Command for METOC issues regarding strategic sealift.

Conduct an initial METOC analysis. Provide past, present, and future states of space, air, and ocean environments to JTF staff. Consider climatology of operational area, observations, and forecasts, including forecast product accuracy and limitations.

c. The METOC Operations Support Community (MOSC)

(1) The MOSC Concept

The number of METOC personnel assigned to a joint task force will normally be insufficient to provide autonomous support to the JTF. The broadly inclusive term "METOC Operations Support Community," or MOSC, is used to describe METOC units / organizations that are available via reachback to a JMO (or SMO acting as JMO). These organizations, shown in the figure below, include forecast centers, oceanographic teams, and operational weather squadrons, and many others. In practice, the JMO will choose one particular organization from the MOSC to be designated by the JTF Commander as the JMCO. The JMCO, more fully described in paragraph 7.4, will coordinate the efforts of other MOSC units as necessary to ensure a full suite of products and services are available to the JMO in support of the JTF.

(2) MOSC Organizations

As depicted in the figure, military MOSC organizations can range from small weather detachments up to organizations as large as AFWA. The MOSC also includes non-DoD governmental organizations like the NWS and non-governmental organizations from academia or the private/public sector. The JMO should be aware that the unit designated as the JMCO must be a military organization and (per CJCSI 3810.1) non-DoD sources of METOC information cannot be used in support of joint operations "unless and until the service METOC personnel responsible for supporting that entity determines that the source information is sufficiently timely, accurate, and reliable." Further - while JMOs may seek non-DoD METOC support for their JTF, recall from JP 3-59, *Meteorological and Oceanographic Operations*, that it is the SMO who "normally becomes the DoD focal point for METOC coordination between non-DOD agencies and supporting military forces." The principle example of a non-DoD METOC source within the MOSC would be the NWS. In this case, very little coordination may be required as it is already stated in JP 3-59, *Meteorological and Oceanographic Operations*, that "for most locations throughout the US, the NWS is the authoritative source for official forecast and related information."

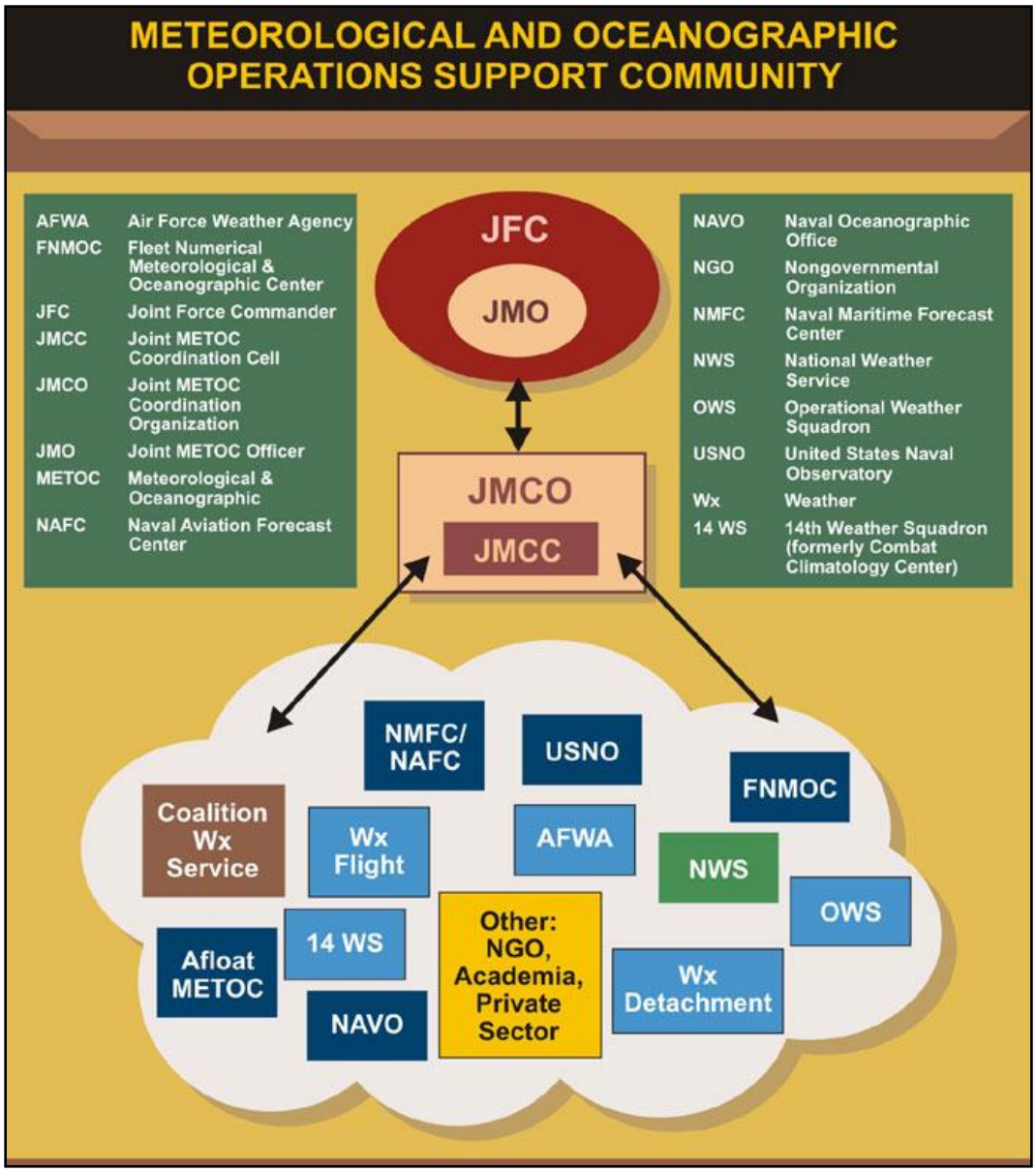

Figure 13: METOC Operations Support Community (From JP 3-59, *Meteorological and Oceanographic Operations*)

d. Joint METOC Coordination Organization (JMCO)

The JMCO is responsible by doctrine for coordinating the activities of all applicable MOSC organizations and facilitating specified METOC operations in support of the JTF. Selection of an organization from within the MOSC to fill the JMCO role depends on location, capabilities, communications connectivity, and operational considerations.

While the JMO may choose an organization from the MOSC as a likely candidate for the JMCC, they do not have the authority to task an organization; for that they require the authority of the Commander of their Joint Task Force (CJTF).

The command relationship between the JTF and the JMCO is that of direct support, with the CJTF being the supported commander and the JMCO commander being a supporting commander.

The CJTF, normally advised by the JMO, may request METOC capability from within or outside the combatant command. Requesting within the CCMD would most likely be to obtain the support of a METOC organization within one of the Combatant Commands Service components (e.g., a CENTCOM-based CJTF designation could flow via CENTCOM to AFCENT and then to 28th OWS or a PACOM-based CJTF could go via PACOM to PACFLT and then to 7th Fleet METOC). Requests outside the combatant command are accomplished through standard tasking channels wherein the JMCO is the organization designated by the tasked Service or Service component to provide or arrange for direct support to the JTF. Designation of the JMCO is normally via the Annex H to the CJTF's OPORD. The JMCO should also be listed as a supporting organization to the JFC in annex A of the named operation's OPORD.

The following table list possible JMCO organizations. More complete descriptions of the organizations can be found in the appropriate Service section of this handbook.

Table 3: Possible JMCO Organizations

Organization	Area
1st Wx Group	CONUS
15OWS	NE US, E Canada
17OWS	Pacific, SE Asia
21OWS	Europe, Africa
25OWS	W US, South America
26OWS	SC US, North Atlantic
28OWS	SE US, SW Asia
FNMOC	Global
FWC Norfolk	Atlantic, CENTCOM
FWC San Diego	Pacific, IO, CENTCOM

e. Joint METOC Coordination Cell (JMCC)

Normally, the support a JMCO provides to a JTF is only a small subset of its overall production. A JMCO should designate (or establish) a specific group to provide support to the JTF on a day-today basis. This group is termed the Joint METOC Coordination Cell (JMCC). The personnel requirements and force composition of the JMCC is determined by the JMCO commander. It will generally be staffed by a subset of the hosting METOC unit, with augmentation (possibly multi-service augmentation), as required.

The JMCC typically provides support to all joint forces and components in the joint operations area (JOA) via reachback. It is doctrinally required to synchronize and integrate pertinent METOC information in the JOA, leverage component capabilities and (virtually) assemble the appropriate MOSC components to meet joint force requirements.

It is critical that the JMCC act as the hub for integration of all METOC data in the Joint Operations Area and coordinate support requirements with the JMO because they produce the joint operations area forecast (JOAF) and other METOC products as required by the supported joint force and staffs - on a battle rhythm established by the JMO supporting the CJTF's decision cycle. The JMO should provide overall direction to the JMCO and its JMCC via the OPORD Annex H, METOC LOI or other established means.

With the requirements of a JMCC as described in the previous paragraph, it should be clear that communications connectivity, manning, equipment, location, and other possible restricting factors must all be carefully weighed when deciding on the JMCC. Also in the decision-making process for the establishment and placement of the JMCC is the need to balance sufficient METOC data flow with sufficient operational input. If emerging support requirements exceed JMCC capabilities after it has been established, then the JMO may need to have the CJTF change JMCO designation, or ask for additional assistance from the MOSC.

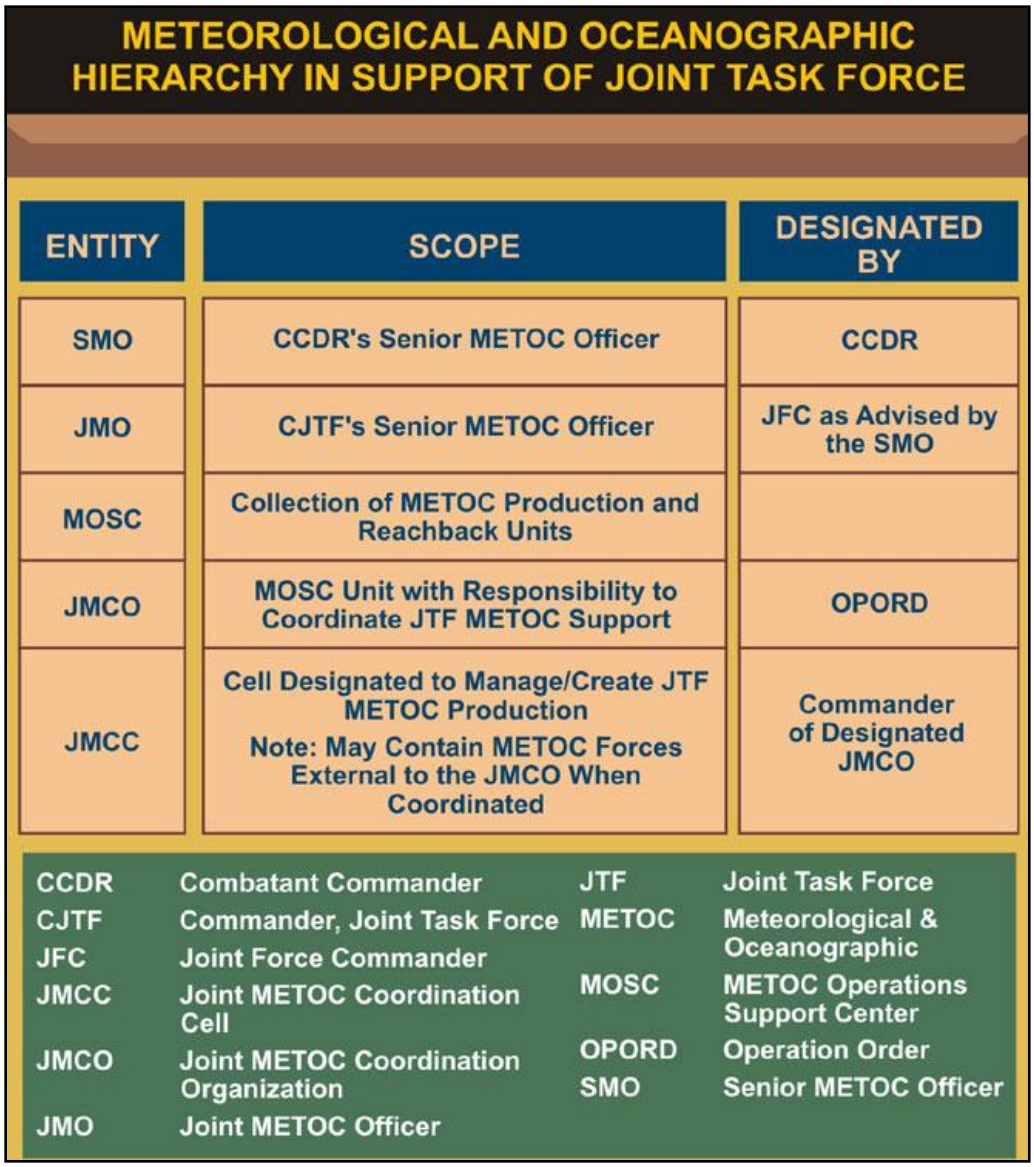

Figure 14: METOC Hierarchy in Support of a JTF (From JP3-59, *Meteorological and Oceanographic Operations*)

f. The Joint Task Force

This section summarizes the structure of a Joint Task Force headquarters and the types of METOC support that might be required by its various elements (J-codes, boards, and centers).

(1) JTF Structure

Organization of the Joint Task Force is up to the JTF Commander. A JTF may be built by augmenting a core organization (*e.g.*, XVIII Airborne Corps, II Marine Expeditionary Forces, Carrier Strike Group, AEF HQ) or *ad hoc* from various "contributors"; additionally, it may have select Service components, subordinate Joint Task Forces, and/or functional components. The JTF Commander will also determine what joint boards, centers and cells will meet--each of

which may require METOC support. The figure below depicts the typical organization of a JTF headquarters per joint doctrine.

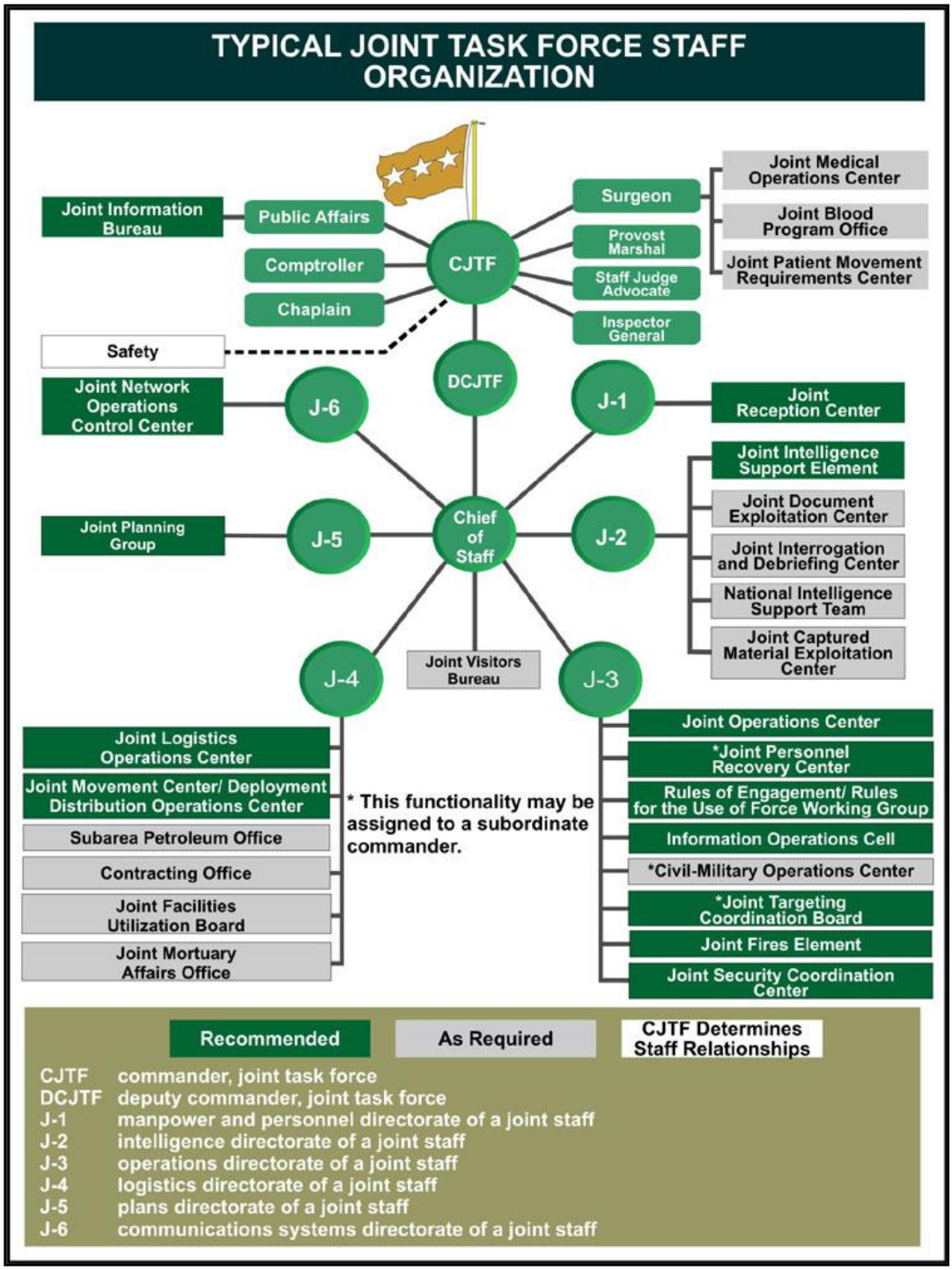

Figure 15: Typical Joint Task Force Headquarters Structure (From JP 3-33, *Joint Task Force Headquarters*)

(2) JTF METOC Support Requirements to JTF HQ Elements

The JMO, or his representative, should coordinate with each of the elements within the JTF headquarters to determine METOC support requirements. This section highlights the roles of the various JTF J-codes, boards, cells and centers, and potential METOC support required by each.

(a) J1 (Personnel)

METOC Requirements
- Daily forecasts

(b) J-2/JIC (Intelligence/Joint Intelligence Center)

Assets
- Joint Deployable Intelligence Support System (JDISS)
- National Technical Means (NTM) imagery analysis from Naval Oceanographic Office or other sources.
- Ability (through Combatant Commander) to task National collection assets as required
- Global Command and Control System (GCCS)

Roles and Responsibilities
- Provide METOC Essential Elements of Information (EEIs) during mission planning phase
- JMO SCI, and possibly special category (SPECAT) access, if required
- Monitor spot reports for directly-reported or implied weather data/impacts
- Provide METOC input to INTSUM
- Provide communications access to SWI data

METOC Requirements
- Briefings as required
- Collection management impacts (cloud-free forecasts, impacts on UAVs, etc.)
- IPB (friendly and enemy impacts to operations)

(c) J-4/LRC (Logistics/Logistics Readiness Center) and Medical/Surgeon

METOC Requirements
- Sea/Air POE/POD and en route weather
- Intra-theater weather (trafficability and air impacts)
- Human factors (wind chill, heat indices, etc.)
- Host nation agreements with respect to METOC support

(d) J-5(J-3 Plans)/Joint Planning Group (JPG)

METOC Requirements
- 24+ hour planning forecasts. Focused on medium and long range forecasts, used to determine the feasibility (due to weather and space environment impacts) of planned

operations. Planners must understand how adverse weather conditions can impact courses of action.

(e) J-6/JCSE (Communications/Joint Communications Support Element)

METOC Requirements

- Weather impacts on communication equipment using various portions of the electro-magnetic spectrum
- May include day/night HF propagation conditions
- Rain rate impacts on SHF & EHF communications systems
- Ducting of UHF & VHF signals
- X-ray flare and geomagnetic effects on HF propagation and scintillation effects on satellite communications and GPS navigation

(f) JPOTF (Joint Psychological Operations Task Force)

Psychological operations are activities designed to persuade or influence a target audience to accept or support United States (or Coalition) efforts to assist the local population and/or authorities. This is accomplished through such varied activities as leaflet drops, radio and TV broadcasts, loudspeaker operations, handbills and posters.

Psychological Operations (PSYOPS) units are normally attached to conventional units and receive weather support from the conventional unit weather team. However, a SOWT element may deploy with the PSYOPS unit to provide target area forecasts, surface and upper air, in support of these operations. These teams have a critical need for upper air data to provide accurate forecasts for leaflet drop operations.

(g) JSAR (Joint Search and Rescue)/CSAR (Combat Search and Rescue)

METOC Requirements

- High resolution satellite imagery. Computer derived SAR forecasts are available via reachback to assist over water search patterns from NAVFOR METOC

(h) JTCB (Joint Target Coordination Board)

Chaired by the JTF Deputy Commander, composed of component commanders or their representatives, to determine/assign target sets for use in planning of the joint forces campaign. The JFACC's ATO target lists for the next several cycles (72+ hours) are typically addressed in detail. Target sets, or specific targets, may be assigned to elements of the joint force (JFACC & JSOTF in particular) for planning and execution.

METOC Requirements

- Stand-up briefing at the daily JTCB meeting. It should specify METOC impacts to operations and reconnaissance for the next four to five days, including impacts due to space weather.

(3) METOC Support to Joint Task Force Components

This section summarizes the types of METOC support that may be required to support functional components of a Joint Task Force: that is, the Joint Force (JF) Air Component Commander (ACC), Land Component Commander (LCC), Maritime Component Commander (MCC), and the JSOTF.

The figure below depicts several variations for forming a Joint Task Force. The CJTF can form along Service or functional component lines or a combination of both.

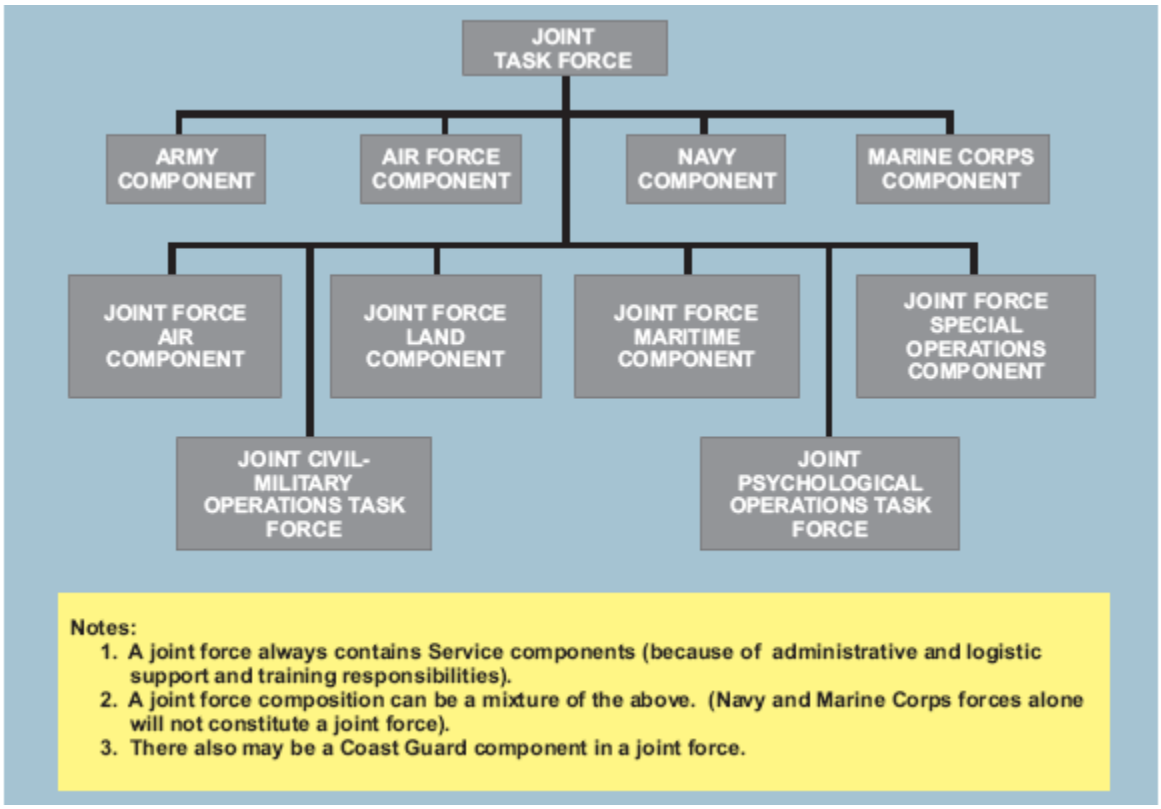

Figure 16: Joint Task Force Component Commands (From JP 3-33, *Joint Task Force Headquarters*)

Note: the JSOTF and the Joint Force Air Component Commander (JFACC) are usually established. The Army and Marine Corps components may stand-alone or combine to form the Joint Force Land Component Commander. The Joint Civil Affairs Task Force (JCATF) and JPOTF are frequently formed as part of the JTF HQ. When two service components are combined, the functional component commander's staff weather officer or oceanographer should be the primary METOC contact for that functional command.

(a) JFACC (Joint Force Air Component Commander)

Structure:

- JFACC Staff Weather Officer (may be the JMO if the JFACC is collocated with the JTF Commander's staff), forecasters and briefers as required for performing assigned tasks

and responsibilities. The JFACC is typically the Commander of a NAF, and the SWO is the senior weather officer on his staff.

Manning:

- JFACC minimum recommended manning (assumes collocation with full support METOC unit):
- One O-5/O-4 OIC
- Two O-3/5 briefers
- Three E-6/7 forecasters
- One GCCS operator

Relationship:

- Tied closely with JFACC plans cell, intelligence/reconnaissance cell, Joint Guidance and Apportionment Targeting cell (GAT), and the current operations cell
- Typically works for the Director, Joint Air Operations Center (JOAC)

Assets:

- No special requirements aside from telephones, PCs, etc.

Roles and Responsibilities

- Advise JFACC commander of operational impacts due to weather
- Met-watch launch, landing, and alternate airfields
- Coordinate with JMO and components as required
- Establish LCC data collection plan (to include FALOP)
- Establish ACC data collection plan and a JAOC -Rear to minimize the footprint forward.

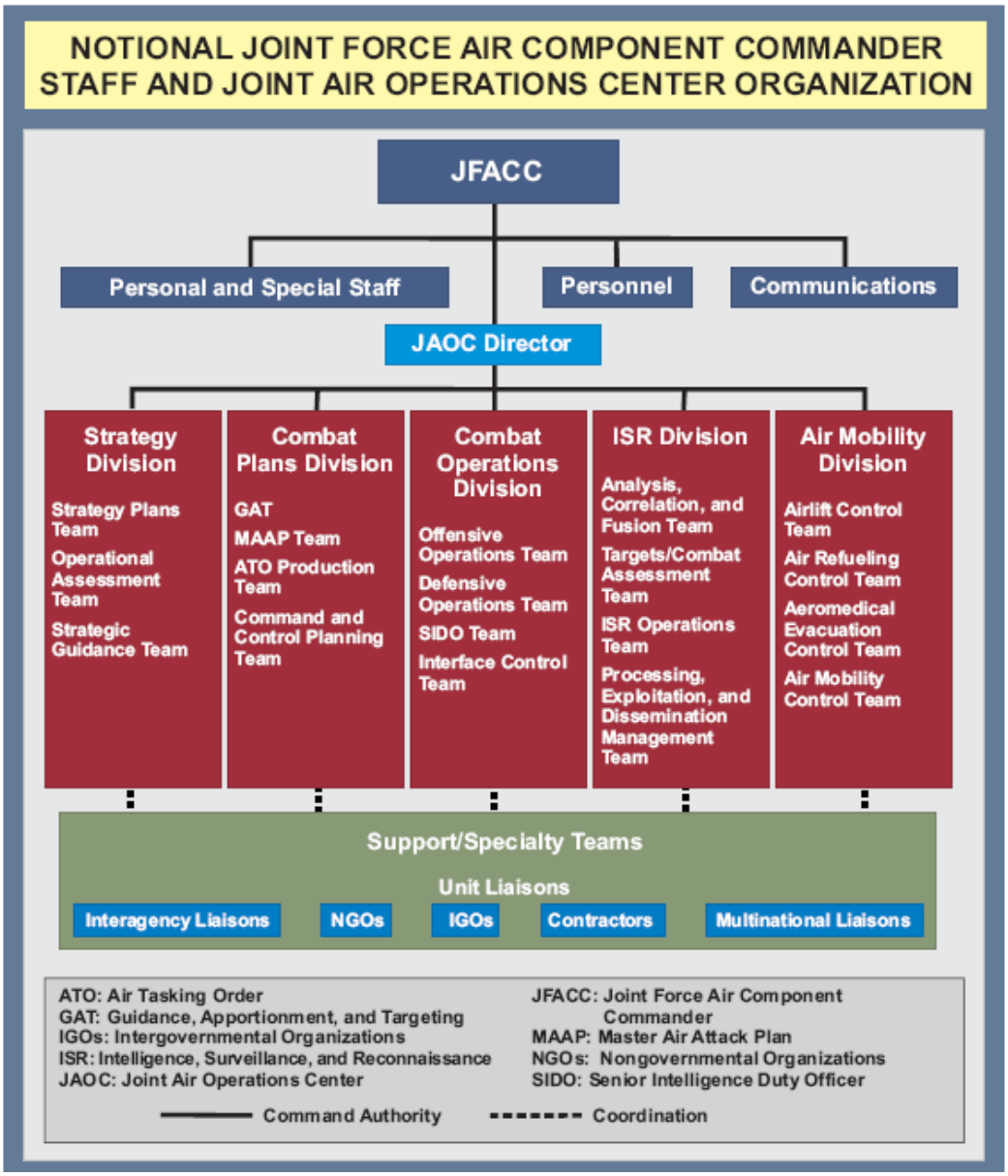

Figure 17: JFACC Organization (From JP 3-33, *Joint Task Force Headquarters*)

JFACC METOC Support Requirements:

- Primary emphasis is briefing and coordinating
- Monitor execution forecasts (*e.g.*, TAFs and AR route forecasts) and observations
- JOAF should provide the basis for these forecasts
- Met-watch JFACC airfields/ships
- Pass local weather warnings and advisories to staff
- Target and en route forecasts (as required), to include Tomahawk support
- Support JAOC and the ATO cycle
- Prepare/present planning electro-optical/IREPS data
- Provide decision assistance to ATO planning cell
- Request special products (Send to JTF JMO)

- Assist JFACC staff in working METOC support needs/shortfalls

JAOC METOC Cell:

- Responsible for supporting the full range of the JTF's air operations. Aside from developing routine staff/mission weather packages, one of the JFACC METOC cell's key roles is to provide critical METOC input to the joint targeting and air tasking cycle. The JFACC and JAOC may be collocated, or more likely, there will be a JFACC-Forward (including the JFACC Commander)

Targeting and tasking for joint air operations:

The ATO cycle begins approximately three days before expected mission date with air planners reviewing JTF objectives and targeting requirements to develop a preliminary target list

After input from weaponeers and other sources, a shell of the main mission-planning document, the ATO is generated. The ATO is then passed to flight and support planners to add in specific unit and resource data. The final ATO is published approximately one day before expected mission execution. After any last-minute revisions are made, the ATO is executed, combat assessment is performed, and the cycle begins again.

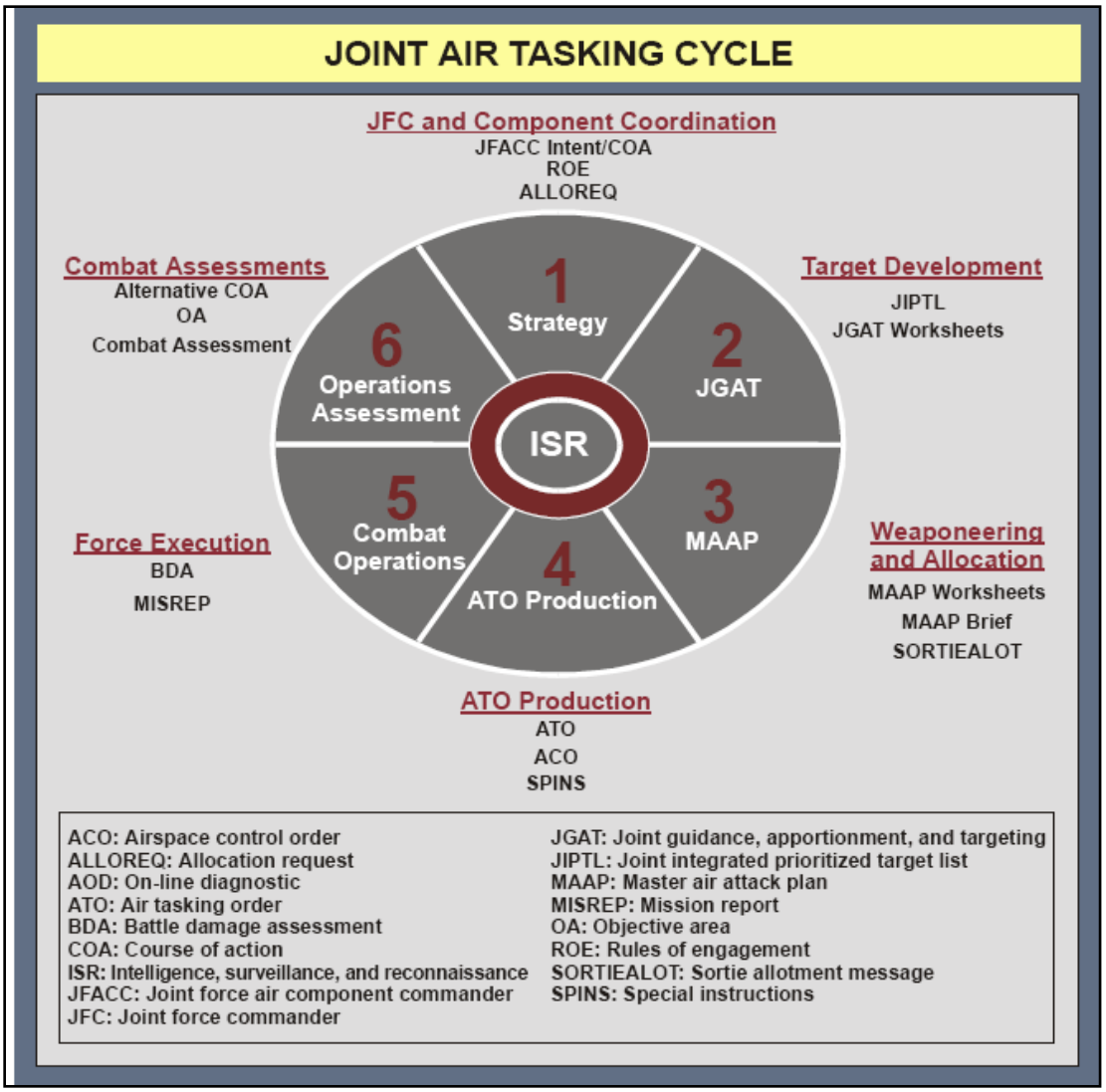

Figure 18: Air Tasking Order (ATO) Planning Cycle (From JP 3-30, *Command and Control of Joint Air Operations*)

Aerospace roles and missions. Early in the ATO cycle, planners consider which aerospace roles and missions are required to meet a given tasking. In most instances, an ATO will incorporate a majority of the roles/missions listed here:

- Aerospace Control (Counter-Air and Counter Space)
- Force Application (Strategic Attack, Interdiction and Close Air Support)
- Force Enhancement (Airlift, Air Refueling, Spacelift, Electronic Combat, Surveillance/Reconnaissance, Special Operations)
- Force Support (Base Operations and Base Defense, Logistics, Combat Support, and On-Orbit Support)

METOC Support Requirements for the joint targeting and tasking cycle:

- Close coordination between the ATO planners and the METOC cell is extremely important. Planners routinely ask for METOC input throughout the ATO cycle because it

directly influences the number and type of aircraft and type of weapons that may be used. Thus, METOC staff normally need to prepare forecast products for each ATO package covering conditions expected at 72, 48, 24, 12 hrs before mission execution. Some forecasts out to 120 hours may be required

- Since the ATO cycle is ~96 hrs in duration (from initial planning to ATO execution), there is more than one ATO being developed at any given time. It is important that METOC support units keep close track of both the briefed weather and developing weather conditions for each active ATO package

- Most ATO forecast products are comprised of routine aviation weather data: plain language forecast, winds aloft, hazards, cloud decks, etc. Specific missions may also require special METOC products, such as IRTSS, TAWS or AREPS output.

- To maximize effectiveness, Navy personnel assigned to the JFACC METOC staff should have aircraft carrier experience

(b) JFLCC (Joint Force Land Component Commander)

Structure:
- JFLCC SWO and supporting forecasters/briefers as required performing assigned tasks and responsibilities
- ARFOR- and MARFOR-assigned roles will require representation for their specific needs

Relationship:
- Army Land Component Commander (LCC): SWO works for G-2, close coordination with G-3
- Marine LCC: SWO works for G-2, close coordination with G-3

Assets:
- Generally organic to LCC commander's unit, augmented as needed (EAC, Corps, Division, or Brigade SWOs and their weather teams)

Roles and Responsibilities:
- Detailed METOC support to the JFLCC/ARFOR/MARFOR combatant command staff
- IPB and Intelligence Collection missions
- Climatology studies for operations time-frame
- Establish LCC data collection plan
- Coordinate with the JMO and components as needed
- Weather inputs to Effective Downwind Messages (EDM)/Chemical Downwind Message (CDM)
- Met-watch all areas of interest, including APODs, SPODs, and areas requiring Fire Support Coordination Measures

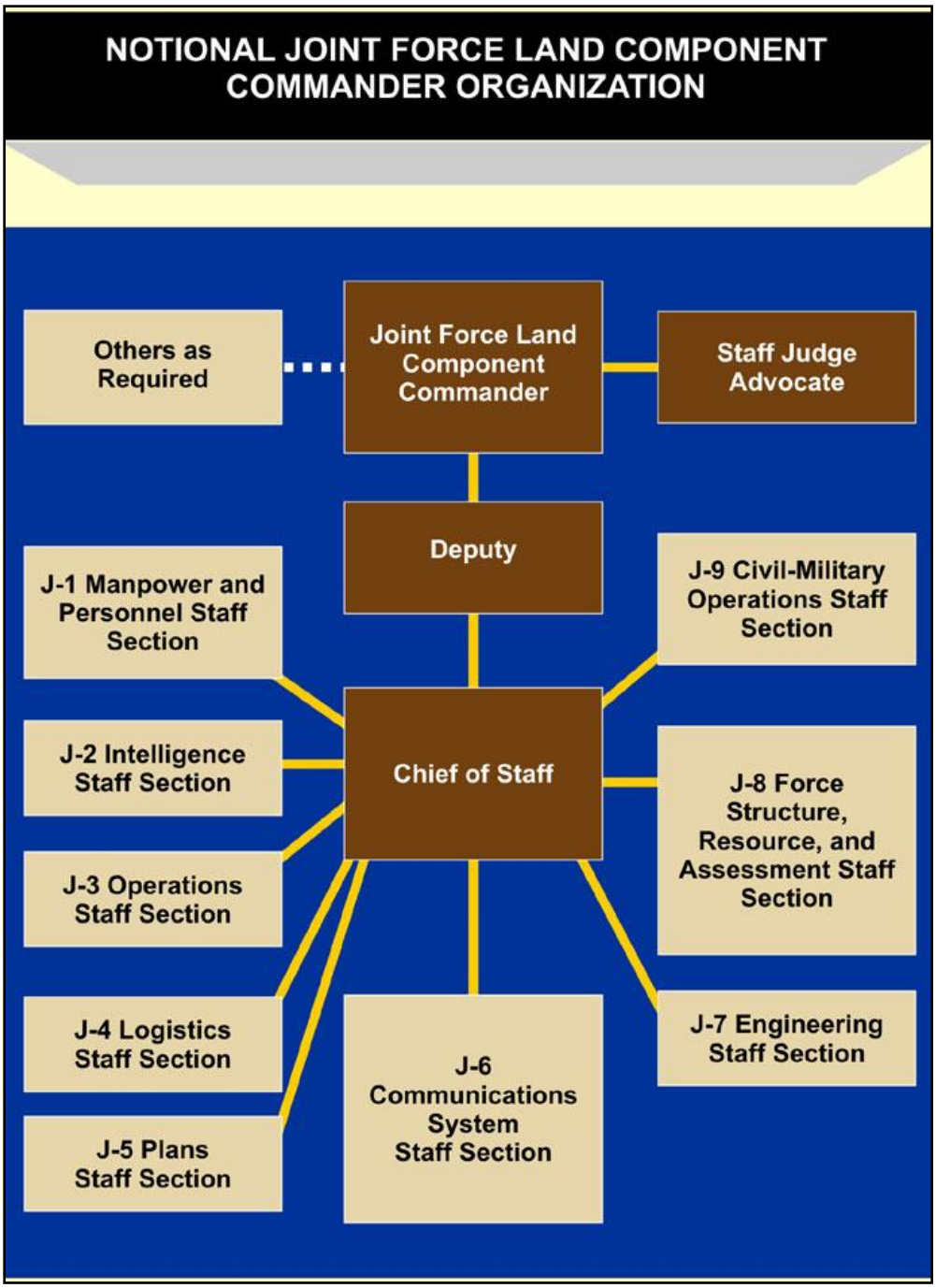

Figure 19: Notional JFLCC Organization (From JP 3-33, *Joint Task Force Headquarters*)

JFLCC METOC Support Requirements:

- JFLCC operations will vary based on the JTF mission, forces, and duration of the military operation. JFLCC support will center around meeting the planning and mission execution requirements of the JFLCC staff, ARFOR, MARFOR, and SOF when required. Support may also be required to the tactical operations center. Weather impacts provided to Army commanders are typically in "stoplight" format: green--favorable / minimal

operational restrictions; amber--marginal / moderate operational restrictions; red--unfavorable / severe weather impacts to operations.
- Long-range forecasts for the JOA and the adjoining Threat Force occupied areas (30, 15, and 7 days) based on climatology, climate models and NWP output.
- Execution forecasts for the JOA (3-5 days, 48-hour, 24-hour)
- Forecasts as needed for Air and Sea Point of Departures (APODs/SPODs), supply routes, and staging areas
- Briefings
- METOC requirements for Intelligence Preparation of the Operational Environment (IPOE):

Level	Forecast Time Interest
EAC	Beyond 96 hours
Corps	Up to 96 hours
Division	Up to 72 hours
Brigade	Up to 24 hours
Battalion	Up to 12 hours

(c) JFMCC (Joint Force Maritime Component Commander)

Structure:
- Numbered Fleet or Strike Group Oceanographer. The joint force maritime component commander (JFMCC) METOC cell is typically embarked in the NAVFOR's flagship, though it may be ashore, if the JFMCC is ashore.

Relationship:
- In a large JTF, a SOF METOC liaison officer or senior NCO may be assigned, reporting to Maritime Component Commander (MCC) N-3

Assets:
- CVN and LHD/LHA OA divisions or LCC/AGF OA division
- Mobile Environmental Teams
- Marine Theater Support from Navy METOC Centers (Norfolk, Pearl Harbor, Bahrain, San Diego, Yokosuka)

Roles and Responsibilities:
- OPTASK METOC (optional message)
- Combination of Annex H (METOC Operations) and a Letter of Instruction, detailing METOC relationships within the Strike Group and reoccurring procedures and requirements while the Strike Group is operating
- Usually updated by the Battle Group before deployment
- Coordinate with the JMO and components as needed

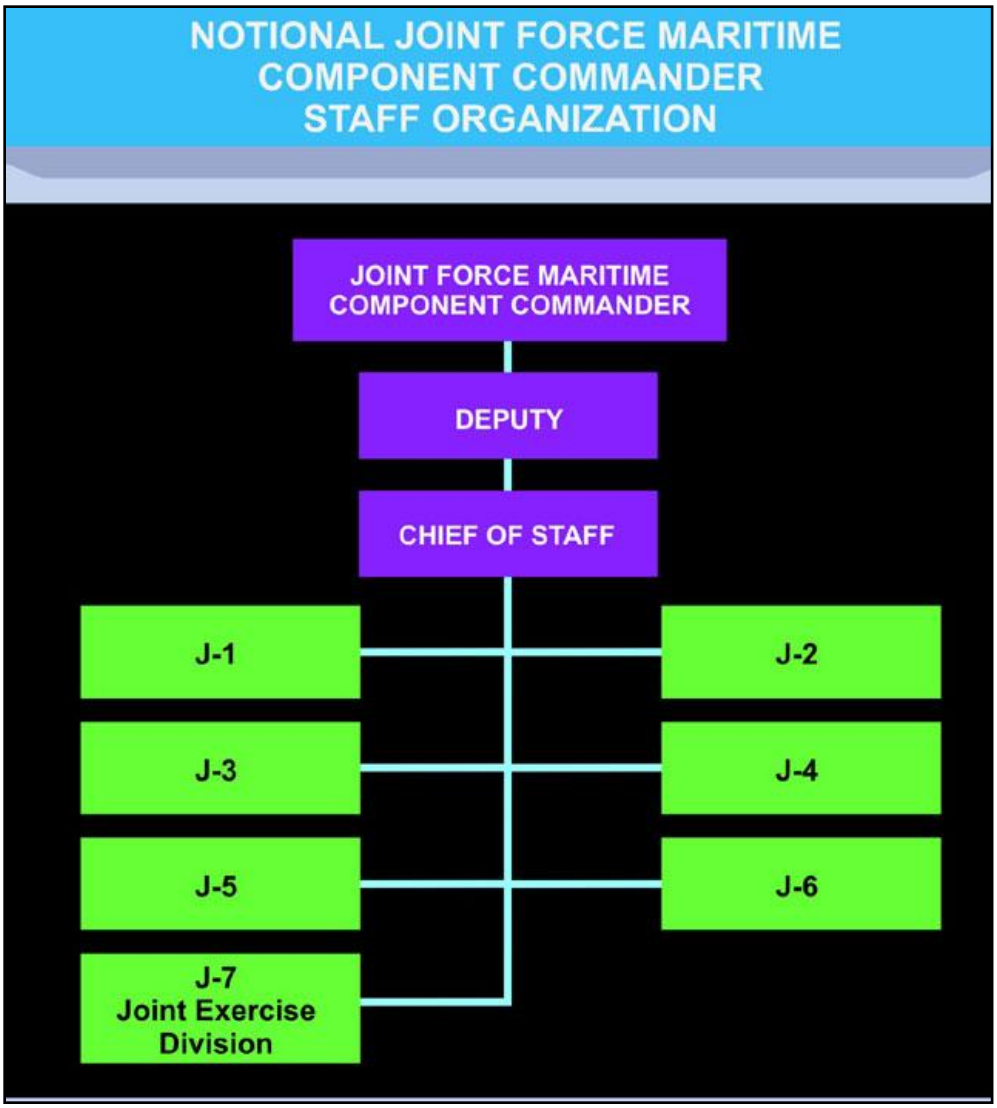

Figure 20: Notional JFMCC Organization (From JP 3-33, *Joint Task Force Headquarters*)

JFMCC METOC Cell Support Requirements:

- The Cell will direct support to subordinate warfare commanders. Typically tailored forecasts will be generated at the lowest level possible within the Strike Group based on a mission coordination forecast. All or some forecasts may be generated onboard the METOC capable unit.
- Briefings
- Maritime data collection
- Specific forecasts as required for various naval force missions:
- Undersea Warfare
- Surface Warfare
- Air Warfare
- Amphibious Warfare
- Mine Warfare
- Special Warfare

- Command & Control Warfare
- Information Warfare
- TLAM go/no-go, strike warfare and target weather

The NAVFOR Commander sets critical METOC thresholds for maritime missions. Reference Pub 1 (RP-1), "Environmental Effects on Naval Weapons Systems and Naval Warfare," contains suggestions of limits for maritime operations. Other threshold considerations can be determined from a variety of Naval Warfare Publications (NWP), particularly those governing classes of ships and their weapon systems. Items to be considered:

- Surf conditions (denoted with the Modified Surf Index, MSI)
- Sea state impacts on flight ops, mobility, replenishment at sea, airborne & ship borne MCM, and Explosive Ordinance Disposal (EOD) Ops
- Ceiling and visibility impacts on shore and shipboard flight operations and target and strike weather (for aircraft and Tomahawk missions)
- Radar performance (refractivity profile)
- Sonar performance (sound speed profile)
- Electro-optical systems performance
- Sensible weather (temperature, visibility, precipitation, altimeter setting, etc.)

(d) JSOTF/JFSOCC (Joint Special Operations Task Force/Joint Force Special Operations Component Commander)

Structure:

- Term JSOTF is generic and does not apply to any specific organization, unit or level of command
- May be small and temporary or large and permanent depending on mission
- May be deployed as a joint organization or formed around an existing service force structure with an augmented staff
- May consist of elements of the theater SOC or may deploy as a complete package from outside of theater at direction of the President/SecDef
- JSOTF normally subordinate to Theater SOC, but other command arrangements are possible

Relationship:

- A METOC liaison officer or senior NCO should be assigned to the HQ JTF to keep the JMO aware of impending SOF missions, requirements, and ensure effective coordination with the JSOTF METOC cell

Assets:

- SOWT deployed at forward operating bases and other SOF command elements
- USN Mobile Environmental Teams assigned to SEAL team support

Roles and Responsibilities:

- SOF-unique support
- Mission-specific requirements
- Products tailored from large to small operating team missions

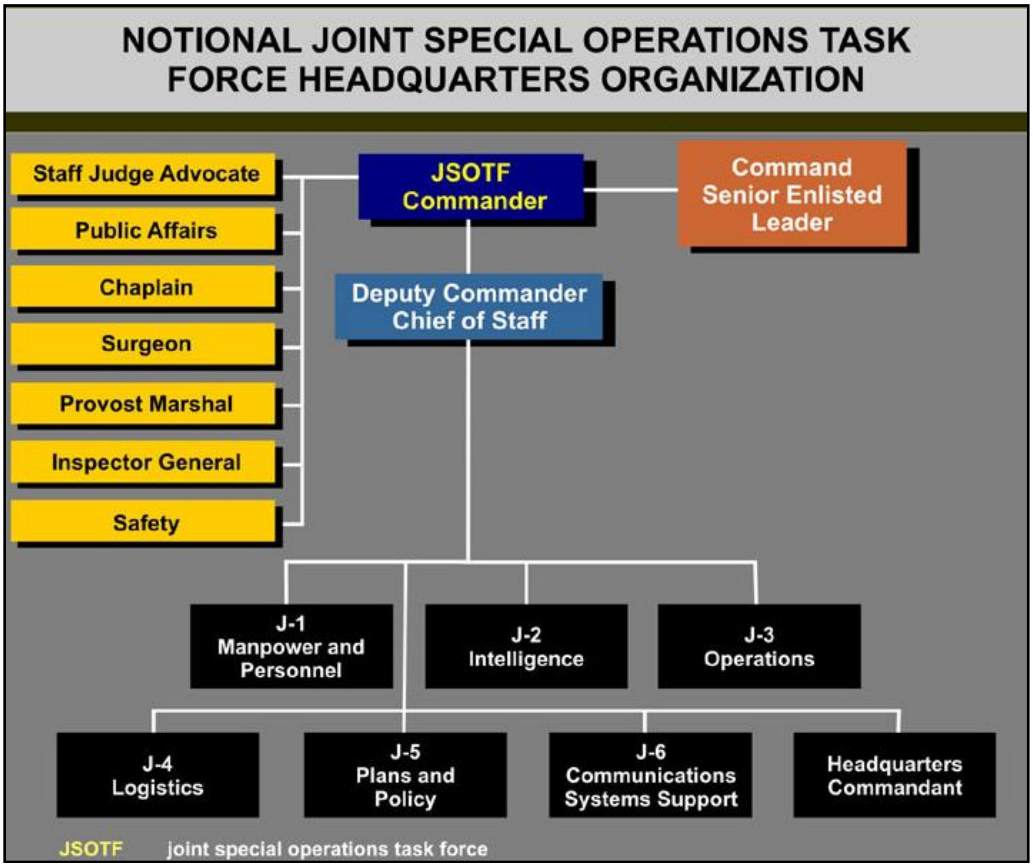

Figure 21: Notional JSOTF Organization (From JP 3-33, *Joint Task Force Headquarters*)

JSOTF METOC Cell Support Requirements:

- Support varies depending on scope and extent of the assigned mission(s); the JSOTF must have highly flexible support providers.
- Basic METOC support package includes 2 officers, 4 enlisted forecasters
- Basic forecast and observing data provided by JTF JMO, then is tailored and distributed to SOF component teams
- JSOTF SWO works closely with JMO to meet SOF mission requirements
- JSOTF SWO and tactical SOF METOC teams may be supported directly by the SOFWOC, the Navy's Warfighting Support Center (WSC), and 14TH WS as required. Support will be coordinated and deconflicted with the JTF JMO, designated JMFU, and applicable Major Forecast Center (OPSEC permitting)
- JSOTF METOC team composed of personnel with proper mix of Army, Navy, and Air Force SOF support experience to effectively exploit the environment for the assigned mission

Possible METOC support requirements for JSOTF headquarters:

- Limited weather observations
- Briefing support to headquarters

- Forecasting support - planning forecasts, point and target forecasts, route forecasts, mission control forecasts, EO forecasts, surf and oceanographic forecasts, solar and lunar data
- METOC support to an Air Force Special Operations Base. Same as tactical AFFOR support. Up to 7 man team provides:
- Limited weather observations
- Briefing support
- Forecast support (TAFs, mission planning forecasts, route forecasts, EO forecasts, flight weather briefings)
- METOC support to an Army Special Operations Base. Up to 7 man team provides:
- Limited weather observations
- Briefing support
- Forecasting support (point and target forecasts, some EO forecasts, Army flight operations support)
- Other Special Operations Forces METOC support: selected SOF weather teams may deploy to take and disseminate weather observations as determined necessary by the JSOTF Commander and JSOTF JMO

g. Joint Task Force METOC

(1) JTF HQ METOC Branch Structure

The JTF METOC organization may range in scope from a small briefing cell to a full-function METOC forecast activity. With the current emphasis on minimizing the footprint of forces forward, the size of the JTF staff and thus the allowable number of JTF METOC personnel collocated with the headquarters will be small. Economy of force will normally dictate the use of METOC Centers to provide products and services that the JTF METOC personnel at the headquarters will be unable to provide.

The assets of the METOC branch are highly variable, depending on scope of the organization and assigned responsibilities.

JTF METOC personnel report to the JMO, who is responsible for the direction and coordination of METOC activities under the Joint Force Commander's Operational Control (OPCON). Since manning can vary with the scope of the operation and forward-deployed JTF footprint, it is recommended that assigned personnel be able to provide METOC support to all Services represented in the JTF – air, ground and maritime. The JMO must ensure a proper mix of officers and enlisted forecasters to provide the credibility and experience required within the JTF staff.

Considerations when identifying branch requirements include:
- Customer backbone communications and data collection plan
- Equipment availability
- Contingency manning (no days off)
- Additional manning required for long-term events

(2) JTF HQ METOC Roles and Responsibilities

- As assigned to directly support CJTF/JMO
- To the maximum extent allowable, produce products and forecasts to support ongoing operations and give METOC guidance to the components
- Assist the JMO in providing full spectrum support to the JTF HQ staff, boards, centers and cells
- Functionally coordinate METOC data and product support from externally tasked assets per LOI or Annex H of the OPORD/OPLAN/CONPLAN
-

(3) Joint METOC Products

The JMO may develop METOC products such as those listed below for JTF customers, or have a regional or major forecast center produce supporting products. Additional products required by the functional components (e.g., the JFACC, JFMCC, JFLCC, etc.) are detailed elsewhere. Additionally, the JTF METOC Cell may need to maintain a capability to produce component METOC products, in case a component command becomes unable to provide indigenous METOC support due to communication limitations.

- Joint Operational Area Forecast (JOAF)
- Drop Zone Forecast
- Weapon Sensor Performance
- Air Refueling (AR) Route Forecasts
- Terminal Aerodrome Forecasts (TAFs)
- Mission Planning Forecasts (MPFs)
- Mission Control Forecasts (MCFs)
- Lower and Upper Level Horizontal Weather Depiction (HWD)
- Significant Weather Prog
- Electro-optics Bulletin
- Surface Analysis
- Specialized Support Bulletins (as requested)
-

(4) Meteorological Equipment

METOC equipment available to the JTF METOC cell will vary, based on the mission and required capabilities at the JTF HQ. Most tactical-level METOC equipment will be located at and below the JTF component level. The JTF METOC cell at a minimum requires computers with NIPRNET/SIPRNET connectivity and access to the Global Command and Control System (GCCS). Depending upon the communications requirements, secure VTC, collaborative planning tool sets and secure voice communications may be needed.

(5) Communications and Computers

This section describes joint command and control, communications, computers systems, and infrastructure. The discussion is conceptual in nature and highlights DoD's approach toward

developing joint collaboration tools and the common operational picture (COP). This material comes from the 14 February 2005 Final Change Draft of JP 6-0, *Joint Communications System*.

(a) Global Information Grid (GIG)

The GIG is the globally interconnected, end-to-end set of information capabilities, associated processes and personnel for collecting, processing, storing, disseminating and managing information on demand to joint forces and support personnel. It is a single architecture for a "plug and play" networked environment for joint and multinational operations and supporting activities. The GIG includes all owned and leased communications and computing systems and services, software (including applications), data, security services, and other associated services necessary to achieve IS. It also includes National Security Systems (NSS) as defined in section 5142 of the Clinger-Cohen Act of 1996. The GIG supports all DOD, national security, and related intelligence community (IC) missions and functions (strategic, operational, tactical and business), in war and in peace. The GIG provides capabilities from all operating locations (bases, posts, camps, stations, facilities, mobile platforms and deployed sites). The GIG provides interfaces to multinational and non-DOD users and systems. *For the purposes of the GIG, raw sensor data is not considered to be "information" until it is transported to the communications system or processing node and converted to a file format that can be used by an information consumer.*

(b) Global Command and Control System (GCCS)

A system of computer applications supporting command and control functions of the DOD. GCCS provides the President and Secretary of Defense, JFC, and subordinate components with critical information processing, dissemination, visualization, and collaboration capabilities necessary for C2 of joint forces across the range of military operations. Its common operational picture (COP) correlates and fuses data from multiple sensors and intelligence sources to provide joint forces the SA needed to be able to act and react decisively. It also provides an extensive suite of integrated office automation, messaging, and collaborative applications. GCCS joint capabilities are key enablers of the functional concept of agile C2 (e.g. superior decision making, simultaneous C2 processes, shared understanding). Built upon the foundation provided by the Net-Centric Enterprise Services (NCES) created by DISA, GCCS incorporates the latest in commercial computer hardware, software, and communications technology. GCCS is able to rapidly and cost-effectively field new applications as requirements evolve and technology advances.

(c) GCCS METOC Applications

With DISA's fielding of NITES and the New Tactical Forecast System (NTFS) in GCCS 4.0, the first METOC segments are available within the DII COE for use by joint METOC personnel. These segments ingest gridded, observational and imagery data for processing and display in the joint mapping and visualization segment. The significance of these segments is twofold: first, the segments provide systems (*e.g.*, GCCS) within the DII COE the capability to display METOC products in the situational awareness picture. Secondly, the Applications Programming Interfaces (APIs) used by the segments are available to other segment developers so that

METOC data can be fully integrated in mission support applications (*e.g.*, satellite vulnerability, joint air defense planning, unmanned aerial vehicle (UAV) mission planning). The APIs are based on WMO communications formats for binary data exchange (GRIB and BUFR). These formats are included in the Joint Technical Architecture (JTA). GRIB formatted gridded fields are available from all of the major production centers. Air Force Weather Agency products are available as gridded fields on SAFWIN. Navy products are available from FLENUMMETOCCEN and Navy METOC regional centers.

(d) GCCS Configuration

Typically, the JTF HQ will have two UNIX servers and any number of PCs configured as GCCS workstations. The GCCS software is implemented within a client/server model, meaning a UNIX server can provide data to a number of clients (other UNIX workstations and/or PCs). The UNIX applications server can host the Enhanced Linked Virtual Information System (ELVIS-II), which provides the COP and other GCCS products (including METOC products) to any client using web-based (JAVA) technology. The PC web server can host the CJTF's METOC site with updated METOC products.

(e) Defense Messaging System (DMS)

DMS is the primary means through which text messages are transmitted to the warfighter, replacing AUTODIN. DMS is a multilevel secure system for transmission of record message traffic in support of the Department of Defense. Critical systems supporting C2 may be designated for DMS applications supporting specified message handling functions. DMS offers two levels of messaging service: DMS high grade service and DMS medium grade service. DMS high grade service has replaced the Automated Digital Network as the organizational message system of record. DMS high grade service allows joint forces to communicate and share information quickly and securely with any DOD or IC organization, using inherent global directory services. DMS medium grade service is a secure e-mail system using DOD public key infrastructure. It supports DOD's non-organizational (e.g., individual, informal) messaging requirements. Using resident global directory services, DMS allows joint forces to communicate and share information quickly and securely with any DOD or IC organization.

(f) SATCOM Systems

The MILSATCOM programs provide basic long-haul communications support to the warrior. The four key components are UHF systems, SHF systems, EHF systems, and commercial satellite communications. UHF systems are not secure and provide low data rate (LDR) connectivity to deployed forces, while EHF systems are survivable and jam-resistant. Direct broadcast satellite systems, such as the Global Broadcast System, use small, low-cost, commercial type terminals to provide high-capacity transfer of information directly to the warrior. Commercial satellites carry non-sensitive administrative and combat support information. Wideband (Ku and C band) SATCOM systems can add extra bandwidth in support of crisis situations without requiring the Government to launch and operate additional military satellite systems.

8. Joint METOC Planning

a. Joint Documents

There are a variety of references used throughout this handbook and by the Joint METOC community. A necessary task in many Joint evolutions is to pause and ensure that the terms being used are commonly understood. A brief description of various reference documents follows.

(1) Joint Doctrine

From JP 1, *Joint Warfare of the Armed Forces of the United States*: The purpose of joint doctrine is to enhance the operational effectiveness of US forces. Joint policy is reflected in CJCS Instructions and joint procedures in CJCS Manuals. These instructions and manuals are not JP, but contain CJCS policy, procedures and guidance that do not involve the employment of forces. Though neither policy nor strategy, joint doctrine serves to make US policy and strategy effective in the application of US military power.

Only those doctrine publications approved by CJCS are referred to as "joint publications." They are developed in coordination with the Services, combatant commands and the Joint Staff. Documents involving the operations of two or more Services that are approved by the relevant Chiefs of Service (or their designated agent) will be referred to as "multi-Service" and will identify the participating Services (e.g., Army and Air Force doctrine; or Army, Navy and Air Force procedures). These documents are not JPs, but they must be consistent with approved JPs.

Joint doctrine is based on extant capabilities, i.e., current force structures and materiel. It incorporates time-tested principles such as the principles of joint operations, operational art, and elements of operational design for successful military action, as well as contemporary lessons that exploit US advantages against adversary vulnerabilities. Joint doctrine standardizes terminology, training, relationships, responsibilities and processes among all US forces to free JFCs and their staffs to focus efforts on solving the strategic, operational and tactical problems confronting them.

Joint doctrine is authoritative guidance and will be followed except when, in the judgment of the commander, exceptional circumstances dictate otherwise. That means doctrine does not replace or alter a commander's authority and obligation to determine the proper COA under the circumstances prevailing at the time of decision; such judgments are the responsibility of the commander, and doctrine cannot be a substitute for good judgment. Joint doctrine is not dogmatic—the focus is on how to think about operations, not what to think about operations. Its purpose is to aid thinking, not to replace it. It must be definitive enough to guide operations while versatile enough to accommodate a wide variety of situations. Joint doctrine should foster initiative, creativity and conditions that allow commanders the freedom to adapt to varying circumstances. The judgment of the commander based upon the situation is always paramount.

Joint doctrine applies to the Joint Staff, CCDRs, subordinate unified CDRs, JTF CDRs, subordinate component CDRs of these commands, and the Services. In developing joint doctrine,

existing Service, multi-Service, and multinational doctrine is considered. However, **joint doctrine takes precedence over individual Service's doctrine, which must be consistent with joint doctrine.** Joint doctrine should not include detail that is more appropriate in Service doctrine, standing operating procedures, plans and other publications. If conflicts arise between the contents of a JP and the contents of Service or multi-Service publications, the JP will take precedence for the activities of joint forces unless CJCS, normally in coordination with the other members of the JCS, has provided more current and specific guidance.

When the Armed Forces of the United States participate in multinational operations, US commanders should follow multinational doctrine and procedures that have been ratified by the United States. For multinational doctrine and procedures not ratified by the United States, commanders should evaluate and follow those belonging to the multinational command.

(2) Publications

Joint Publications are, by definition, doctrine. Not all Services use this same definition.

The Air Force definition of a publication is "An officially produced, published, and distributed document issued for compliance, implementation, and or information." This much more generic term is sometimes called an "issuance" in the other Services or in the Joint context.

(3) Instructions

Instructions, specifically CJCS Instructions, contain **policy and guidance** that does not involve the employment of forces.

(4) Manuals

Manuals, specifically CJCS Manuals contain detailed **procedures for performing specific tasks** that do not involve the employment of forces.

b. Types of Command

(1) Combatant command (COCOM)

From JP 1, *Doctrine for the Armed Forces of the United States*: Combatant Command is the command authority over assigned forces vested only in the commanders of combatant commands. Combatant Command is the authority of a CCDR to perform those functions of command over assigned forces involving organizing and employing commands and forces, assigning tasks, designating objectives, and giving authoritative direction over all aspects of military operations, joint training (or in the case of USSOCOM, training of assigned forces), and logistics necessary to accomplish the missions assigned to the command. It cannot be delegated or transferred.

(2) Operational Control (OPCON)

From JP 1, *Doctrine for the Armed Forces of the United States*: OPCON is the command authority that may be exercised by CDRs at any echelon at or below the level of combatant command and may be delegated within the command. OPCON is inherent in COCOM and is the authority to perform those functions of command over subordinate forces involving organizing and employing commands and forces, assigning tasks, designating objectives, and giving authoritative direction necessary to accomplish the mission.

(3) Tactical Control (TACON)

From JP 1, *Doctrine for the Armed Forces of the United States*: TACON is the command authority over assigned or attached forces or commands, or military capability or forces made available for tasking, that is limited to the detailed direction and control of movements or maneuvers within the operational area necessary to accomplish assigned missions or tasks. TACON is inherent in OPCON and may be delegated to and exercised by CDRs at any echelon at or below the level of combatant command.

(4) Supported and Supporting Commanders

From JP 1, *Doctrine for the Armed Forces of the United States*: A support relationship is established by a superior CDR between subordinate CDRs when one organization should aid, protect, complement, or sustain another force.

Support may be exercised by CDRs at any echelon at or below the combatant command level.

The establishing authority (the common superior CDR) is responsible for ensuring that both the ***supported*** CDR and ***supporting*** CDRs understand the degree of authority that the supported CDR is granted.

There are four defined categories of support that a CCDR may direct over assigned or attached forces to ensure the appropriate level of support is provided to accomplish mission objectives:

- General Support
- Mutual Support
- Direct Support
- Close Support

c. Types of Joint Operation Planning

A JMO/SMO could be expected to participate in two types of joint operation planning: Contingency Planning and CAP. These categories differ primarily in levels of uncertainty, available planning time, and products. Figure 22 shows where these planning processes fit in relation to overall joint strategic planning. Extensive use of JP 5-0, *Joint Operation Planning*, 26 Dec 06, will be used in the following sections to describe joint operation planning. The specific role of METOC in the planning process will be explored in subsequent sections.

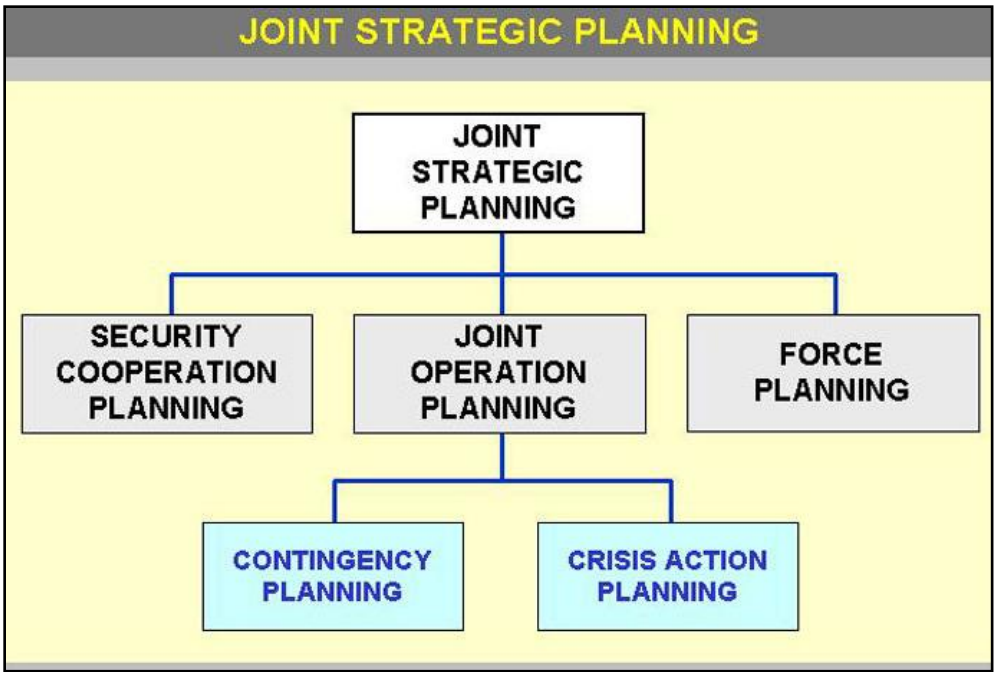

Figure 22: Joint Strategic Planning (From JP 5-0, *Joint Operational Planning*)

(1) Contingency Planning

From JP 5-0, *Joint Operation Planning*, 26 Dec 06,: A contingency is an anticipated situation that likely would involve military forces in response to natural and man-made disasters, terrorists, subversives, military operations by foreign powers, or other situations as directed by the President or SecDef. The joint planning and execution community (JPEC) uses contingency planning to develop plans for a broad range of contingencies based on tasks identified in the Contingency Planning Guidance (CPG), Joint Strategic Capabilities Plan (JSCP), or other planning directives. Contingency planning begins when a planning requirement is identified in the CPG, JSCP, or a planning order, and continues until the requirement no longer exists. The joint strategic capabilities plan (JSCP) links the Joint Strategic Planning System to joint operation planning, identifies broad scenarios for plan development, specifies the type of joint OPLAN required, and provides additional planning guidance as necessary. A CCDR may also initiate contingency planning by preparing plans not specifically assigned but considered necessary to discharge command responsibilities.

(2) Crisis Action Planning

From JP 5-0, *Joint Operation Planning*: Within the context of the JOPES, a crisis is an incident or situation involving threat to the United States, its territories, citizens, military forces, possessions, or vital interests. It typically develops rapidly and creates a condition of such diplomatic, economic, or military importance that the President or SecDef considers a commitment of US military forces and resources to achieve national objectives. It may occur with little or no warning. It is fast-breaking and requires accelerated decision making. Sometimes a single crisis may spawn another crisis elsewhere. JOPES provides additional crisis action procedures for the time-sensitive development of OPORDs for the likely use of military forces in

response to a crisis. While contingency planning normally is conducted in anticipation of future events, crisis action planning is based on circumstances that exist at the time planning occurs.

d. The Joint Operation Planning Process (JOPP)

From JP 5-0, *Joint Operation Planning*: The JOPP is an orderly, analytical planning process, which consists of a set of logical steps to analyze a mission, develop, analyze, and compare alternative COAs, select the best COA, and produce a plan or order. JOPP begins with planning initiation, and moves through mission analysis, COA development, COA analysis and wargaming, COA comparison, COA approval, and plan or order development. Figure 23 shows the steps used in the JOPP.

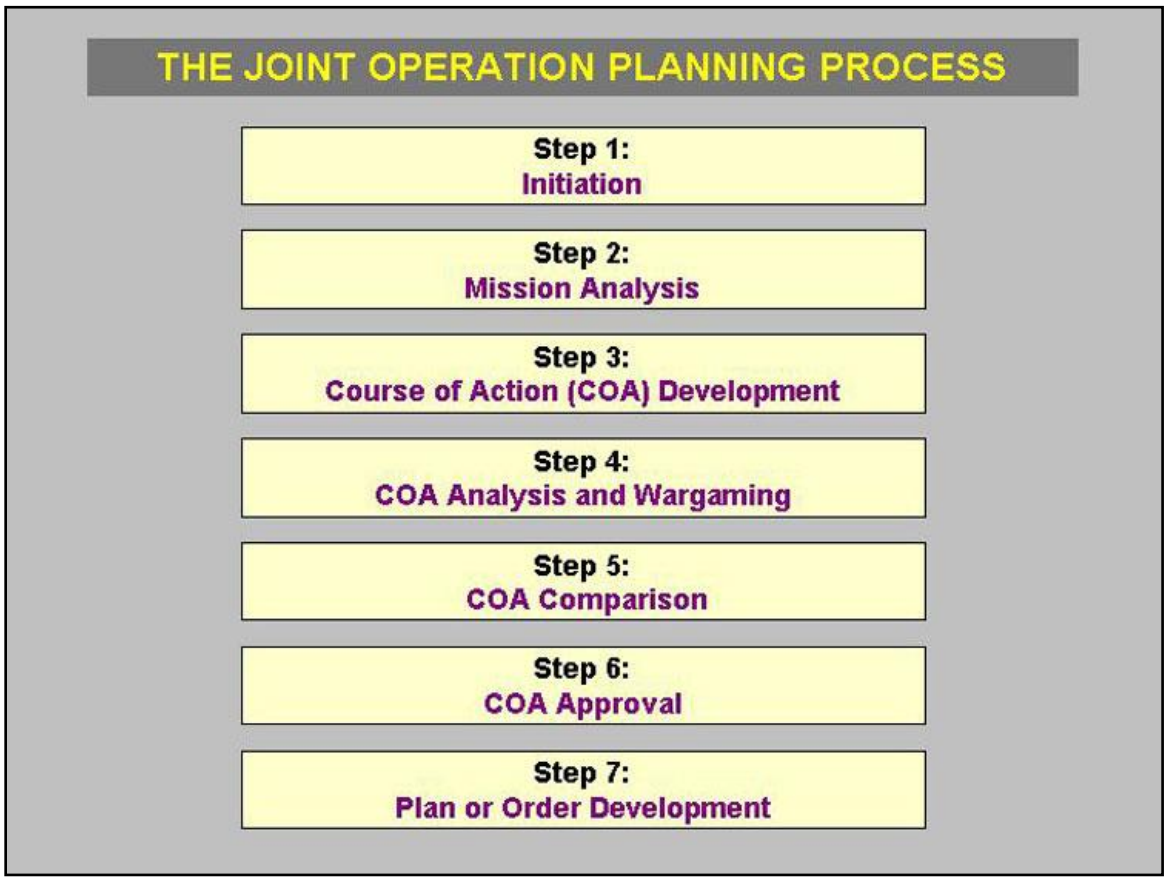

Figure 23: The Steps of the Joint Operation Planning Process (From JP 5-0, *Joint Operation Planning*)

Commanders direct their organizations throughout planning. This direction takes the form of interaction with the staff, guidance on the development of products, and decisions at key points in the process, such as approval of a COA. In CAP, this interaction typically is continuous as the JOPP steps are compressed and blend together. Commanders ensure that subordinate commands have sufficient time to plan, particularly in a CAP situation. They do so by issuing warning orders at the earliest opportunity and by collaborating with other commanders, agency leaders, and multinational partners as appropriate to ensure a clear understanding of the commander's

mission, intent, guidance, and priorities. Commanders resolve command-level issues that are beyond the staff's authority.

The staff's effort during planning focuses on developing effective plans and orders and helping the commander make related decisions. The staff does this by integrating situation-specific information with sound doctrine and technical competence. The staff's planning activities initially focus on mission analysis, which develops information to help the commander, staff, and subordinate commanders understand the situation and mission. During COA development and comparison, the staff provides recommendations to support the commander's selection of a COA. Once the commander approves a COA, the staff coordinates all necessary details and prepares the plan or order.

e. Joint Intelligence Preparation of the Operational Environment (JIPOE)

From JP 5-0, *Joint Operation Planning*: The operational environment encompasses the air, land, sea, space, and associated adversary, friendly, and neutral systems (political, military, economic, social, informational, infrastructure, legal, and others), which are relevant to a specific joint operation. Understanding this environment has always included a perspective broader than just the adversary's military forces and other combat capabilities within the traditional battlespace. However, current and future strategic and operational requirements and types of operations can benefit by a more comprehensive view of all systems in this environment relevant to the mission and operation at hand.

A systems understanding of the operational environment considers more than just an adversary's military capabilities, order of battle, and tactics. Instead, it strives to provide a perspective of interrelated systems that comprise the operational environment, relevant to a specific joint operation. Among other benefits, this perspective helps intelligence analysts identify potential sources from which to gain indications and warning. It also helps analysts with center of gravity analysis and planners with operational design by identifying nodes in each system, the links (relationships) between the nodes, critical factors, and potential decisive points. This allows commanders and staffs to consider a broader set of options to focus limited resources, create desired effects, and achieve objectives.

The JIPOE / IPB process consists of four basic steps shown in the figure below:

Define the Battlespace Environment
Describe the Battlespace Effects
Evaluate the Adversary
Determine Adversary COAs

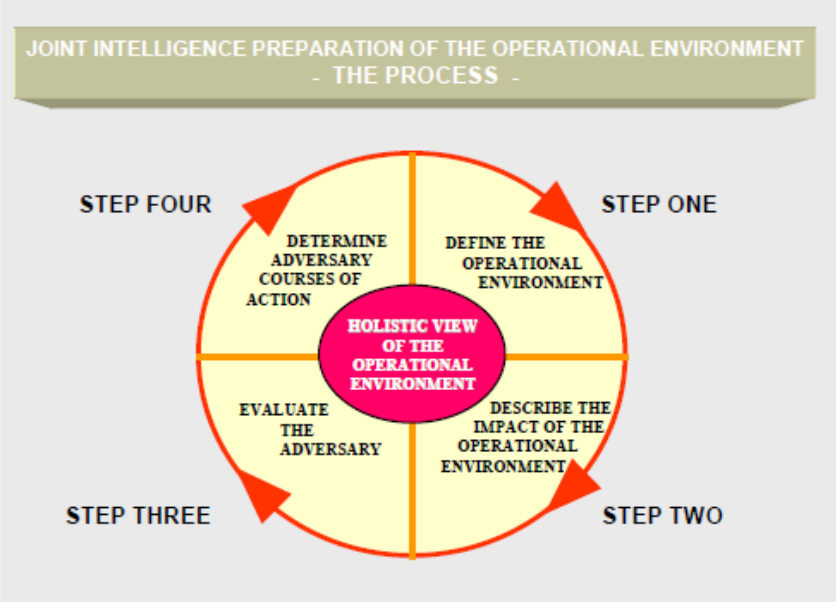

Figure 24: JIPOE Process (From JP 2-01.3, Joint and National Intelligence Support to Military Operations)

There is opportunity for METOC input in each of these steps. The product of this process is then used in the Intelligence Estimate (described below).

f. METOC in Mission Analysis

Commander's guidance is used by staffs to develop the Staff Estimates, which are used to form the Commander's Estimate during Mission Analysis. An overview of inputs to the Staff Estimate from several staff members (along with METOC comments) follows in the paragraphs below.

(1) Intelligence Estimate

1. MISSION.
2. ENEMY SITUATION.

a. Characteristics of the Area of Operations. This paragraph discusses the effect of the physical characteristics of the area of operations on military activities of both combatants. (If an analysis of the area has been prepared separately, this paragraph in the intelligence estimate may simply steer to it). **This section requires direct METOC involvement with Intelligence personnel.**

(1) Military Geography

(a) Topography

(b) Hydrography

1. Existing Situation. Describe the nature of the coastline; adjacent islands; location, extent, and capacity of landing beaches and their approaches and exits; nature of the offshore approaches, including type of bottom and gradients; natural obstacles; surf, tide, and current conditions.

2. Effect on Enemy Capabilities.
3. Effect of Friendly Courses of Action

(c) Climate and Weather

1. Existing Situation. Describe temperature, cloud cover, visibility, precipitation, light data, and other climate and weather conditions and their general effects on roads, rivers, soil trafficability, and observation
2. Effect on Enemy Capabilities
3. Effect on Friendly Courses of Action

(2) Logistics Estimate

The Logistics Estimate will summarize data about the area, taken from the Intelligence Estimate with specific emphasis on significant factors affecting logistics activities. Specific METOC concerns (*e.g.* trafficability) should be passed to the Logistics personnel if applicable to the operations.

(3) Commander's Estimate of the Situation

1. MISSION
2. THE SITUATION AND COURSES OF ACTION
   a. Considerations Affecting the Possible Courses of Action
      (1) Characteristics of the Area of Operations
      (a) Military Geography
         1. Topography
         2. Hydrography. Include the characteristics of offshore sea areas, approaches to the beaches, currents, tides, the beaches themselves, ports, docks, and similar maritime considerations
         3. Climate and Weather. Extremes of temperature, wind velocities, cloud cover, visibility, precipitation, and other such factors that can affect military operations. Sunrise, sunset, and twilight data are normally given in this subparagraph

g. Joint Plan Phasing

From JP 5-0, *Joint Operation Planning*: Arranging operations is an element of operational design, and phasing is a key aspect of this element. Phasing is a useful tool for any type of operation, from those that require large-scale combat to operations such as disaster relief, noncombatant evacuation, and peacekeeping.

A "Phase" is a definitive stage of an operation or campaign during which a large portion of the forces and capabilities are involved in similar or mutually supporting activities for a common purpose.

A phase can be characterized by the focus that is placed on it. Phases are distinct in time, space, and/or purpose from one another, but must be planned in support of each other and should

represent a natural progression and subdivision of the campaign or operation, as shown in Figure 25.

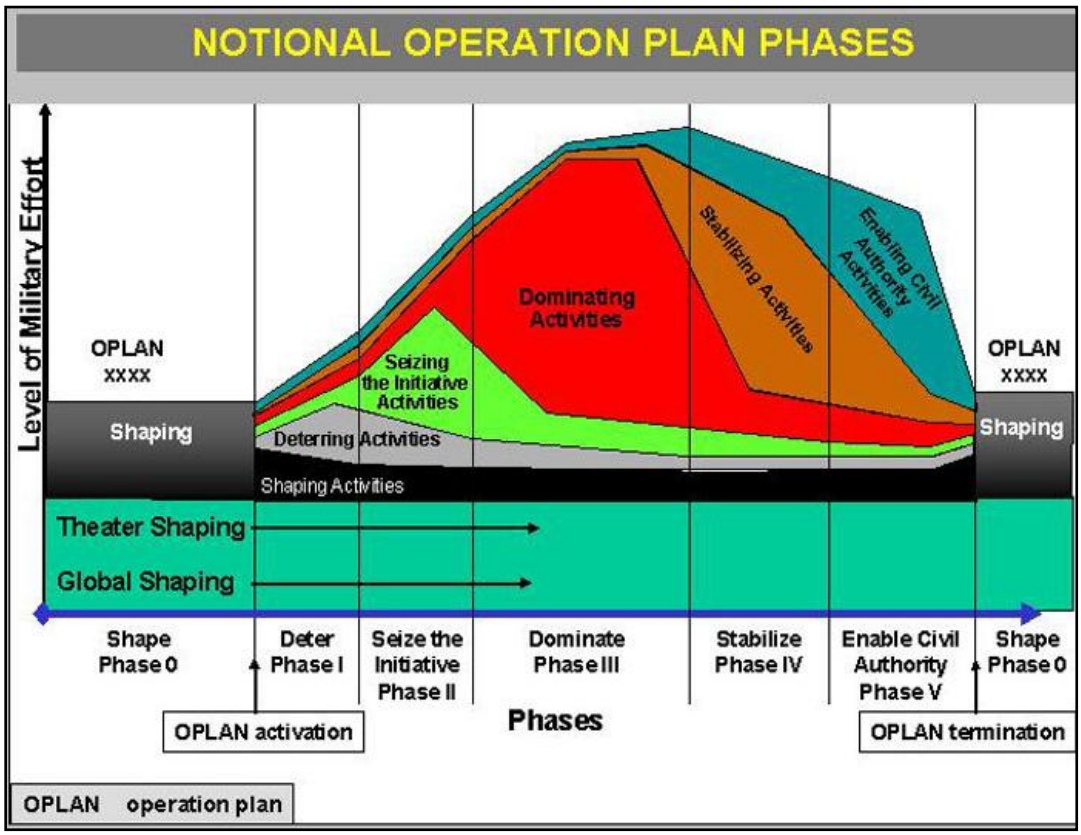

Figure 25: Notional Operational Plan Phases (From JP 5-0, *Joint Operation Planning*)

The five Phases of a Joint Plan are:

- Phase 0: Shape
- Phase I: Deter
- Phase II: Seize the Initiative
- Phase III: Dominate
- Phase IV: Stabilize
- Phase V: Enable Civil Authority

h. Contingency Plans

(1) Operation Plan (OPLAN)

OPLAN, a complete and detailed operation plan contains a full description of the concept of operations and all required annexes and appendixes. OPLANs are written when the contingency has a compelling national interest, a specific threat is critical to national security, and whose scope and nature (large scale) requires detailed prior planning.

(2) Concept Plans

CONPLANs, with or without a TPFDD, are operation plans in an abbreviated format, requiring considerable expansion for conversion into an OPLAN, campaign plan, or OPORD. CONPLANs are written for common type missions that may develop rapidly but take on many different forms; *e.g.* noncombatant evacuation operations.

(3) Base Plan

A Base Plan describes concept of operations, major forces, concepts of support and the anticipated timelines for completing a mission. Normally this does not include annexes or a TPFDD.

(4) Theater Security Cooperation Plan

Although a Theater Security Cooperation Plan (TSCP) is not a contingency plan, it is closely related because its focus is national security. A TSCP is driven by the Secretary of Defense's Security Cooperation Guidance. A TSCP is expected to be implemented, unlike a contingency plan, which is only implemented when a crisis situation develops.

i. METOC in the Plans

(1) Base Plan

In preparing the Base Plan, refer to Annex H (METOC). Ensure that when Annex H is published, it is included in the list of Annexes at the end of the Base Plan. For an OPLAN/CONPLAN which may not include an Annex H, a more descriptive paragraph should be included in the base plan.

(2) Annex B, Intelligence

1. Situation
    a. Characteristics of the Area
    b. Hydrographic, Amphibious, Topographic, and Weather
        (1) Summarize the hydrographic data (sound, tides, wave height, and currents) and amphibious considerations (beach defenses and obstacles, slope, consistency, and routes of ingress and egress) needed to support amphibious and logistics over-the-shore operations (LOTS). Refer to Annex H and M.

        (2) Address topographic aspects, including trafficability, key terrain, obstacles, cover, concealment, and avenues of approach. Refer to Annex M.
        (3) Include, as appropriate, climate and weather aspects as they pertain to the operational environment. Intel and METOC coordinate and refer to Annex H.

Astronomical, climatic, and oceanographic data may be published in appendices to this annex.

(3) Annex H, Meteorological and Oceanographic Operations

A template for an Annex H is below. Classification markings would be included within the parentheses. Examples of Annex H are in Chapter 10.

ANNEX H TO CJTF XXX OPLAN XXXX-00
METEOROLOGICAL AND OCEANOGRAPHIC OPERATIONS

( ) REFERENCES: List documents that provide additional guidance and information.

1. ( ) Situation.

a. ( ) Concept of METOC Support. State the general concept of METOC operations to support for the forces assigned to the OPLAN. May consider highlighting key products (existing, new, tailored; distribution)

b. ( ) Assumptions. State the assumptions that affect the METOC operations required by the plan. Provide estimates of the availability of data and facilities in the operational area, availability of support from non-US and US nonmilitary agencies, and the feasibility of obtaining METOC data from radar and satellites.

c. ( ) Planning Factors. Identify any significant METOC conditions that may influence the execution of the plan. The purpose of this paragraph should be to establish the requirement for any unusual METOC operations that will clarify the assignment of specific responsibilities. Include METOC factors that may influence operations and the probability of their occurrence (broad brush, seasonal patterns: temperature, winds, precipitation, humidity, aviation impacts (clouds, fog, thunderstorms), maritime impacts (currents (ocean and littoral), tides, water levels, sea surface temperature (SST), salinity, acoustics, waves), optical phenomena (mirages), space environmental factors, Mission-Oriented Protective Postures (MOPP) factors (endurance, acclimatization, hydration, exposure), solar/lunar data

d. ( ) Resource Availability. Identify items supporting units need to bring to support the mission for a minimum of 90 days. Identify conventional and non-conventional weather resources (INTERNET, INMARSAT, etc.) planned to be used. Consider including key IP addresses, JOAF/special product headers and availability, and non-US capabilities (host nation, coalition, non-government organizations (NGOs), humanitarian relief organizations (HROs).

2. ( ) Mission. State in a clear, concise statement the METOC operations objectives in support of the plan. Should answer how, when, who, what and where. Suggestions:
When: usually WHENDI (when directed)
Who: JTF and METOC support units
What: accurate, consistent, coordinated, tailored METOC support

Where: every applicable level of the JTF

Objective: provide tailored support, timely advice to maximize effectiveness of JTF operations, and provide force and resource protection

3. ( ) Execution.

a. ( ) General.

b. ( ) Concept of Operations. Describe the METOC operations structure and how it will function in the implementation of the plan. Refer to other documents available to tasked units that establish doctrine and procedures, as appropriate. Note deviations from standard practices and any additional procedures peculiar to the operation. Include the operation's phasing in separate subparagraphs; for example:

- Pre-deployment (climatology as planning tool, TPFDD planning, weather data to be used, JMO/SMO coordination, astronomical data)
- Deployment (climatology/real world data, transition to JMFU, JMO/SMO coordination)
- Employment (real world/climatological data; observe, analyze, and predict the state of the battlespace and advise on impacts; determine customer requirements; evaluate adequacy of support)
- Transition (same as before; JMO/SMO coordination; deactivation/transfer of JMFU responsibilities)
- Redeployment (continues until forces redeployed or integrated into follow-on/transition force; JMO/SMO coordination on redeployment requirements)

c. ( ) Tasks and Responsibilities. Identify the Service or Services responsible for providing space and atmospheric, oceanographic, and terrestrial environmental support during the operation, including weather communications, data base, and production responsibilities. Delineate specific responsibilities to specific units:

- Requested SMO/CCDR support (management of national/theater assets, manpower, equipment, and communications)
- JMO tasks (climatology; IPB; METOC impacts on COAs; integration of METOC operations into joint operations, including personnel, equipment, communications, organizational structure, and logistics; coordination with components of JTF; assessment of METOC effectiveness; data management; JMFU management)
- Sample component tasks (METOC structure should mirror JTF structure):
- ARFOR (battlespace meteorological watch; observations and forecasts; nuclear, biological, and chemical (NBC) focal point; assess METOC impacts; coordinate with JTF

- NAVFOR battlespace METWATCH affecting maritime conditions in/near JOA; surface and upper air observations; forecast for air, surface, and sub-surface operations; assess METOC impacts; AOA forecasts; coordinate with JTF.
- AFFOR (battlespace METWATCH affecting air force operations in/near JOA; observations and forecasts; assess METOC impacts; provide air-unique forecasts (refueling, low-level, airdrop) if JFACC; coordinate with JTF)
- Marine Corps Forces (MARFOR) (battlespace METWATCH affecting MARFOR operations; observations and forecasts; assess METOC impacts; coordinate with JTF; AOA forecast (if NAVFOR not doing it)
- JSOTF battlespace METWATCH affecting joint special operations; assess METOC impacts; coordinate with JTF.
- JPOTF battlespace METWATCH affecting joint psychological operations (e.g., leaflet drop forecasts); assess METOC impacts; coordinate with JTF. May be handled by another component; i.e., ARFOR)
- Joint Civil-Military Operations Task Force (CMOTF provides potential interface with NGOs/HROs)
- JFACC (battlespace METWATCH for air operations in/near JOA; requirements for alternate and divert airfields; observations; air-unique forecasts (air refueling, low-level, airdrop); assess METOC impacts; coordinate air forecasts
- Service components (i.e., Navy, USAF, Army, USMC—provide support as requested through CCMD; coordinate with JMO and SMO as required; manage KQ identifiers)

d. ( ) Deployment

e. ( ) Employment

f. ( ) Redeployment & Reconstitution

g. ( ) Coordinating Instructions. Include instructions common to two or more components. Suggestions:

- JOAF as coordinating forecast
- Assess JTF products for consistency, accuracy
- Develop local, tailored products
- Weather warning and advisory responsibility (may be on-scene or centralized facility)
- Satisfy subordinate units' requirements
- Transmit products to JMFU
- Standardize/coordinate use of software (e.g., TAWS)

- Designate production center(s), if appropriate (regional, oceanographic, space)
- Forward lessons learned, support deficiencies to JMO (for forwarding to SMO)

4. ( ) Administration and Logistics. Provide broad guidance on how logistic and administrative support is to be furnished for METOC operations. (Reference to Annex D or pertinent command directives may suffice.) If required, tell units to deploy a minimum x-day supply of expendables.

5. ( ) Command and Control. Indicate the channels for control of METOC operations if different from the command relationships outlined in the Basic Plan or in Annex J. May want to include:

- A general statement of the scope and type of METOC C4I support applicable to the operation (e.g., GCCS; can reference Annex K.) Include specific details explaining the METOC communications concept and requirements in Annex K.
- Instructions to cover periods when communication circuits are not operational. Cite potential impacts to METOC operations and available backup resources.
- Instructions for transmitting METOC information at echelons where special circuits are not available.
- Mechanism(s) for reporting METOC personnel and equipment status.
- Instructions for implementation of METCON, OCEANCON, and ICECON.
- OPSEC considerations (can reference Annex L).

Appendixes: None are specified in JOPES; however, appropriate matters above may be placed in appendixes, when required, by length or detail of guidance required.

(4) Annex K, Command, Control, Communications and Computer (C4) Systems

Ensure that METOC communication requirements are included in Annex K- Especially see Appendix 2 to Annex K, C(4) Planning and Appendix 3 to Annex K, Satellite Communications Planning. Include GBS and bandwidth requirements, SIPRNET/NIPRNET connectivity, radio networks (HF, VHF, UHF), telephone networks, fiber optic networks, weather communications, air-to-air and air-to-ground communications, fleet broadcast communications, and ship-shore-ship communications.

(5) Annex M, Geospatial Information Services (GIS)

Ensure that any METOC requirements for GIS are included in this Annex. This includes any special METOC products formatted Geospatially, METOC input to Geospatial Databases and

any special Oceanographic/Hydrographic survey requirements such as a Rapid Environmental Assessment (REA).

(6) Annex N, Space Operations

1. Situation.

c. Friendly. Identify all friendly space forces and assets in theater and to be deployed in theater. Include METOC satellite requirements as well as any associated receivers and sensors.

2. Execution.

b. Space Activities. Ensure all required METOC information from space assets is stated in paragraph (2) of Annex N.

Note: the word "environmental" in Annex N refers to any meteorological, oceanographic, geodetic, and other environmental support information provided by space assets that affect space, air, surface, or subsurface activities and assets. Describe detailed environmental services in Annex H, Meteorological and Oceanographic Operations.

(7) Other Annexes Potentially Requiring METOC input

Annex D, Logistics (see Logistics Estimate)
Annex P, Wartime Host-Nation Support
Annex Z, Distribution

j. Types of Orders

There are a variety of orders used in the planning process as shown in Figure 26. Brief descriptions of some common types of Orders follow in the paragraphs below. Figure 27 depicts the place of these orders within a notional JOPP timeline.

JOPES Volume I contains procedures and formats for the CJCS Warning Order, Commander's Estimate, CJCS Planning Order, CJCS Alert Order, CJCS Deployment Order, CJCS Execute Order, and the Operation Order.

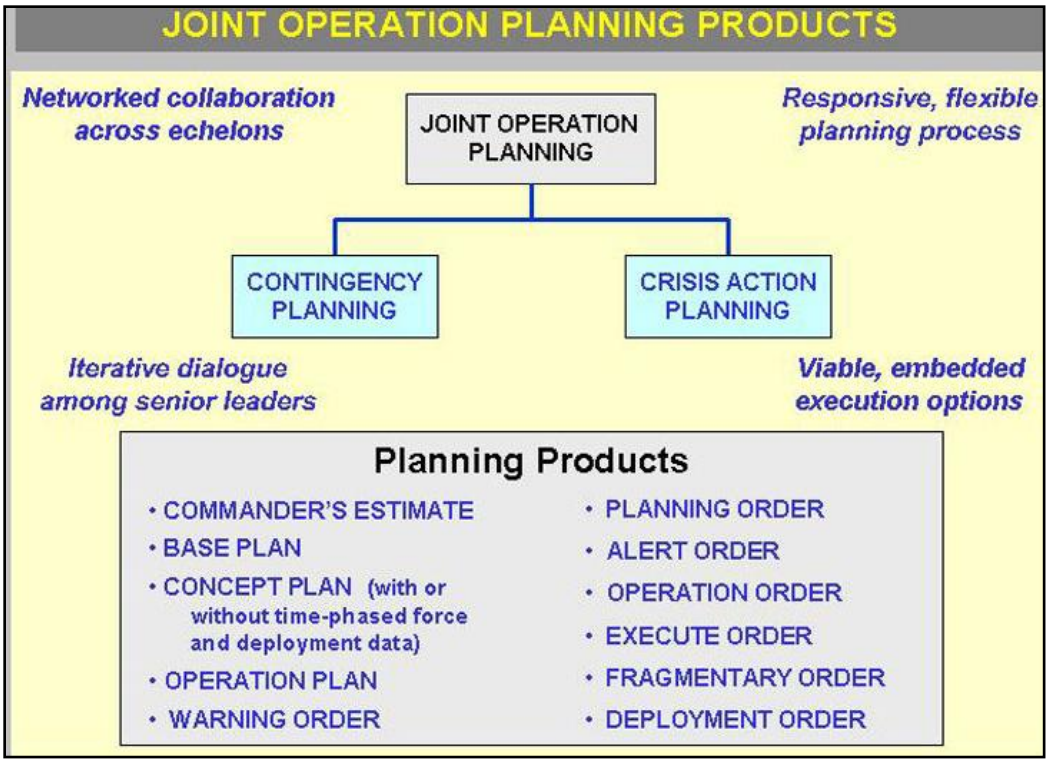

Figure 26: Joint Operation Planning Products (From JP 5-0, *Joint Operation Planning*)

(1) Operation Order (OPORD)

From JP5-0, *Joint Operation Planning*: an OPORD is "a directive issued by a commander to subordinate commanders for the purpose of effecting the coordinated execution of an operation. OPORDs are prepared under joint procedures in prescribed formats during Crisis Action Planning.

(2) Fragmentary Order (FRAGO)

From JP5-0, *Joint Operation Planning*: a FRAGORD is "an abbreviated form of an OPORD (verbal, written, or digital), which eliminates the need for restating information contained in a basic OPORD. It is usually issued as needed or on a day-to-day basis."

(3) Warning Order (WARNORD)

From JP5-0, *Joint Operation Planning*: a WARNORD is "a planning directive that initiates the development and evaluation of military COAs by a supported commander and requests that the supported commander submit a commander's estimate."

(4) Planning Order (PLANORD)

From JP5-0, *Joint Operation Planning*: a PLANORD is "a planning directive that provides essential planning guidance and directs the initiation of plan development before the directing authority approves a military COA."

(5) Alert Order (ALERTORD)

From JP5-0, *Joint Operation Planning*: an ALERTORD is "a planning directive that provides essential planning guidance and directs the initiation of plan development after the directing authority approves a military COA. An ALERTORD does not authorize execution of the approved COA."

(6) Execute Order (EXORD)

From JP5-0, *Joint Operation Planning*: an EXORD is "a directive to implement an approved military COA. Only the President and the SecDef have the authority to approve and direct the initiation of military operations. The CJCS, by the authority of and at the direction of the President or SecDef, may issue an EXORD to initiate military operations. Supported and supporting commanders and subordinate JFCs use an EXORD to implement the approved CONOPS."

(7) Prepare to Deploy and Deployment Order (PTDO, DEPORD)

From JP5-0, *Joint Operation Planning*: The CJCS, by the authority of and at the direction of the President or SecDef, issues a prepare-to-deploy order (PTDO) or deployment order (DEPORD) to:

- Increase or decrease the deployment posture of units.
- Transfer forces from one CCDR to another with the gaining CCDR exercising that command authority over the gained forces as specified by the SecDef in the DEPORD.
- Deploy or redeploy forces from one CCDR's AOR to another.
- In the case of a PTDO, propose the day on which a deployment operation begins (C-day) and the specific hour on C-day when deployment is to commence (L-hour).
- In the case of a DEPORD, establish C-day and L-hour.
- Direct any other activity that would signal planned US military action or its termination in response to a particular crisis event or incident.

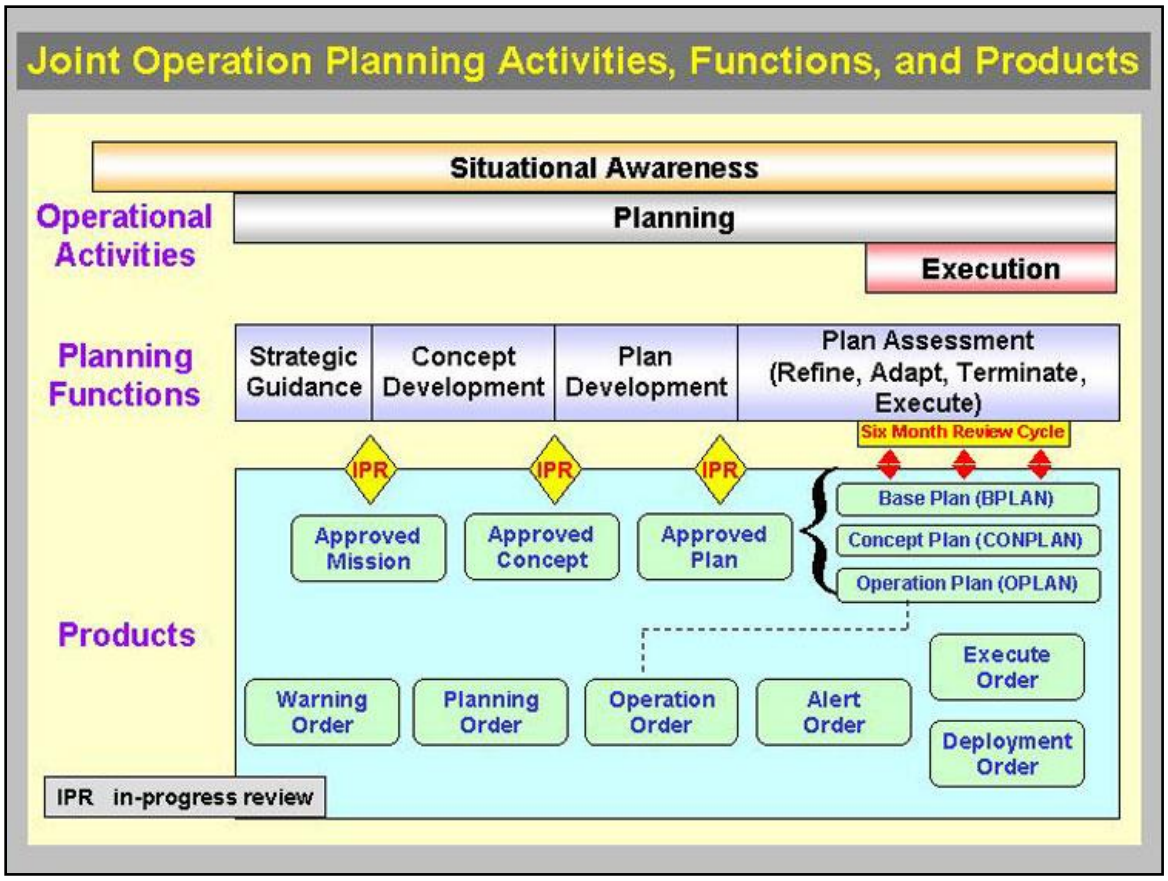

Figure 27: Joint Operational Planning Activities, Functions and Products (From JP 5-0, *Joint Operation Planning*)

K. The SMO and Operations and Exercises

The Supported and Supporting SMOs must be closely involved in a successful operation or exercise.

During exercise and/or Crisis Action Planning, the SMO may need to accomplish some or all of the actions delineated below. Once the Joint Task Force forces and structure are announced and a JMO assigned, the JMO should consider the JMO actions, and the SMO assumes a monitoring and assistance role. Tasks that may need to be completed:

Initial actions:

- Answer climatology input requests (may be first clue to pending operation)
- Determine force structure (CJTF, JFACC, JFLCC, JFMCC, NAVFOR, MARFOR, AFFOR, ARFOR, JSOTF)
- Additional METOC resources may be requested in two ways:
- Request support from the supported Commander's components, who provide the requested support from their resources or ask for assistance from their Service.
- Request support from a supporting Commander (often US Joint Forces Command). The supported Commander's J-1 can facilitate the request process: if the event is a JCS pre-

approved SMEB, the request can go directly to the supporting Commander. If the event is a contingency or non-SMEB, the request must be coordinated with the Joint Staff.
- Coordinate climatology/real time METOC data requirements with the JMCO. Consider data availability, accuracy, and limitations; if the JTF Commander has determined need for a JMFU, consider designation of appropriate forces.
- Coordinate/tailor METOC support product requirements for the Commander.
- Assign/coordinate METOC tasks as appropriate to component SWO(s) to ensure unity of effort.
- Provide input to CCMD staff estimates, including Commanders Estimate of the Situation (CES), Intelligence, Operations, Logistics, and C4, as well as COA development and analysis.
- Begin building CCMD OPORD Annex H, and inputs to Annex B (Intelligence), Annex C (Ops), Annex K (Communications), Annex M (Geospatial Information and Services (GI&S)), and Annex N (Space).
- Manage special METOC needs at the national / theater level, such as national assets, MM5 model runs from AFWA, space environment support from AFWA, NOGAPS/COAMPS from FNMOC, and NWS/host nation weather service support applied to the operation/exercise.

After JTF formation:
- When identified, conduct liaison with the JTF JMO. Parallel or collaborative planning may be required. Once completed, provide your CCMD OPORD Annex H and input to other annexes to the JMO. Coordinate and assist the JMO in the following areas as required: organization, personnel augmentation, identification and location of component SWOs, theater and joint area of operations communications, equipment, logistics, data requirements, products and timelines.
- Coordinate climatology/real time METOC data requirements with the JMCO, the JMO, and component SWOs
- Coordinate with the JMO on Allied METOC support.
- Develop, in conjunction with the JMO, the METOC CONOPS and, if amplification of Annex H is needed, a Letter of Instruction (LOI) specific to the operation, describing general guidance such as JMCC designation, communication plans, equipment requirements, and theater observation collection plan. The CONOPS should be included in the JTF's Annex H.
- Monitor deployment status of Service component METOC assets, and subsequently, METOC operations in the JOA.
- Maintain awareness of operations under other staff responsibility.

l. The JMO in Joint Planning for Operations and Exercises

A listing of possible METOC actions by the JMO follows introductory paragraphs (in italics) that describe an unfolding situation.

A crisis situation is developing. The JMO starts with Phase I or II and progresses through five phases of the Joint Planning Process.

- Contribute to the Joint Task Force's overall mission analysis
- Provide past, present, and future states of the space, air, and ocean environments to the JTF. Consider:
- Past states: climatology of the region. Consider topography and general weather, climatic controls, special meteorological phenomena, tropical weather, and statistical climatology; solar, lunar, and light level data; tidal data; bathymetry; currents and oceanography; ionospheric / geomagnetic impacts.
- Present state: observations. Data sources land and ship reports, upper air soundings, satellite earth sensors, weather radars, lightning detection systems, profilers, solar telescopes, ionosphere sensors, buoys, and aircraft.
- Future state--forecasts. Global, regional, and tactical level forecasts can come from regional METOC centers, tactical level units, and indigenous sources.
- Provide input to J-2's Intelligence Estimate and Intelligence Preparation of the Battlefield (IPB), as well as Joint Planning Group (JPG), J-3 Operations, J-4 Logistics, and J-6 (Communications) estimates, as appropriate.
- Provide impact of METOC conditions on the COA.
- Provide input to CES.
- Develop Annex H (see Appendix B) and provide METOC input and/or requirements for Annex B (Intelligence), Annex C (Operations), Annex D (Logistics), Annex J (Command and Control), Annex K (Communications), Annex N (Space), and the Basic Plan (paragraph 4.f), as required.
- Plan and integrate METOC operations into the joint operation

The CJTF has directed the JTF staff, components, and commands to conduct detailed planning to convert the COA into an OPLAN and supporting plan. The CJTF's intent and concept of the operation identifies requirements for planning METOC operations, preparatory to completion of the plan.

- Review Combatant Commands apportionment of METOC assets and resources.
- Identify force, equipment, communications, and data requirements for METOC support, including augmentation for the JTF headquarters (JTF HQ).
- Provide input to the TPFDD.
- Monitor deployment of METOC resources (personnel, equipment, and communications).
- Identify METOC shortfalls through the JFC to the CCDR.
- Manning.
- Communications.
- Information requirements.
- Service requirements beyond the capabilities of assigned METOC assets.
- Develop operational support plans and procedures that support the concept of operations documented in Annex H.
- As required, establish and tailor joint force METOC forecast activities to CONOPS and composition of assigned forces.
- Consider use of JMCOs, component and tactical level assets and capabilities, and capabilities at rear operating areas.
- Consider formation and composition of a JMCC.

- Establish product requirements (content and scheduling) and coordinate support services for JTF HQ and JTF components.
- Direct/coordinate initial activities of METOC assets in JOA (see paragraph 6.2.1.3 below).
- Begin critical METOC functions to support JTF operations: data sensing and collection, analysis, forecasting, tailored application of products to enhance JTF decision-making processes, dissemination, and evaluation (see Joint Publication 3-59 Chapter 4).
- Sustain METOC operations in the JOA.
- Ensure compatibility, consistency, and timeliness of information exchange among METOC assets and resources.
- Identify transportation and logistic requirements for METOC support.
- Control and execute METOC operations.

The Secretary of Defense and supported CCDR have issued execution orders for JTF operations which will include METOC operations. Sufficient elements of the joint force have deployed to begin operations, or the whole joint force has deployed. Operations have begun per CJTF's concept and are continuing.

- Monitor METOC operations in support of the JTF.
- Collect information from all sources. Keyed to:
- Previously determined information plan - requirements, sources, and timing.
- CJTF's critical information requirements (CCIRs).
- Maintain awareness of operations under other staff proponency.
- Monitor deployment and employment status of Service component METOC assets
- Recommend changes to the TPFDL for METOC assets, as required.
- METOC Forecast Centers.
- Past, present, and future states of space, air, and ocean environments, utilizing all-source observations and forecasts (land, upper air, ship, buoy, ionospheric, lightning, aircraft, unmanned aerial and underwater vehicles, satellite).
- Assess effectiveness of METOC operations
- Assess information architecture:
- METOC information systems; access to operational information and force status.
- Assess information exchange processes and reporting requirements.
- Evaluate organization of METOC operations.
- Simple, clear, responsive command lines, IAW CJTF intent.
- Unity of effort - JMO guidance.
- Apportionment of METOC assets.
- Assess support missions assigned to METOC assets.
- Missions appropriate for tasked components/units.
- Missions integrated with operational missions (*e.g.*, appropriate support provided throughout the ATO cycle).
- Missions supported by sufficient JTF resources.
- Deconflict METOC operations with 'conventional' missions. Consider:
- METOC reporting requirements.
- Command, Control, Communications, and Computers (C4) interoperability.
- Frequency allocation.

- Intelligence, Surveillance, Reconnaissance (ISR) collection efforts.
- Surface and airspace deconfliction.
- Coordination of logistic support.
- Prepare plans and orders related to METOC operations (ongoing)
- Maintain current estimate of METOC operations (paragraphs 6.2.1.3 and 6.2.1.4).
- Assess progress of current METOC operations and their effect on JTF operations.
- Relate information to attainment of desired conditions.

Planning Future Operations

- Campaign endstate and/or termination conditions.
- Relate to decision points for current or future operations.
- Develop/refine friendly COA(s) with regard to METOC operations.
- Consider continuing METOC operations IAW current apportionment, guidance, and prioritization.
- Develop branches and sequels to METOC operations (*i.e.*, changes based on the evolving situation or additional requirements).
- Develop enemy COA(s) that impact or affect METOC operations, or current and future environmental or civil conditions.
- Evaluate current, apparent operations/conditions.
- Develop branches to current, apparent operations/conditions.
- Analyze friendly COAs.
- Analyze wargames against enemy COAs or current and future environmental or civil conditions.
- Analyze all feasible alternatives, using best information available.
- Compare friendly COAs.
- Determine the COA that best achieves objectives against most probable and/or most dangerous enemy COA, or against most likely or most dangerous/complex environmental or civil conditions.
- Determine feasible alternatives, using best information available, as well as advantages and disadvantages of each.
- Prepare discussion and/or recommendations to current estimates.
- Coordinate and update changes to Annexes B, C, D, H, K, and N, as appropriate.
- Direct and lead subordinate operational METOC operations
- Approve Plans and Orders related to METOC operations.
- Organize and direct the JMFU (if one is designated), and Service component assets.
- Synchronize actions IAW established timelines and conditions.
- Coordinate actions and/or operations, where lines of authority and responsibility overlap and/or conflict.
- Advise components/units of adjacent or related actions/operations.
- Direct supporting operations, as required.
- Resolve conflicts.
- Adjust control measures, as required, or relay component adjustments to adjacent, supported, or supporting units.
- Decide on operational actions/direction.
- Change, recommend change, or continue METOC operations and priorities.

- Seek CJTF/supervisors guidance if a change appears necessary.
- Ensure change remains supportive of current mission and intent, based on continuing estimate of the situation.
- Coordinate and conduct appropriate planning for change.
- Write plan and/or order for change.
- Approve and issue Plan and/or Order.
- Acquire and communicate operational information about METOC operations
- Display and brief information as required.
- Inform supervisors, decision makers, other JTF staff, and staff counterparts, based on:
- CCIRs (Commander's Critical Information Requirements.
- Planned hierarchy of significant information.
- Information that could affect a commander's decision.
- Understanding of information requirements of commanders and other staff.
- Report - formal (required / periodic) and informal (hasty / as required).
- Develop general military information--briefings, reports, analyses, *etc.*
- Monitor COMSEC, COMPUSEC, SIGSEC related to METOC operations.
- Conduct public affairs operations related to METOC operations.

9. Management: Personnel, Equipment & Training

The question foremost in the minds of many JMOs and SMOs is, "how can I get METOC personnel and equipment?" The answer to that question requires answering the basic Who, What, Where, When and Why questions. The paragraphs that follow describe the procedures for obtaining forces and/or capabilities required to meet the mission.

a. Combatant Commander(CCDR) Permanent Staffs

From JP 1-0, *Personnel Support to Joint Operations*: Manpower management consists of providing plans, policy, and oversight on joint manpower program (JMP) issues. The JMP is the policy, processes, and systems used in the determination, prioritization within and among Service manpower requirements, validation, and documentation of joint manpower requirements and the additional augmentation required for contingencies or wartime and/or mobilization. Responsibility for the JMP does not fall below unified command level; however, subordinate J-1s coordinate JMP issues.

The JMP includes (From CJCSI 1330.01):

Joint Table of Distribution (JTD) - A manpower document that identifies the positions and enumerates the spaces that have been approved for each organizational element of a joint activity for a specific fiscal year (authorization year) and those spaces which have been accepted for planning and programming purposes for the five (5) subsequent fiscal years (program years).

Joint Table of Mobilization and Distribution (JTMD) - A manpower authorization document that identifies the reorganization of the peacetime structure and the additional positions required to augment the existing positions on the JTD in time of mobilization.

All billet changes will be reflected on the Joint Staff JTD or JTMD in the Electronic Joint Manpower and Personnel System (e-JMAPS), which is published monthly with each Service receiving their portion. The Joint Staff/J-1 will reconcile the JTD/JTMD and the JDAL semiannually.

b. Billet Changes

The short answer for the SMO seeking to change the JTD is to see the J1 and be prepared to wait a very long time for action. Changes can happen, but they follow two processes, neither of which is rapid. See CJCSI 1001.01 for details on the processes.

(1) Change Manpower Packages (CMP)

Commanders and directors submit CMPs to make semi-annual changes to their manpower requirements and authorizations.

These actions are normally "zero-balance" actions because they realign existing joint manpower positions to meet changing mission needs and do not affect the total number of joint manpower positions.

(2) Resource Decision Process (RDP)

- The **RDP** is used when commanders and directors require increases in joint manpower to support missions assigned by higher authority (e.g., SecDef, CJCS decisions).
- Submitted to the Joint Staff/J-1 outside the normal CMP staffing process. These are known as "out- of-cycle" requests.
- The Joint Staff/J-1 staffs and develops a proposed course of action for decision by the Director, Joint Staff, and the Service operations deputies (OpsDeps).

c. Contingency Operations Staffs

The key to manning contingency operation staff positions is the Joint Manning Document (JMD).

(1) The Joint Manning Document

From JP 1-0, *Personnel Support to Joint Operations*:

"A key factor to effectively transition a single-Service organization from its routine Service-related missions to that of a JTF HQ is creating a JMD for contingency operations that will define the organization and provide the basis for tasking individual augmentee requirements. The commander, JTF, in concert with the establishing commander's staff, develops and organizes a draft JTF JMD that will be forwarded for the supported establishing commander's validation and approval. This document provides the baseline for JTF HQ staffing and is used for strength reporting, personnel accounting, awards eligibility determination, base support, and a host of other services and functions. The end product of this coordination will be a validated JMD, listing positions by paragraph, line number, duty title, grade, branch of Service, skill/specialty code, security clearance, and special remarks. Once the tasking message is released, the JTF JMD becomes an official document, the maintenance of which is the responsibility of the establishing command J-1.

Personnel Augmentation:

- Policies and procedures for assigning individuals to meet combatant command temporary duty (TDY) and temporary additional duty (TAD) augmentation requirements are found in Chairman of the Joint Chiefs of Staff Instruction (CJCSI) 1301.01C, *Individual Augmentation Procedures*. These policies and procedures are applicable to all combatant commands, Services, and DOD agencies. In general, the individual augmentation process flows from the combatant command (after its Service components fill all requirements from internal assets), through its Service components, to the Services with a reclama process through the CJCS to the SecDef when required. (Exception: Special operations forces requirements will be sourced directly through the theater special operations command to the USSOCOM). Communication, timeliness, and tracking are essential to the success of this process."

(2) Individual Augmentees and Joint Manning Documents

Another method to source METOC personnel requirements is through Individual Augmentees (IA) filling positions on JMD.

(a) IA Definitions

An IA is, by definition, an unfunded temporary duty position (or member filling an unfunded temporary duty position) identified on a JMD by a supported CCMD to augment staff operations during contingencies. IA tour lengths are subject to Service guidelines, usually not to exceed 179 days. The CCDR or his Deputy may extend the tour length and inform the Service.

The JTF J-1 maintains the overall JMD for the JTF HQ. The JMD is the formal document listing anticipated JTF billet requirements and proposed organizational structure of the JTF. It is a more detailed version of a table of organization. The JMD lists line-by-line billet requirements by grade, MOS/NEC/DESIG/AFSC, requested Service, directorate, and security clearance requirement, and assigns a sequence tracking number and billet description to each billet. It provides the baseline for developing individual augmentation requirements to the JTF HQ. The figure below is an example JMD with explanations of the fields following.

JOINT MANNING DOCUMENT FORMAT

A	B	C	D	E	F	G	H	I	J	K
Combatant Command	Activitiy	Work Center (Para)	Line Number	Billet Description	Grade	CLRNC	Skill MOS-Desig	Service	Approval Date	LAD
USCENTCOM	HQ	J/C-1			O6	TS		USN		ddmmmyy
USEUCOM	CJTF-X	J/C-2			O5	S		USAF		
USJFCOM	OJF	J/C-3			O4	TSSCI		USMC		
USNORTHCOM		J/C-4			E7			USN	LEAVE	
USPACOM		J/C-5			E6			USAR	BLANK	
USSOCOM		J/C-6			E5			USAFR		
USSOUTHCOM		J/C-7			GS15			USMCR		
USSTRATCOM		J/C-8			GS14			USNR		
USTRANSCOM		Operation			Cont			COAL		
		Other			Other					

L	M	N	O	P	Q	R	S	T	U
Last Name	First Name	SSN	Actual Grade	Actual Service	Source	Actual Skill MOS-Desig	Date Reported	Rotation Date	Remarks
Gish	Joe	111-11-1111	O6	USN	COMSUBLANT	1120	ddmmmyy	ddmmmyy	
Doe	John		O5	USAF	MOB RES				
			O4	USMC	ADSW Res				
			E7	USN					
			E6	USAR					
			E5	USAFR					
			GS15	USMCR					
			GS14	USNR					
			Cont						
			Other						

Figure 28: JMD Format (From CJCSI 1301.01C)

Column A	The organization establishing the JMD
Column B	The specific Operation or CJTF the IA will support
Column C	Specific work center the IA will support
Column D	LINE NUMBER within a specific division or directorate
Column E	Billet description information
Column F	GRADE required to fill the position
Column G	Clearance requirement for the position
Column H	Skill required – in the form of a MOS, Designator, etc.
Column I	Service required to fill the position
Column J	Approval Date of the position (filled in by JS-J1)
Column K	Latest Arrival Date (ddmmmyy)
Column L	Last name (of a by name request)
Column M	First name (of a by name request)
Column N	SSN (of a by name request)
Column O	Grade (of a by name request)
Column P	Service (of a by name request)
Column Q	Source, or parent command, of the IA
Column R	Skill (of a by name request)
Column S	Actual Date Reported (ddmmmyy)
Column T	Expected Rotation Date (ddmmmyy)
Column U	Free form remarks

A JTD is a manpower document which identifies the permanent party positions and enumerates the spaces that have been approved and funded for each organizational element of a joint activity for a specific year, and those spaces which have been accepted for planning over the four subsequent fiscal years.

(b) Procedures for Obtaining Individual Augmentation

From JP 1-0, *Personnel Support to Joint Operations*:

a. The JTF commander or supported CCDR will document the requirements to support the mission in the form of a JMD. The supported CCDR will forward the JMD, along with position descriptions, specific reporting instructions and desired report date for each position to its Service component commands and Combat Support Agencies (CSAs) to fill. The Service component and CSAs will report to the supported CCDR what personnel from their commands will fill positions on the JMD. The Service components will request individuals per their respective Service policies. The supported CCDR will then send the JMD to the JS J-1, for prioritization and sourcing of any unfilled positions. The supported CCDR should estimate the duration of the position in the remarks of the JMD. As an exception to this process, special operations requirements are passed directly from the supported combatant command through the theater special operations command to USSOCOM, and CSA requirements are passed directly from the CCDR to the director of the CSA, which will work through the JS to obtain the necessary SECDEF approval to fill the requirements.

b. Upon receiving the validated JMD from the supported CCMD, the JS will start the prioritization and sourcing review process. The JS J-1 will be responsible for coordinating the process. During the first phase of the process, the validated JMD is sent to the Service HQ, CSAs and supporting CCDR to identify potential sourcing options. The JS J-3 will review the JMD positions to ensure a unit or units cannot provide the same capabilities. The JS J-5 will establish the current global priorities. The Services, CSAs, and supporting CCDR should identify ability to source the JMD positions and report back to the JS, normally, 21 days for annual review and within 7 days for off cycle reviews.

c. Service HQ and CSAs will initiate movement of approved IA personnel to meet the requirements contained in the reporting instructions to ensure the IAs arrive at the supported command by the requested date.

d. Should a Service or CSA disagree with the supported combatant command requirements or a supporting combatant command or DOD agency disagree with a Service request to fill a shortfall requirement, they can reclama to the Chairman of the Joint Chiefs of Staff. CJCS will monitor — through the Joint Staff — all requests for individual augmentation and, as necessary, help resolve disagreements or (as the JCS considers appropriate) take the matter for decision to the Secretary of Defense. Individual mobilization augmentees (IMAs) are recalled to active duty IAW procedures in Appendix Q, "Reserve Component Call-up."

e. The supported CCDR will be responsible for reviewing and revalidating JMD positions at least every twelve months. If JMD positions are still required and validated, they will continue to be filled as previously assigned. The JS prioritization and sourcing review process can be used in situations where relieving personnel cannot be identified, for instance high demand / low density skills.

(c) IA Sourcing Procedures

An IA billet must be in support of an operation, contingency, or exercise that is approved by the President or SecDef and validated by the CCDR. IA requests must not be used to temporarily fill vacancies in permanent manning billets on the JTD. To request an IA, the CCDR or JTF Commander must document the personnel requirement on the Command's JMD, which is maintained by the J1 or the administrative section.

When a vacant JMD position is identified, the CCDR or JTF J1 validates the need to fill the billet and forwards the manning requirement to the Service Component Commander (SCC) which has been assigned the position. The SCC first attempts to fill billet requirements using organic assets. If organic assets are not available, the SCC attempts to fill the position in accordance with Service-specific IA policies.

If the Service Component is unable to fill the vacant JMD position, the CCDR or JTF Commander forwards the requirement to the Joint Staff J1 for prioritization and fill.

The Joint Staff J3, Service headquarters, and supporting CCDR will review JMD positions to identify options to fill the positions. Joint Staff J5 will establish global priorities for IA fills.

Services and the supporting CCDRs should identify and report personnel to source JMD positions within 7 days. NOTE: As of 2011, responsibility for identifying sourcing solutions for Joint IAs was transferred from the Joint Staff to USJFCOM J3.

This process is depicted in the figure below:

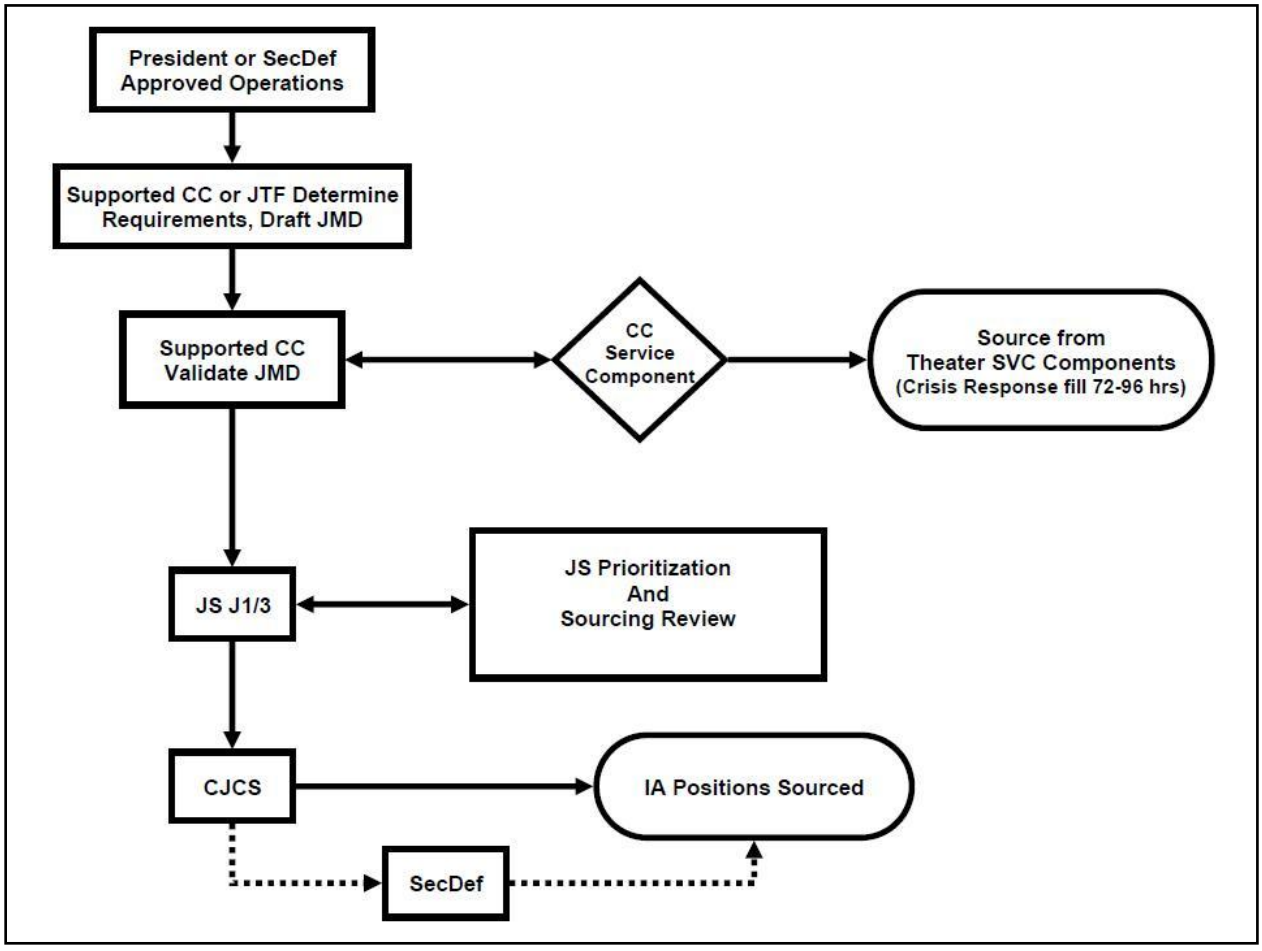

Figure 29: The IA Process (From CJCSI 1301.01C)

The supported CCDR must periodically re-validate IA positions to ensure they are mission-specific and essential to support designated operations. IA positions should be eliminated if they are non-essential, duplicated by other organizations, or could be supported by reach-back. IA billets that will be required for long periods should be converted to permanent change of station (PCS) billets on the JTD.

(d) Some IA Service-Specifics

USFF (N37/38), CNMOC, and OPNAV (N84) (Oceanographer of the Navy) should be included on all Navy METOC IA requests.

The Maritime Component Commander IA request must be sent via Naval Message to Commandant of the Marine Corps (CMC) (MP) and (MM) thru the Service chain of command,

informing Joint Staff (J-1-PRD), to fill a vacant billet. Headquarters Marine Corps HQMC ALS-44 should be included on all Marine Corps METOC IA requests.

The Joint Staff sends validated joint IA requirements, via a JMD, to the Air Force Joint Action Coordinating Office (JACO) as a Joint Action. The JACO relays the AF-specific portion of the JMD to the HQ USAF Crisis Action Team Manpower & Personnel Readiness Center (HQ USAF/CAT-MPRC) for processing. If the HQ USAF/CAT-MPRC is not activated, HQ USAF/DPPR assumes MPRC duties. After the Joint Staff and Service agree to the sourcing commitment, the AFCC ensures the requirements are entered in the appropriate TPFDD.

(e) IA Rotation Policies

The JTF J-1, with the combatant command J-1, will develop a rotation plan for joint individual augmentee positions. Unit rotations are a J-3 function. A staggered rotation will maintain a level of expertise and experience within the JTF and is desired.

As the duration of the JTF matures and tour length policies are defined, it may be advantageous to permanently assign each staff billet to a Service component for fill. Under this policy, a Service component assumes ownership of all billets assigned to them and fills them automatically at the required rotation date (e.g., every 90 days). This policy alleviates the need for numerous augmentation request messages and avoids reinventing the rotation plan. Establishment of this policy will be via the commander's Execute Order after detailed coordination with CJTF.

d. Manning Requirements

The majority of the information in this section comes from unclassified portions of the Secretary of Defense's 4 June 2008 memorandum on the subject of Global Force Management Implementation Guidance (GFMIG) for FY 2008-2009.

(1) Global Force Management

GFM is a process to align force apportionment, assignment, and allocation methodologies in support of the defense strategy and in support of joint force availability requirements; present comprehensive insight into the global availability of U.S. military forces; and provide senior decision makers a vehicle to quickly and accurately assess the impact and risk of proposed allocation, assignment, and apportionment changes within the GFM, the force allocation process allocates the Services' rotational forces to satisfy combatant commander operational requirements for military capabilities to support the defense strategy and the President's NSS. The GFM allocation process has two specific supporting processes, allocation in support of specific requests for capabilities and allocation in support of combatant command rotational force needs.

The baseline documents that establish the policy and procedures in support of GFM are: the UCP, "Forces For Unified Commands Memorandum" ("Forces For"), the JSCP, and Joint Publication 1, "Doctrine for the Armed Forces of the United States."

METOC forces and capabilities are generally too small to appear in GFM, but they do on occasion – so it is in the best interest of a SMO/JMO to understand the system.

(2) Force Management Processes

Assignment: Force Assignment guidance and requirements are outlined in US Code (USC) Title 10, Sections 161, 162, and 167. In the UCP, the President instructs the SecDef to document his direction for assigning forces in the "Forces for Unified Commanders." Under SecDef guidance the Secretaries of the military departments shall **assign** forces under their jurisdiction to unified and specified combatant commands to perform missions assigned to those commands.

Allocation: By law, a force assigned to a combatant command may be transferred from the command to which it is assigned only by the authority of the SecDef; and under procedures prescribed by the SecDef and approved by the President. Under this authority, the SecDef **allocates** forces between combatant commanders.

Each fiscal year, the SecDef approves a deployment order called the Global Force Management Allocation Plan (GFMAP). The GFMAP authorizes the transfer and attachment of rotational forces to specified combatant commanders. Modifications to the base order are made throughout the year to account for emergent requirements.

Apportionment: Pursuant to the JSCP, apportioned forces are types of combat and related support forces provided to combatant commanders as a starting point for planning purposes. The Chairman of the Joint Chiefs of Staff is responsible, and **apportions** forces to combatant commanders based on the SECDEF's Guidance for the Employment of the Force (GEF).

Example: The Navy's oceanographic survey ships are specifically mentioned in the "Forces For Unified Commanders." They are *assigned* to various combatant commanders. If a SMO/JMO knew well in advance of a requirement for these ships to be moved, then they could inform their CCDR's J3 to request the *allocation* in the GFMAP base order. If there was an emergent operational requirement, they would need to have them *allocated* via the Global Force Management Emergent Allocation Process wherein their CCDR submits a request for forces (RFF). An approved RFF will result in a modification to the GFMAP base order (among other things). These ships may have already been *apportioned* to the CCDR in support of an OPLAN supporting the GEF.

(3) The GFM/RFF Process

USJFCOM, as the primary JFP for conventional forces, focuses on the global allocation of forces to support combatant command requirements. USJFCOM, USTRANSCOM, and USSOCOM supervise the implementation of SecDef allocation decisions.

The part of the GFM process of most interest to a SMO or JMO would probably be Global Force Management Emergent Allocation Process – sometimes called the RFF process – as it relies upon a RFF from a combatant commander. The steps of this process are described in detail in

the GFMIG, pages III-14 to III-31 and Commander Joint Chief of Staff Manual (CJCSM) 3122.01A.

METOC forces may be requested in an RFF in a variety of ways. An RFF may specifically request weather forces, such as some received from CENTCOM in the last few years in response to emerging requirements. They may be part of a larger request, such as the NATO Response Force (NRF), or a Defense Support of Civil Authorities (DSCA) package. Air Force METOC forces can be indirectly requested through an RFF for an Army unit "with habitually aligned Air Force weather forces." In this last case, if follow-on FRAGOs are written then care must be taken to keep the weather units included with the Army.

(4) The RFF Process.

Step 1: CCDRs submit a request for forces / request for capabilities to support emerging or crisis-based operational requirements to the SecDef via the CJCS IAW Enclosure R to JOPES Vol. 1 (CJCSM 3122.01A). To be valid, all RFFs must include a General/Flag Officer endorsement verifying that the CCDR's J3 has reviewed and endorsed the request.

Step 2: The Joint Staff assesses the capabilities or forces requested in the RFF/RFC.

Step 3: Upon validation, the Joint Staff assigns a JFP and directs the JFP to develop a sourcing recommendation. The forwarded RFF/RFC includes any sourcing guidance developed by the Global Force Management Board (GFMB), Chairman, or SECDEF.

Step 4: The designated JFP, using Joint Staff, combatant command, and Service inputs, will develop recommended global sourcing solutions.

Step 5: Designated JFPs use their sourcing recommendation(s) to develop a DEPORD for final coordination with the Military Departments, other government agencies, and combatant commands through the CCDR's assigned Service component commands.

Step 6: The designated JFP provides its recommended global sourcing solution.

Step 7: The Joint Staff staffs the draft DEPORD (or EXORD) with agencies and OSD. Upon SecDef approval, the DEPORD or EXORD is executed IAW JOPES processes.

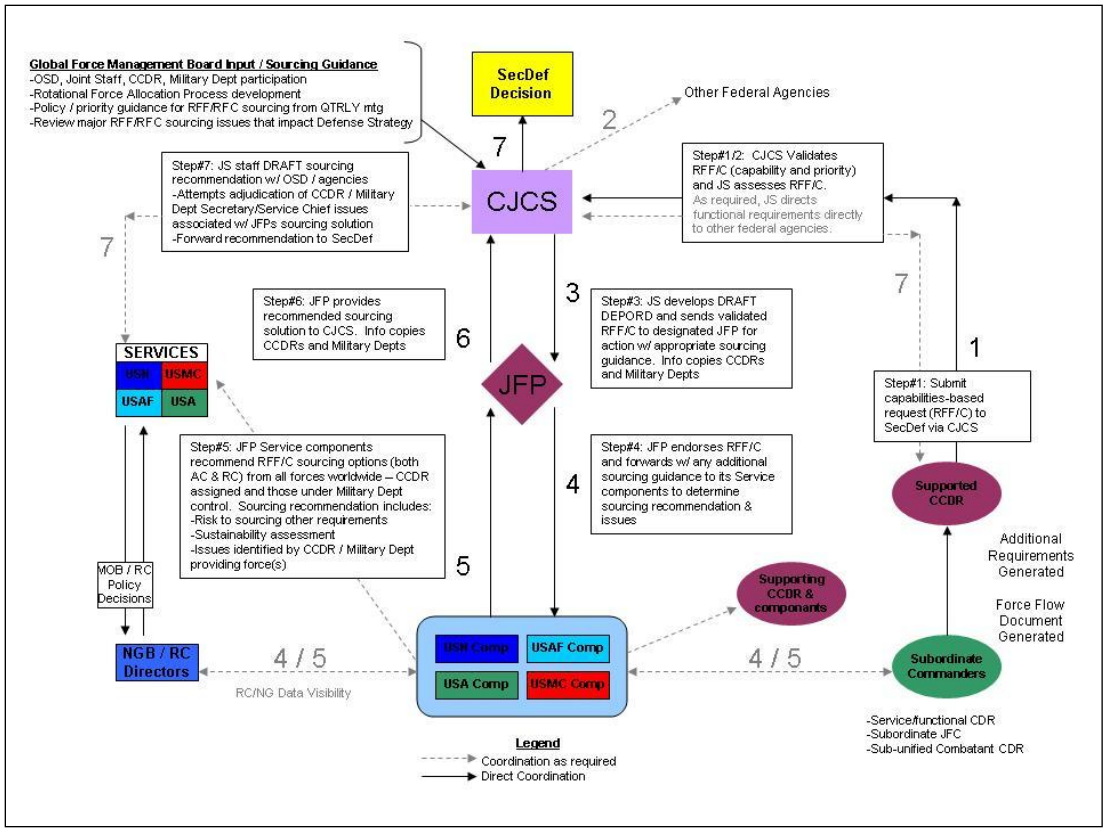

Figure 30: The RFF Process (From GFMIP)

e. Exercise Manning Requirements

The temporary manning associated with an exercise is generally noted in a Joint Manning Document called an Exercise Manning Document (**EMD**). It will be the responsibility of the command hosting the exercise to prepare the document. The EMD is the document that accounts for the training audience personnel. Another document, the exercise support manning document (**ESMD**) will account for the personnel assigned to the Joint Exercise Control Group (JECG), also known as the White Cell.

The SMO/JMO involved in the exercise should contact the lead METOC personnel in the training audience to ascertain the composition of the METOC personnel to be trained and verify that this is accurately captured on the EMD.

For the ESMD, the SMO/JMO involved should contact lead of the JECG into which METOC has been assigned – generally operations, intelligence, or scenario. The METOC concept of operations for the exercise should spell out the METOC personnel in the JECG, as well as their responsibilities. The personnel listed on the ESMD will generally be from CCMD or Service component staff.

The SMO/JMO will most likely work directly with J7 personnel for changes to these documents.

f. The Joint Urgent Operational Needs (JUON) Process

It is possible that wartime conditions could cause an urgent need for METOC resources. Pragmatically, this could follow a mission or operational failure in which weather was a contributing factor. If there is a readily available solution to present to the CCDR, it is possible they may request it via the JUON process. Policy regarding JUON is provided in CJCSI 3470.01:

"JUONs can be considered as life- or combat-mission-threatening needs based on unforeseen military requirements that must be resolved in days, weeks, or months. This process is not intended to replace the Joint Capabilities Integration and Development System (JCIDS) process but rather to accelerate the process of fielding readily available systems to satisfy joint urgent wartime needs."

The JUON process applies only to supporting CCMDS already operationally employed in SECDEF-directed missions. It must also be considered inherently joint in nature (e.g., theater-wide combatant commander need spanning multiple Services) and outside of the scope of existing DOD 5000 series and Service processes; i.e., Air Force's combat capability document (CCD), Army's operational need statement (ONS), Marine's urgent universal need statement (UNS), Navy's rapid deployment capability (RDC) and USSOCOM's combat-mission need statement (CMNS). This process is not intended to compete with any of the current Service processes but rather to complement them.
The CCDR's role is to identify, validate and prioritize JUONs that are not being met within their AOR and forward those that are "urgent and compelling" to the Joint Staff for action via the process shown in the figure below from CJCSI 3470.01. For details on the process, see the instruction.

Immediate Warfighter Needs (IWN) are specific hi-visibility JUONs that require resolution and capability fielding within 120 days or less

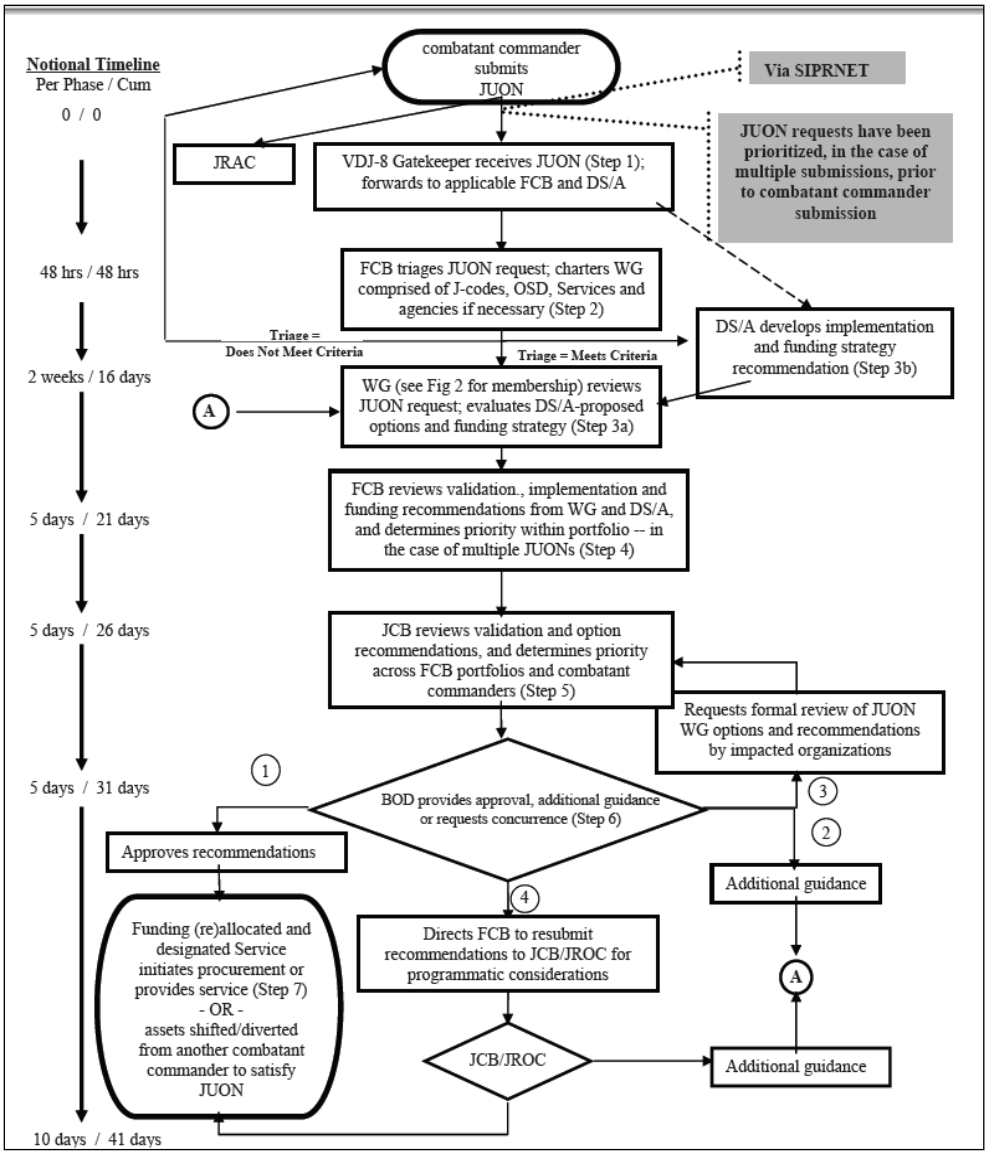

Figure 31: The JUON Process (From CJCSI 3470.01)

g. Service Methods to Shorten Acquisition Timelines

Services use various methods to shorten the acquisition timelines for less than ACAT I programs to meet urgent and compelling needs during crisis and conflict. (ACAT I programs are Major Defense Acquisition Programs (MDAPs) - defined as a program estimated by the Under Secretary of Defense (Acquisition and Technology) to require eventual expenditure for research, development, test, and evaluation of more than $300 million or procurement of more than $1.8 billion (per 10 USC 2430).

Air Force. The USAF CCD is unique to the Air Force and used in lieu of an initial capability document, capability development document and capability production document to support an interim solution to a warfighter's urgent capability needs. When warfighting commanders have recognized a capability gap and/or shortfall that could result in loss of life and/or prevent mission

accomplishment, they submit an urgent need to the lead major command (MAJCOM) for requirements identification and approval. An urgent need does not become a CCD until the lead MAJCOM has approved the requirement and has submitted it to HQ USAF for action. In most cases, the lead MAJCOM satisfies the combatant commander's urgent need through means other than the CCD process (non-materiel solution, internal programming authority, off-the-shelf purchase, etc.). This is the preferred method as it provides the quickest support to the warfighter. Currently, there is no requirement for a combatant commander to write or endorse the CCD in AFI 63-114, "Rapid Response Process;" however, combatant commander endorsement is usually requested.

Army. HQ Department of the Army (DAMO/RQ) uses the operational needs statement (ONS), described in AR 71-9, "Materiel Requirements," para 3 and 4 and Appendix B. The required 120-day action time has been replaced with a "do it now" approach. The combatant commander may ask the Army component commander to initiate, but endorsement of component initiatives is not required unless HQ DA specifically requests an endorsement. The first general officer in the chain of command is all DAMO/RQ needs to start the process.

Marine Corps. The Marine Corps follows the DOD 5000 series publications and uses the process for commercial off-the-shelf (COTS) procurement. The Marine component within the combatant command initiates the urgent universal need statement requests using the combat development universal need statement format. Criteria for submission is that the request is an "urgent and compelling" requirement that if not filled would impact the operator's ability to complete his or her mission. Intent is to fill the requirement within 60 days of Marine Requirements Oversight Council approval.

Navy. The US Navy follows the DOD 5000 series and uses the process for COTS procurement. The Navy also has established a Rapid Deployment Capability program, defined in SECNAVINST 5000.2B, to field a required new capability in 4 to 6 months. All requests originate from the combatant commander through the supporting Service component and take about 6 months to complete the process.

United States Special Operations Command (USSOCOM). The USSOCOM Combat Mission Need Statement (C-MNS) process, documented in USSOCOM Directive 71-4, "Combat Mission Need Statement (CMNS) Process," supports urgent and compelling new or existing materiel needs identified during preparation for or active special operations forces (SOF) combat and/or contingency operations. A C-MNS must satisfy at least one of two criteria: (1) critical shortfall on the overall success of the mission (mission failure); or (2) critical combat survivability deficiency (loss of life). The C-MNS process supports expeditious acquisition of new or existing materials, normally fielded within 180 days of C-MNS approval. A C-MNS is prepared by the operational unit in the field, endorsed by the theater special operation command (TSOC) commander and endorsed by the USSOCOM component for validation and approval. Although the process parallels the JCIDS process in format, the C-MNS does not substitute for this process. Upon C-MNS receipt, a HQ USSOCOM rapid response team is formed from subject matter experts in each USSOCOM staff directorate and applicable components to identify, validate, approve and field a solution rapidly.

h. The JOPES Planning System

JOPES is a command and control system used by the Joint Planning and Execution Community (JPEC).

It is a combination of joint policies and procedures ("Big JOPES"), supported by Information Technology (IT) ("Little JOPES"), designed to provide joint commanders and planners with a capability to plan, conduct, and monitor joint military operations. It is the DoD-directed single, integrated joint command and control system for conventional operation planning and execution (including theater-level nuclear and chemical plans). It includes policies, procedures, reporting structures, and personnel, supported by the C4I systems and is used by the joint community to conduct Joint planning during peace and crisis.

Joint operation planning is a process coordinated through all levels of the national structure for joint planning and execution. The focus of the joint operation planning process is on the CCDRs, who use it to determine the best method of accomplishing assigned tasks and direct the actions necessary to accomplish the mission. JOPES is designed to facilitate rapid building and timely maintenance of plans and rapid development of effective options through adaptation of approved operation plans during crisis.

JOPES allows for the effective management of operations in execution across the spectrum of mobilization, deployment, employment, sustainment, redeployment and demobilization. JOPES is supported by a networked suite of Automated Data Processing (ADP) applications, tools, and databases, which reside on the GCCS (on the SIPRNET at http://c2www.af.pentagon.smil.mil/xoxw/). JOPES ADP systems include the mechanisms to create and maintain TPFDDs and to submit CCDR movement requirements to USTRANSCOM. JOPES ADP is commonly referred to as JOPES. All Joint, conventional TPFDDs are developed by and reside in JOPES ADP.

JOPES also assists in identifying shortfalls, which are converted to joint operation requirements to the PPBE. The term "the use of JOPES is directed" in JOPES orders directs all tasked organizations to use JOPES in developing plans/orders to accomplish the tasked mission(s). This means organizations must follow the guidance set out in Joint Pub 5.0 and well as all the Chairman of the Joint Chiefs of Staff (CJCS) Instructions governing JOPES.

(1) Capabilities of JOPES

JOPES includes people, procedures, policies, communications, and supporting Information Systems (IS) software located on the GCCS on the SIPRNET at http://c2www.af.pentagon.smil.mil/xoxw/. For the AF planner, JOPES offers some important capabilities.

(2) TPFDD

The TPFDD is the database used to coordinate the movement of forces into their operational locations. The TPFDD includes forces from all Services and their movement requirement. These

forces compete for the limited available lift to have their assets in-place first. JOPES Volume III establishes the methods and procedures the JPEC will follow to coordinate its efforts to develop a TPFDD.

(3) Rapid Query Tool (RQT)

RQT provides a capability for the planner to query and produce reports from a TPFDD. RQT provides the means for planners to produce relevant TPFDLs. These TPFDLs are used to coordinate the deployment flow and ensure each UTC's movement is in the proper sequence. A TPFDL can be sorted by different data fields. Common data sorts used by planners are by Service, UTC, dates (ALD, LAD, RDD, and so forth), destination, origin, transportation mode, and functional area.

(4) Scheduling and Movement (S&M)

S&M is the JOPES application that handles command and control information on deployment activity and status. It functions as a vehicle for reporting and tracking movement of TPFDD requirements. S&M allows you to review, update, schedule, and create manifests for both Transportation Component Command (TCC) carrier and organic movement before and during deployment. It provides the capability to review and analyze an extensive variety of requirement and movement data.

(5) Medical Analysis Tool (MAT)

MAT provides medical planners with a means of determining the overall medical feasibility of an existing or proposed OPLAN. This is a JOPES direct support tool.

(6) Joint Engineer Planning and Execution System (JEPES)

Provides the planner a means to analyze facility, material, and force level support requirements for civil engineering personnel. This is a JOPES direct support tool.

(7) Web Hoc Query (WHQ)

WHQ provides users with a means to develop, save, and print tailored queries extracting data from the JOPES core database via the SIPRNET.

(8) Airfield Information

Airfield information is provided via access to the National Geospatial-Intelligence Agency Web site. (JOPES direct support tools).

(9) Standard Reference Files

These standard reference files specify codes for locations, cargo and passenger movement details for UTCs or large equipment items, movement details for UTCs, or individual equipment items.

(10) Geographic Location File (GEOFILE)

The GEOFILE provides codes for specific locations. Properly used, these codes aid force movement planning. Planners must be careful they use the correct code to ensure the required location is listed. For example, Charleston seaport, airport, and military airport each have different geographic codes.

(11) Type Unit Characteristics (TUCHA) file

The TUCHA file contains the deployment data for all approved DoD unit type code (UTCs), including the number of passengers and the cargo increments and the weights and dimensions. This standard reference file is used when planners develop the TPFDD. When a planner enters a UTC in a TPFDD, the information from this file is copied into the TPFDD. These cargo data are the Level 4 information needed to plan the forces movement.

(12) Type Unit Equipment Detail File (TUDET)

The TUDET contains the dimensional and weight data for large pieces of equipment. It may be looked up using the nomenclature or national stock number.

(13) Global Status of Resources and Training (GSORTS)

The GSORTS database record provides unit readiness status and current location. The GSORTS database record reflects the readiness level of selected units in terms of training, equipment, and personnel against the level required to undertake assigned missions. Planners may review the data in this database while selecting units to support an operation

(14) Joint Flow and Analysis System for Transportation (JFAST)

Although not a JOPES tool, JFAST complements JOPES by assisting the planner with analyzing OPLAN feasibility in terms of inter-theater movement. It also provides a capability to generate non-unit-related cargo (CIN) and personnel (PIN) requirement estimates based on the forces to be supported and the duration of the planned operation.

(15) Supported Command and Supporting Command

The Service components of the supported command (usually the supported command is a geographic CCMD) are responsible for determining the types of forces they require and the arrival dates and locations of those forces. The supporting commands (primarily USJFCOM and USTRANSCOM) are responsible for identifying the specific forces that will deploy, the locations from which they will deploy, and the dates by which they must depart in order to arrive by the date specified by the supported command.

USJFCOM works with the services and other CCMDs to determine which units will deploy to meet the requirements identified by the supported command. USTRANSCOM arranges for the strategic movement of forces through its three component commands: the Army's Military

Surface Deployment and Distribution Command, the Air Force's Air Mobility Command, and the Navy's Military Sealift Command.

i. Time-Phased and Deployment Data, TPFDD

JOPES organizes the information obtained from the four standard reference files, along with scenario-specific information, into a specific TPFDD plan known by a Plan Identification Number (PID)**.** A PID directly corresponds to an OPLAN or CONPLAN and contains all of the unit line numbers and force modules (described below) associated with that plan's movement of forces. Dates associated with the movement of forces are known as **C-days and N-days**. A C-day is an unnamed day on which a deployment operation will commence. When used in conjunction with a C-day, an N-day indicates the number of days preceding the C-Day. For example, N–1 refers to 1 day before C-day, N–2 refers to 2 days before C-day, and so on. At execution of the deployment, an actual date is assigned as C-day.

(1) Unit Line Numbers and Force Modules

A unit line number (ULN) is an alphanumeric field (from two to seven characters in length) that describes a particular force in the TPFDD database. The information contained in the ULN is used as the basis for organizing TPFDD-related planning, reporting, and tracking data on the movement of forces and equipment from points of origin to deployed destinations. The ULN is a unique identifier for a TPFDD force requirement and is the cornerstone on which all movement data are built.

Personnel from the supported command (including components) establish force requirements. When supported commands do not have the units in theater needed to satisfy requirements, supporting commands designate units for deployment to the supported command's area of operations. This process is known as **sourcing**. Force requirements and sourcing information are needed to plan and execute the strategic movement of forces.

Forces described by ULNs, as found within a PID for a specific force movement, are organized by using force modules. According to CJCSM 3150.16B, JOPES Reporting Structure (JOPESREP), Volume I, **a force module is a grouping of combat, combat support, and combat service support forces, with their accompanying supplies.** Non-unit resupply and personnel necessary to sustain forces for a minimum of 30 days may be included. The elements of Force Modules are linked together or are uniquely identified so that they may be extracted from or adjusted as an entity in the JOPES databases to enhance flexibility and usefulness of the operation plan during a crisis.

In effect, force modules provide a means of organizing ULNs (remember a ULN designates a specific force) into groups useful to commanders and staffs. Any ULN could be part of several force modules. For instance, one force module may comprise all the ULNs of a specific brigade. Another force module may contain those ULNs departing from a specific port of debarkation. Yet another force module may contain all logistics support battalions.

(2) ULN Information

A ULN describes one or more unit movement requirements for their passengers and/or equipment that share a movement from the same origin to the same destination, at the same time, using the same transportation mode and source. ULNs contain five major types of movement information: the deploying units, the dates associated with the movement, the locations involved with the movement, the number of personnel and the type and quantity of cargo to be moved, and the type of transportation that will be required to move the forces.

(a) Deploying Units

For each ULN, a representative from the supported command (the command requesting forces) enters a UTC, which will extract the corresponding narrative description of the force required from the TUCHA file. For instance, if the supported command requires a field artillery battalion with 155-millimeter (MM) towed cannons, it will use the TUCHA file to select a UTC of "1FUTT." This UTC has a narrative force description of "FA BN 155MM TOWED 3x6."

A UTC can represent a force that ranges in size from an 18,000-soldier Army division to a brigade, a battalion, a company, a platoon, or an individual service member. There are thousands of different UTCs. The corresponding size of the force requested is identified in the unit level code, which is a three-character alphabetic code used to specify the organizational level of a force. After the supported command has requested the generic types of units it requires by using UTCs, the supporting command (USJFCOM is the force provider for most conventional U.S.-based forces) responds to these requirements by tasking specific units by UIC to deploy and adding this information to the existing ULNs through the GCCS.

(b) Movement Dates

In a manner similar to that used to identify units for deployment, both the supported and the supporting commands determine the dates when forces will move through those geographic locations associated with the forces' deployment. **In chronological order, the milestone dates associated with the movement of forces are**:

- Ready to load date (RLD) at the unit's point of origin
- Available to load date (ALD) at the port of embarkation (POE)
- Earliest arrival date (EAD) and latest arrival date (LAD) at the port of debarkation (POD), which is known as the EAD–LAD window
- Required delivery date (RDD) at the unit's final destination
- The GCC's required delivery date (CRD)

The supported command determines the EAD, LAD, RDD, and CRD because the locations associated with those dates are in the supported commander's area of operations. The earliest arrival date (EAD) and the LAD describe a window of time during which a force must arrive at the POD. Planners normally incorporate a range of 3 days for air arrivals, 7 days for sea arrivals (although Caribbean deployments use less than 7 days, while Southwest Asia deployments require a longer period), and 5 days for land-related arrivals.

The CRD is the date when forces need to be in place, as initially determined by the supported commander. Although the CRD and the RDD can be the same, the realities of moving forces usually will prevent the positioning of forces as quickly as the CRD stipulates. In that case, a more realistic date—the RDD—is established. In many instances, the RDD location is the **reception, staging, onward movement, and integration (RSO&I) site**. It is there that personnel receive their equipment, which may have been sent separately, and begin preparing for movement to a staging base or a tactical assembly area.

(c) Movement Locations

Each ULN tracks at least four different movement locations: the unit's point of origin, its POE, its POD, and its destination. If necessary, an intermediate location (ILOC) also is tracked. An ILOC is a stopping point in the deployment routing of a unit and is used for a unit layover lasting a specified time, normally longer than a day. This layover often is used to unite the personnel and cargo of split shipments. A unit may need to stop at an ILOC when moving from its point of origin to its POE, from its POE to its POD, or from its POD to its destination. Movement locations are entered into the JOPES database using GEOLOC codes. The supporting command determines the preferred POE. The force associated with the UIC identified in the ULN will travel to the POE from its point of origin. Normally, a unit's point of origin is its home station. However, the point of origin could be a training facility or a temporary location.

(d) Personnel, Cargo, and Transportation

JOPES personnel and cargo information is expressed in four levels of detail. The Air Force uses level 6 detail for personnel information. It can range from a simple expression of the aggregate number of passengers (level 1) all the way to a level of detail that includes the names and Social Security Numbers of each passenger (level 6).
Cargo detail can range from a level 1 expression of total tonnage (expressed in short tons) to a specific listing of the weight, volume, dimensions, and CCC for each specific item (level 6).

(e) Split Shipments

A unit may move its personnel by air while its cargo moves by sea. The corresponding ULN entries are known as split shipments; in effect, two ULNs are created for the unit. The first four characters of the two ULNs are identical; however, the fifth position of one of the ULNs would have a "P" to indicate passenger movement, while the fifth position of the other ULN would have a "C" to indicate cargo movement.

(f) Additional ULN Data

The ULN also contains additional information that planners and operators use to manage the movement of forces. This information includes the mode and source codes, the load configuration code, and the discharge constraint code.

The mode and source codes describe how the cargo or passengers will be moved among

geographic locations. There are five transportation modes: air, sea, rail, truck, and pipeline. The JOPES database uses a modified format to codify modes: "A" for air, "L" for land, "S" for sea, "P" for optional, and "X" to indicate that transportation is not required (for example, when the unit's POD and final destination are the same). The corresponding source code describes the organization that is providing the transportation. [Mode and source codes can be found in CJCSM 3150.16B, Volume I, Table A–9.]

j. METOC and the TPFDD

The Joint METOC Officer will need to be involved during the early phases of Crisis Action Planning to track METOC personnel and equipment needed for execution of the operation. **Navy and Marine Corps METOC personnel and equipment deploy with their units and do not need to be added to the TPFDD (assuming their entire unit is deploying). However, detailed planning must be done for weather support to Air Force and Army units.**

Weather support is not pre-packaged and must be tailored for each operation. Individual METOC personnel will also need to be added to the TPFDD for the JTF, JFACC, JFLCC, JFMCC, and the JSOTF. The Staff Oceanographer or Weather Officer should work closely with the Senior METOC Officer at the Combatant Command level to assist in METOC augmentation. Additional METOC resources can come from the supported Combatant Commands components or from a supporting CCMD.

(a) JTF TPFDD Helpful POCs

- J-1 is the Manpower and Personnel section and usually handles individual augmentation requirements
- J-5 is the Plans section and usually enters records into the TPFDD. The J-4 (Logistics), if not the primary POC, will have a major part in the process

(b) Reading a TPFDD Record

ULN(1)			UNIT TYPE							PORT OF DEBARKATION OR OCEAN AREA(9)					
FRN	FRAG	INS	CODE	SERV	DESCRIPTION	PERS	ULC	SOURCE	ORIGIN	MODE	LOCATION NAME	CNTRY	LAD	PRI	AD
(1a)	(1b)	(1c)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9a)	(9b)	(9c)	(9d)	(9e)	(9f)

Figure 32: TPFDD Format (From AFM 10-401V2)

(c) TPFDD Format Notes:

(1) ULN--The unit line number uniquely identifies a force requirement. It is made up of:

(a) FRN--The force requirement number alphanumeric code that uniquely identifies a force requirement in a plan.

(b) FRAG--The fragmentation code is an alpha designator for a subordinate unit, fragmentation, or increment of the requested force.

(c) INS--The insert codes is an alphanumeric designator for inserting subordinate units, fragmentation, or increments used to retain original fragmentations of forces when a planned movement requires additional subdivision.

(2) UNIT TYPE CODE--The UTC is an alphanumeric code from the TUCHA file for the type unit described. If not listed in TUCHA, this may be a nonstandard code.
(3) SERV--The parent service code of the force requirement.
(4) DESCRIPTION--The short type name of the force requirement.
(5) PERS--The authorized personnel strength associated with the UTC.
(6) ULC--The unit level code associated with the UTC.
(7) SOURCE--The agency designated to provide the force requirement.
(8) ORIGIN--For planning purposes, this is the station at which the unit is located (in-place) or will most likely become available for deployment.
(9) PORT OF DEBARKATION OR OCEAN AREA-Consists of:

(a) MODE--The code for the preferred mode of transportation to the POD or ocean area.
(b) LOCATION NAME--The name of the geographic location of the POD or ocean area, or the term "IN-PLACE" for in-place units.
(c) CNTRY--The country or state name associated with the location name.
(d) LAD--The latest arrival date by which the force must complete unloading at the POD or ocean area.
(e) PRI--The desired sequence of arrival (priority) on the LAD at the POD. It should be left blank if the unit is in place. The entry is optional if the unit is going to an ocean area or is on call to the POD.
(f) AD--Priority add-on is the alphabetic code used to insert a force requirement into the priority arrival sequence without re-sequencing already assigned priorities.
This entry is left blank if the unit is in place. The entry is optional if the unit is on call to the POD.

(2) Air Force TPFDD Requirements

TPFDD requirements for tactical AFFOR assets are controlled and maintained by the Unified/Component commands. METOC planners should contact HQ ACC, HQ PACAF, USAFCENT, USAFSOUTH, and HQ USAFE weather plans sections for TPFDD information regarding their METOC forces and assets:

ACC/A3W Contingency and Readiness Branch (ACC/A3WC):	DSN 574-8459/8443
PACAF Weather Plans (PACAF/A3/5/8/A3OA):	DSN 448-1475
USAFCENT Weather Division (USAFCENT/A3W):	DSN 965-2980/0468
USAFE Weather Plans (USAFE/A3WL):	DSN 480-9325
USAFSOUTH/A3W:	DSN 228-5419

Table 4: Tactical AFFOR UTC's and Description

UTC	*Description*	*Qty*	*Rank/Rate/ Designator*
XWAOS	WEA TAC METEOR OBSRV SYS TMOS	1	TMQ-53
XWPAC	WEA COMMAND METEOROLOGIST	1	SENIOR O3+

XWQA1	WEA FORECASTER	1	E3-E6
XWQA2	WEA OPERATIONS MANAGER	1	E7-E8
XWQAB	WEA OPERATIONAL METEOROLOGIST	1	O2-O3
XWEWRX WSTT	WEA WEATHER RADAR SYSTEM	11	Weather radar TMQ-43
XWTFS	NEW TACTICAL FORECAST SYSTEM	1	N-TFS
XWTAC	AFSOC Jump Qualified Weather Officer	11	E7-E8 Any "O"
XWTAD	AFSOC Special Operations Weather Team (SOWT)	11	E3-E6 Any "E"

Table 5: Individual Air Force Weather Augmentees

Name	*AFSC*
Staff Weather Officer	15W4
Qualified Weather Officer	15W3
Special Operations Weather Team (O2-O4)	15W3C
No UTC/REQUIREMENT exists for weather E9	
Special Operations Weather Team (E2-E8)	1W0X2
Weather Forecaster Superintendent (E7-E8)	1WO91, 1W071
Weather Forecaster Craftsman (E6-E7)	1W071
Weather Forecaster Journeyman (E4-E5)	1W051
Weather Forecaster Apprentice (E2-E3)	1W031

(3) Army TPFDD Requirements

Since the Air Force provides Army weather support via Battlefield Weather (BW) personnel, Air Force weather organizations organize, train and equip forces (UTCs) to operate with the Army.

- POC for all FORSCOM augmenting forces is HQ ACC/A3W.
- POC for all United States Army Forces, European Command (USAREUR) augmenting forces is HQ USAFE/A3W.
- POC for all USARPAC augmenting forces is PACAF/A3/5/8/A3OA.

Table 6: Tactical Army Weather Support UTCs and Description

UTC	*Description*	*Qty*	*Rank/Rate*
XWAAC	ARMY SUPPORT COMMAND METEOROLOGIST	1	SENIOR O3+

XWAA2	ARMY SUPPORT WEA OPERATIONS MANAGER	1	E7-E8
XWAAB	ARMY SUPPORT OPERATIONAL METEOROLOGIST	1	O1-O3
XWAA1	ARMY SUPPORT WEA FORECASTER/OBSERVER	1	E3-E6

AR 115-10/AFJI 15-157 identifies specific service logistics support responsibilities to Army-support weather units

(4) Navy TPFDD Requirements

Table 7: Navy METOC Personnel UTCs

UTC	*Description*	*Qty*	*Rank/Rate*
KWP01	METOC Officer	1	01-04
KWP02	METOC Forecaster	1	E5-E8
KWP03	METOC Observer	1	E1-E5
KWP04	METOC Upper Air Team	2	E1-E5

Table 8: Navy METOC Equipment UTCs

UTC	*Description*	*Designator*
KWC01	Automated Meteorological Observing Sys	AMOS
KWC03	Mini-Rawin System	AN/UMQ-12
KWC04	ICS-9700 UltraLite INMARSAT Systems	INMARSAT
KWC05	Mini Facsimile Recorder	TR-4
KWC06	Mobile Oceanographic Support System	MOSS
KWC07	Interim Mobile Oceanographic Support Sys	IMOSS

The following UTCs are still valid, though the ones listed above should be used. If they are used, they are limited to non self-deploying elements going to a JTF HQ, JFACC, or JSOTF.

Personnel: use XWZ99 for UTC and insert the following information:
Oceanographer Officer: Designator 1800/6460
Enlisted Forecaster: Navy Enlisted Code (NEC 7412); E5/E6
E7-E9 (AGC, AGCS, AGCM)
Enlisted Observer: E1-E5 (AGAR,AGAA,AGAN,AG3,AG2)
Equipment: XWZ99 Interim Meteorology and Oceanographic Support System (IMOSS): 0.5 short ton

(5) USMC TPFDD Requirements

Military Occupation Specialty (MOS):
Weather Officer WO1-CWO5; O3-O5 (MOS 6802)
Weather Forecaster E5-E9 (MOS 6842
Weather Observer E1-E5 (MOS 6821)

Marine forces UTCs. All METOC equipment is contained within the first two UTCs; METOC personnel are carried in any of the last 6 UTCs as a part of their unit

Table 9: USMC Forces UTCs

UTC	*Description*
8DSF1	Fixed Wing Support Meteorology Mobile Facility
8DWR1	Rotary Wing Support Meteorology Mobile Facility
8MLUA	Rotary Wing Support Squadron (includes METOC)
8MLUB	Rotary Wing Support Squadron w/ Maritime Pre-positioned Shipping (MPS)
8MLUP	Rotary Wing Support Squadron as a fly-in echelon
8MMUA	Fixed Wing Support Squadron (includes METOC)
8MMUB	Fixed Wing Support Squadron with MPS
8MMUP	Fixed Wing Support Squadron as a fly-in echelon

(6) Special Operations Forces TPFDD Requirements

Table 10: JSOTF HQ METOC UTCs

UTC	*Description*	*Qty*	*Rank/Rate*
XWQAB	Air Force Weather Officer	1	15W3
XWSFG	Special Forces Group Wx Team	1	J15W3/1W0X
XWSFB	Special Forces Battalion Wx Team	4	2 (5/7)
XWRGB	Ranger Battalion Wx Team	2	1W0X2 (5/7) 1W0X2 (5/7)
KWP01	Navy METOC Officer	1	01-04
KWP02	Navy METOC Forecaster	1	E5-E8
KWP03	Navy METOC Observer	1	E1-E5
KWP04	Navy METOC Upper Air Team	2	E1-E5

k. METOC and the JCIDS Big Picture

The Navy METOC O5 billet on the Joint Staff is the METOC POC for the placement of METOC within the Joint Capability Area lexicon. Understanding the "big picture" of the Joint Capabilities Integration Development System (JCIDS) and Joint Capability Areas (JCA) is necessary to be an effective SMO and recommended for a JMO.

(1) JCIDS and JCA Background

The JCIDS is the formal DoD procedure which defines acquisition requirements and evaluation criteria for future defense programs. JCIDS was created to replace the previous service-specific requirements generation system to meet the combined needs of all US military services.

The central focus of JCIDS is to address capability shortfalls, or **gaps** as defined by combatant commanders. JCIDS is therefore said to provide a **capabilities-based** approach to requirements generation.

Another major emphasis of JCIDS is to consider whether a solution to a potential operational gap requires the development of a physical system (a **materiel** solution) or a procedural or training based solution (a **non-materiel** solution). In this sense, the JCIDS process provides a solution space that considers solutions involving any combination of doctrine, organization, training, materiel, leadership and education, personnel and facilities (**DOTMLPF**).

The JCIDS process starts with the development of joint integrating concepts and the capability they imply from the SECDEF and combatant commanders. From the joint integrating concepts, the joint chiefs of staff refine requirements and develop an integrated priority list via a joint quarterly readiness review. Military judgment is further applied by the Joint Requirements Oversight Council (JROC) (comprised of the Vice Chairman of the Joint Chiefs of Staff and other service vice-commanders) which **validates** requirement attributes and determines how to produce the required capability.

JCA were established in conjunction with JCIDS in order to provide for a common lexicon throughout the Department of Defense.

JCAs were first proposed in the 2003 Joint Defense Capabilities Study, also referred to as the Aldridge Study. It called for dividing the Department of Defense's capabilities into manageable capability categories (later called areas) as an essential early step to implementing a capabilities-based approach, because they provide the framework for capabilities planning. The study recommended dividing capabilities functional categories that minimize redundancies in capability decomposition, provide clearer boundaries to assign weapon systems, and improve management ability to develop and implement capabilities planning.

In 2005, the Joint Force Capabilities Assessment sub-study developed the initial 21 tier 1 JCAs. A subsequent Secretary of Defense memo approved them for "use as appropriate," and referred to them as "the beginnings of a common language to discuss and describe capabilities across many related Department activities and processes."

The Joint Requirements Oversight Council (JROC) and the Deputy's Advisory Working Group later approved a functional decomposition of nine new tier 1 JCAs down to their tier 3 level. The JCAs' further refinement and decomposition below the tier 3-level was approved by the Director of the Joint Staff and the Acting Principal Undersecretary of Defense for Policy in a co-signed JCA memo dated 12 Jan 2009.

The nine current JCAs are collections of like DOD capabilities functionally grouped to support capability analysis, strategy development, investment decision making, capability portfolio management, and capabilities-based force development and operational planning. The nine areas are:

1. Force Support

2. Battlespace Awareness
3. Force Application
4. Logistics
5. Command and Control
6. Net-Centric
7. Protection
8. Building Partnerships
9. Corporate Management and Support

The JCA Management System (JCAMS) was successfully deployed on the Joint Doctrine, Education and Training Electronic Information System (JDEIS) portal as the authoritative JCA database. JCAMS is being expanded to map JCAs to the Universal Joint Tasks, Program Elements, and Joint Operations Concepts to improve and increase JCA utility. Additionally, JCA linkages are being developed to benefit the Department's capability-based processes. These include capability portfolio management, adaptive planning, readiness reporting, and the analytic agenda.

(2) METOC in the JCA

Joint METOC appears within the Battlespace Awareness (BA) Area as part of the tier two Area "Environment." The Initial Capabilities Document (ICD) for the METOC Environment, which documents the results of a capabilities-based assessment (CBA) is in the staffing process with an approval goal of July 2009. When the JROC approves the ICD it is validating that there is a need to address the capability gaps and that there are potentially affordable and technically feasible solutions to the gaps.

(3) JCA Definitions

Battlespace Awareness is the ability to understand dispositions and intentions as well as the characteristics and conditions of the operational environment that bear on national and military decision-making. For a full list of the Environment definitions, with the JCA numbering scheme, see Appendix A.

l. METOC in Joint Training

(1) Universal Joint Task List

The UJTL serves as a menu of tasks in a common language, which serve as the foundation for capabilities-based planning across the range of military operations. Tasks are separated into the Strategic National (SN), Strategic Theater (ST), Operational (OP), and Tactical (TA) levels of warfare.

(2) METOC-specific UJTL Tasks

SN 1.1.5 Determine Impact of Environmental Conditions on Strategic Mobility
SN 3.5.3.2 Provide Weather/Environmental Support

ST 2.2.3 Collect and Assess METOC Information
OP 2.2.3 Collect and Assess METOC Operational Information

(3) METOC-related UJTL Tasks

SN 1.1.1 Determine Transportation Support Availability
SN 2.2.1 Collect Information on Strategic Situation
SN 2.4.1.2 Determine Enemy's Global Capabilities & Strategic Courses of Action
SN 2.4.2 Prepare National Strategic Intelligence Products
SN 2.4.2.2 Provide Current Intel to National Strategic Planners & Decision Makers
SN 3.5 Provide Space Capabilities
SN 3.5.3 Provide Space Force Enhancement
SN 4.2.5 Coordinate Defense-Wide Base Operational Support Worldwide

ST 2.3 Process and Exploit Collected Theater Strategic Information
ST 2.4.1.1 Identify Theater Threats and Issues
ST 3.2.2.1 Conduct Theater Psychological Activity
ST 4.4.1 Determine Number and Location of Sustaining Bases
ST 5.1 Operate and Mange Theater C4I Environment
ST 6.2.6.1 Establish and Coordinate Counter-Reconnaissance Theater-Wide

OP 2.2.1 Collect Information on Operational Situation
OP 2.2.5 Collect Target Information
OP 2.4.1.1 Identify Operational Issues and Threats
OP 2.4.1.2 Determine Enemy's Operational Capabilities, COAs, & Intentions
OP 2.4.2.2 Provide Current Intelligence for the Joint Operating Area
OP 3.2.5.1 Conduct Air Interdiction of Operational Forces/Targets
OP 3.3.3 Determine Operational Targets
OP 5.1 Acquire & Communicate Operational Level Info and Maintain Status
OP 5.1.3 Determine Commander's Critical Information Requirements
OP 7.3 Coordinate Passive3 CBRNE Defense in the JOA

TA 2 Develop Intelligence
TA 3.3 Coordinate Battlespace Maneuver and Integrate with Firepower

(4) JTFHQ Master Training Guide (MTG)

The JTFHQ MTG is designed to provide a descriptive, performance-oriented training guide to assist leaders in training their units. It also serves as a guide for the JTFHQ in actual operations. The MTG includes information on two specific METOC Tasks and can also be cross-referenced to numerous operational tasks that also require METOC input or interaction. JMOs should study the MTG to identify areas to engage the staff in different phases of the operation. For a full listing of the METOC Tasks, see Appendix B.

To supplement the Universal Joint Task List, the Services provide additional guidance for mission related tasks. Service Joint Task List Guidance can be found online.

10. METOC Operations

a. Quality Control & After Action / Post Deployment Reports

So you may be asking "Why is a section on quality control (QC) and After Action Reports / Post Deployment Reports (AAR / PDR) at the FRONT of the Operations section?" Because successful operations should include a plan for obtaining the necessary feedback and data to judge operational effectiveness and make objective reports.

(1) The Purpose of Quality Control (QC)

Some METOC personnel see "quality control" and are limited to thinking of things directly related to weather science, like a TAF verification program. While that is a part of Joint METOC QC, it also considers the larger question of our ability to provide timely and accurate decisionable METOC information.

To evaluate the health/effectiveness of joint METOC support requires understanding of quality and impact of METOC information provided at each level of support. It requires various 'metrics' to be employed by Services and the JMCO/JMO. The QC focus to develop and enhance policy and field the systems that will enable continuous improvements at unit level. Ultimately, the goal is to improve the effectiveness of METOC service to CCDRs at strategic, operational and tactical levels of war.

(2) Determining Effectiveness of METOC Support to Operations

There is no standard within Joint METOC for determining effectiveness. Negative feedback seems to have a better chance of being voiced, but all feedback is important. It should flow originally from the users of our product to the tactical forecasters and from there up through the SMO – and back.

Some Service-specific effectiveness areas follow:

(a) US Air Force Metrics

Ari Force metrics include:
- Terminal Aerodrome Forecast (TAF) Verification (TAFVER)
- Severe Wx Warning Verification (WARNVER)
- Mission Execution Forecast Verification (MEFVER)

Discussions of these are posted monthly to OWS webpage.

The 28 OWS (OIF/OEF JMCO) do a "Daily Roll-up" that includes:
- Exec summary of the 24 hr periods' warning numbers
- Daily insight into primary mission/how well unit is doing
- Utilize to make operational, personnel, and training changes/decisions

(b) US Navy Metrics

QC / environmental monitoring is conducted at major Navy reachback facilities and the findings are posted to the Navy Oceanography Portal.

- FNMOC: Ocean & Atmospheric Model verification; observation validation; satellite imagery applications; atmospheric, oceanographic, and climatology databases
- NAVOCEANO: Mine-warfare, expeditionary-warfare, and anti-submarine-warfare databases; ocean models; bathymetry, hydrography, and physical oceanography survey databases; satellite imagery analysis
- Naval Maritime & Aviation Forecast Centers (Norfolk, VA): Ship routing forecasts; maritime & facility observations, forecasts, watches, and warnings; aviation briefings; TAF verification
- Naval Observatory – Precise Navigation & Timing perimeters

(3) OIF Joint Operations Area Forecast Verification

The OIF JOAF Verification (JOAFVER) is coordinated between OIF JMO and 28 OWS (OIF JMCO) with the JMO providing oversight. The purpose is to identify:

- overforecasting / underforecasting
- How well/quickly forecasters pick up on weather impacts to ops
- % missed and % false alarm rate

(4) Mechanisms to Obtain Feedback

Currently there is no uniform CCMD method for obtaining feedback from JMOs to incorporate into a shared, METOC-specific location. SMOs are encouraged to list feedback procedures (like DCO sessions) on the SMO Collaboration section on the USJFCOM SIPR portal.

The JOAF is the starting point for forecasts in support of planning Joint Operations. Execution of operations and tactical forecasts requires greater fidelity. How does this information work back to JMO/SMO to inform future planning and JOAFs? The question should be answered via the Annex H or METOC LOI.

The Discovery Phase of the Joint Lessons Learned Program (JLLP) requires active and passive collection of information. Active collection, collection specifically generated to collect information, takes the form of interviews, conversations, surveys, direct observations, and direct / immediate feedback from field. Passive collection schemes require reviewing Lessons-Learned inputs from outside sources.

(5) Lessons Learned and After Actions Reports (AAR)

CJCSI 3810.01 requires SMOs to collect after action reports and lessons learned upon completion of joint operations, incorporate into revisions of OPLANS and CONPLANS, and provide to the Services for future programming and planning.

Lessons learned and after actions reports are a fundamental part of quality control in that they can provide a JMO with information that help to ensure initial quality of METOC support to operations meets expectations.

Lessons learned are a valuable tool for improving support. They should be reviewed prior to deployment or upon arrival in an AOR. Most are maintained by the SMO or Service-specific / joint databases. Resources for viewing them are:

Joint Center for Operational Analysis (JCOA)
Deploys surge teams worldwide and conducts active collection, analysis, and dissemination of lessons learned and best practices across the full spectrum of military ops in order to improve the warfighting capabilities of the joint force
Website links to all service LL sites!
https://us.jfcom.mil/sites/JCOA/Pages/Default.aspx

USAF Lessons Learned Sites
https://www.jllis.mil/USAF/

Center for Army Lesson Learned
http://usacac.army.mil/cac2/call/index.asp

Marine Corps Center for Lessons Learned
https://www.mccll.usmc.mil/

USN Lessons Learned (via Navy Warfare Development Command)
Navy Lessons Learned Database (SIPR): http://www.jllis.smil.mil/navy
Navy Lessons Learned Database (NIPR) https://www.jllis.mil/navy/

USSOCOM Lessons Learned
http://www.jllis.smil.mil/ussocom

CJCSI 3150.25D establishes policy, guidance, and responsibilities for the CJCS Joint Lessons Learned Program (JLLP) and codifies the Joint Lessons Learned Information System (JLLIS) as the DOD system of record for the JLLP. An overfiew of the system is provided below. SMOs/JMOs are encouraged to review the instruction for the details of the program.

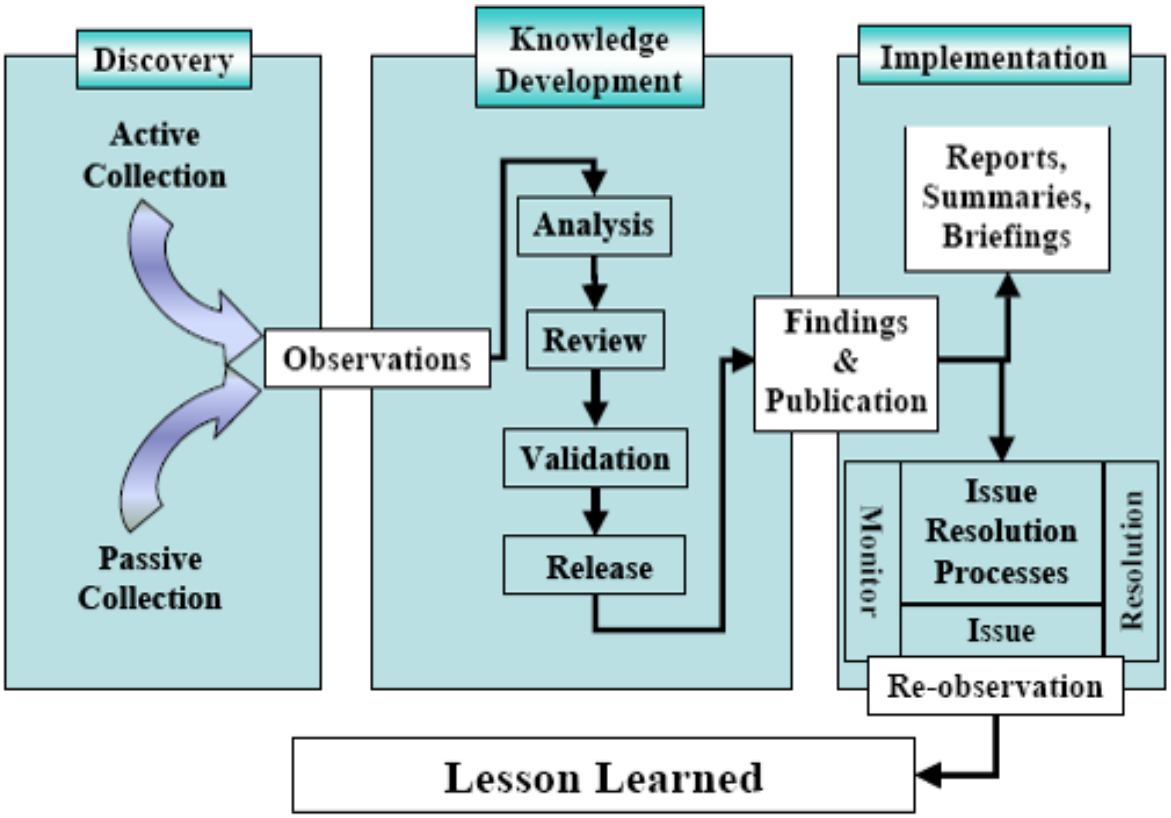

Figure 33: The Joint Lessons Learned System (From CJCSI 3150.25D)

Per CJCSI 3150.25D. Following program capabilities are required of LL organizations participating in JLLP:

> Capture, analyze, and learn from their passive collection efforts.
> Participate in issue resolution processes in their area of operations and/or interests, enhancing their ability to advise their commands in a timely manner.
> Small-scale active collection capabilities

Bottom Line: Joint METOC is required to participate in the JLLP so SMOs and JMOs should plan on capturing data for this program just as they plan on gaining the information required to make their forecasts.

b. Joint METOC Operations – Doctrine and Instructions

The doctrine for Joint METOC operations is contained in Joint Publication 3-59. The overarching concept within the document is "one operation, one forecast." This stresses the importance of cooperation among all members of the Joint METOC team in support of operations to ensure the Joint Force Commander (and other decision makers) are provided with the METOC information necessary.

Further guidance on Joint METOC Operations, specifically the METOC responsibilities of CCMDs and their SMOs, is found in CJCSI 3810 (series).

c. Joint Operations Area Forecast (JOAF)

The JOAF is the cornerstone of the "One Operation, One Forecast Concept". This forecast belongs to the JMO and the JMO is responsible for it, regardless of who drafts it. This forecast is not issued without the JMO's approval.

Consider use of existing bulletins as the JOAF. If a new product is required, a suggested format could include:

- Remarks
- Prognostic Discussion
- Forecast out 24 hours (for Area 1, Area 2, *etc*. Include clouds, winds, temperature, weather, visibility, etc.)
- Forecast out 48 hours (for Area 1, Area 2, *etc*.)
- Impacts on warfare areas (air, ground, amphibious, etc.)
- Astronomical data
- Tides/sea data
- TAFs available
- Next JOAF / coordination

Example JOAFs are included in Chapter 10.

d. KQ Identifiers

A "KQ identifier" (KQ ID) is a 4-letter tactical location identifier that uniquely identifies a non-permanent observation site. It also enables wider dissemination of classified observations by encoding the location. Every METOC observation needs a location/time so that the data can be utilized for modeling and archival databases. The inclusion of additional weather observing data enhances the accuracy of forecasts and climatology for that region.

One of the lessons-learned from Operation IRAQI FREEDOM (OIF) was that there was a need for a centralized KQ ID management process. The Air Force was designated as the DOD executive agent for KQ ID process, and the Air Force in turn designated HQ AFWA as its lead agent. HQ AFWA stood up a KQ ID management program and serves as the DOD METOC focal point.

METOC sites that are originating decodable weather messages require a KQID if they are not assigned an ICAO identifier. The KQID is used primarily when conducting operations from tactical, temporary, and expeditionary locations. It does not replace the ICAO/WMO process for new / permanent airfields. On a case-by-case basis, permanent KQ IDs have been issued to sites when it was not possible to acquire an approved ICAO/WMO location identifier for the site (e.g., the location is shared with civilian/indigenous weather agencies already using approved ICAO/WMO location identifier).

KQIDs may be assigned to METOC forces supporting:

- Exercises or contingencies at deployed location

- Training/exercises in immediate operating area of METOC forces or civilian weather stations using ICAO
- Testing programs requiring temporary location ID

Requestors must provide the following information:
- Name/unit/e-mail address/phone number of POC
- Classification of location and supported operation or exercise
- Name of exercise, test, or contingency
- Releasability (for non-DoD use/"sensitive" non-releasable)
- Location name/latitude/longitude
- Observation equipment to be used
- Start and stop (if known) dates

SMO/JMOs
- Request KQ IDs as far in advance as possible
- Inventory/revalidate sub units' KQ IDs periodically
- Notify AFWA if KQs not needed/can be deactivated
- Respond immediately to possible KQ ID compromise
- Deconflict JTF KQ IDs as required
- Coordinate w/HQ AFWA and 14 WS to database/archive METOC info generated under KQ IDs

Non-DOD organizations may retrieve obs/forecasts through indigenous systems or from Aviation Digital Data Service
http://adds.aviationweather.gov

Current KQ Listing:
View under each theater's drop-down menu on JAAWIN page.

AFWA Operations Center can provide assistance with any JAAWIN issue.

e. Sensing Strategy / Collection Plan

During the planning and execution of joint operations, the SMO is responsible for first developing a METOC sensing strategy and then an initial METOC collection plan. The sensing strategy should be included in theater plans. If an operation commences, the JMO will refine the baseline collection plan to reflect available METOC assets and support the current mission. METOC collection plans will normally be published in annex H (Meteorological and Oceanographic Services) of operations plans (OPLANs)/operations orders (OPORDs).

(1) Sensing Strategy

The sensing strategy leverages all possible instruments of national power as necessary, such as Department of State, Department of Commerce, and other federal departments and agencies, to meet the CCDR's ongoing METOC situational awareness requirements. It includes organic DOD METOC data collection capabilities and identifies gaps in DOD METOC collection. Non-

DOD METOC data also may be available and used if it is determined to be sufficiently timely, accurate, and reliable to supplement DOD METOC assets and to incorporate into theater METOC processes.

(2) Collection Plan

The collection plan must be developed and implemented to orchestrate the timing, distribution of collection sites, and efforts of all components within the joint force. A complete plan will foster unity of effort while optimizing data collection, dissemination, and integration into METOC products from indigenous and national sources. Spreading observational resources across an area of interest to obtain optimum coverage will significantly improve the quality of METOC services.

(a) Collection Plans: Getting Started

When building or refining a collection plan, there are some preliminary questions to consider:

- What are the mission requirements?
- Is the current/projected collection plan adequate?
- What could be done to make it better?
- What/where are current "sensing" assets in theater?
- Can adequate sensing be accomplished with existing METOC capabilities?
- Can assets be re-located or requested?
- What is the availability/reliability of indigenous assets?
- Does it make sense operationally and meteorologically/ oceanographically?

(b) Collection Plan Development

In a perfect world with unlimited resources, designing the ideal METOC collection strategy would be easy. However, METOC collection assets are not infinite, so the SMO/JMO must create and tailor a realistic collection plan that can best support the CJTF, while also meeting the JMCC's sensing requirements. Ultimately, the collection plan supports operations, and the METOC community's data requirements are secondary to operational priorities. It is a balancing act that the SMO/JMO must constantly battle.

(c) Collection Data Sources

Start by assessing your collection ability and note location, distribution and composition of any existing sensing assets. Available theater resources (indigenous, national, DOD sources) can be leveraged to fill sensing gaps and augment the collection plan. There are numerous data sources to consider for the theater collection plan:

- Surface observations and soundings (RAOBS)
- Human /automated weather sensors
- TAFs and other forecasts
- Ocean, space, and atmospheric model output
- Radar and meteorological satellite imagery (including NTM)

- Climatology, oceanographic data, and astronomical data
- Non-METOC and/or non-traitional sources (seismic, volcanic, etc)
- FALOP
- ARTYMET
- Mobile obs (MOBOB) program
- Weather Reconnaissance missions
- Indigenous weather reporting networks
- SOF special reconnaissance missions

Because the quality of the METOC support is directly proportional to the amount and quality of the data used, it is imperative that the sensing data be quality controlled and determined and/or approved by the SMO as accurate, timely, consistent and relevant for the operation. Terrain features can affect data (ie wind funneling through a valley) so sensor placement should be noted to capture data anomalies. Climatology may indicate weather parameters that are critical to mission thresholds, and thus indicate a location where data gathering would be critical.

Data sources can also be grouped in terms of the strategic, operational, and tactical levels of war. For the strategic perspective, the SMO/JMO can utilize large-scale collection assets such as METSAT data from the regional forecast centers or note the orbit crossing times of polar satellites. On the operational level, there are upper-air soundings, buoys, tide gauges, etc, which will provide theater data. Then on the tactical level, there are more precise and small scale collection sensors such as surface observing systems, tactical radar, lightning detection systems, etc.

The SMO has oversight over the area of interest and has insight on other JTFs potentially operating in theater. Coordinate with the SMO and component/functional SWOs to obtain mission and service-unique requirements, weather impacts, criteria, or sensitivities. Early coordination and communication with the JTF staff is paramount to the creation of the collection plan, because it will determine the information required. Even the timing and frequency of mandatory briefings to HQ, staff, components, and operators may dictate the collection needs. Identify any METOC communication requirements and submit to the JTF J-6. Ensure that any METOC requirements are relayed to the JTF. Assets are finite, and you will not receive assistance unless it is documented. Stay engaged throughout the pre-deployment phase and ensure any forces deploying into theater have the proper METOC equipment. It is your job to maximize the efficiency of theater METOC equipment and prevent redundancy while also building unity of effort. At times, the JMO must make difficult decisions on asset placement. For example, there is no operational benefit to having two weather balloon launches in close proximity at the same time. However, if the assets are already in place and are not moveable, then think creatively and alternate launch times or launch sites so that there is either more coverage over time or less duplication.

(3) Dissemination of Sensing Data

Distributing sensors and collecting the sensing data are critical pieces of the collection plan, but equally important is the distribution of the METOC information. The success of the plan is contingent on reliable and timely communications between all METOC forces in theater so that

there is maximum data sharing. Not only must the data be available for all joint forces in theater, it must be accessible to the reachback forecast centers and JMCO/JMCC for inclusion into their forecast products. The turnaround time and data perishability will also drive the location of the JMCO/JMCC. The information must be received while still representative then integrated into a forecast product which can be made available to the end user in the field.

f. Domestic / Interagency METOC OPS

Joint METOC operations in CONUS are conducted in a distinctly different manner than peacetime Service "Organize, Train, and Equip" operations or joint operations conducted overseas. CONUS METOC operations can be in support of natural disasters like Hurricane KATRINA or terrorist incidents like the 9-11 attacks.

The NORTHCOM SMO will be the SMO for all Joint CONUS METOC operations. Refer to their written instructions for exact procedures for any given event. Some important items to consider in a CONUS event:

DSCA is defined as support provided by U.S. military forces (Regular, Reserve, and National Guard), DOD civilians, DOD contract personnel, and DOD agency and component assets, in response to requests for assistance from civilian Federal, State, local, and tribal authorities for domestic emergencies, designated law enforcement support, and other domestic activities.

(1) National Guard Forces

National Guard forces normally operate in state active duty (SAD) status or under the rules of Title 32 USC, when activated by their State Governors, and are not OPCON to CDRUSNORTHCOM, CDRUSPACOM or CJTF. National Guard forces will only operate under Title 10 rules in CONUS when they are "Federalized" by the President. A second National Guard mobilization category is when state forces are operating outside of their home state under agreements negotiated between states governors. These forces are OPCON to the supported state governor, not the home state governor. Military forces providing this DSCA may be SAD or Title 32 forces. This could have implications for the NORTHCOM/PACOM SMO, or a JMO if support is provided to – or needed from – SAD or Title 32 forces.

(2) Command Relationships

The JMO will usually be located at the headquarters of the JTF and is the conduit for all weather info (DOD or NWS) to flow to the CJTF.

- If the DHS requires additional weather support (ie DOD assets are used for a National Security Significant Event (NSSE)), then DHS coordinates with the NORTHCOM Defense Coordinating Officer in consultation with the NORTHCOM/PACOM SMO, JMO and the Joint METOC Coordination Cell (JMCC)

- USGS, FEMA, FAA coordinate only with the NWS who in turn coordinates with the JTF JMO

- IMAAC/DTRA coordinates directly with NORTHCOM/PACOM SMO and J34
  - IMAAC/DTRA obtains weather information from both NWS and DOD sources for plume modeling

(3) METOC Support

The JMO utilizes/leverages all federal and international METOC capabilities within the NORTHCOM/PACOM AOR. The National Weather Service is the lead METOC agency within the CONUS for all National Special Security Events (NSSE) and most US DSCA activities. The primary support to USNORTHCOM is 1 WXG and its OWSs. For the PACOM portion of the Homeland, the 17 OWS is the primary support, in addition to Alaska in the NORTHCOM AOR.

The JMO coordinates with the DHS weather representative on "official" forecast for the NSSE. The JMCC provides the "official" DOD forecast or JOAF which is coordinated and derived with/from the "official" DHS forecast

Per JP 3-59, *Meteorological and Oceanographic Operations*, general US interagency coordination within the METOC community is conducted by the Office of the Federal Coordinator for Meteorological (OFCM) Services and Supporting Research. However, for specific time-sensitive DOD support to other US agencies, the combatant command, as the supported commander, may take the lead for interagency coordination; within the METOC community, the combatant command SMO normally becomes the DOD focal point for METOC coordination between non-DOD agencies and supporting military forces. So this clears the NORTHCOM/PACOM SMO to take the lead for DOD coordination with the NWS.

(4) Non-DOD METOC Data Sources

Recall from CJCSI 3810 that no entity may use non-DOD METOC data sources in support of joint operations unless and until the service METOC personnel responsible for supporting that entity determines that the source information is sufficiently timely, accurate, and reliable. The SMO should make the determination that all METOC information is specific to a particular unified command. In the case of CONUS operations, the USNORTHCOM SMO has stated that the NWS is timely, accurate and reliable.

(5) The IMAAC

The National Response Framework is an agreement signed by federal agency partners that designates the Interagency Modeling and Atmospheric Assessment Center (IMAAC) as the single federal source of airborne hazard predictions for DHS.

The core concept behind the IMAAC is that a single, coordinated, and validated plume model output is sent to all necessary DHS decision makers to include the on-scene commander through national leadership. Combatant command METOC personnel should coordinate with DTRA to receive the latest information on the meteorological data used in the creation of the subject plume.

The National Atmospheric Release Advisory Center (NARAC) at Lawrence Livermore National Laboratory (LLNL) is currently the primary provider of IMAAC products.

g. International / Allied / Coalition / Foreign METOC OPS

(1) The NATO METOC Operational Concept

- METOC personnel in the NATO Command Structure (NCS)
  - Coordinate policy with nations
  - Conduct activities at strategic and operational level
  - Establish METOC requirements…coordinate theater support
  - Provide support for planning strategic/operational objectives

- METOC personnel from Troop Contributing Nation (TCN)
  - IAW OPLANS, execute operational/tactical level activities
  - Provide mission tailored support for planning and executing operational level objectives and tasks

- Constraint
  - NATO does not inherently possess resources (i.e. NWP) to produce the METOC data and products for NATO-led activities

- Solution
  - NATO relies on a nation to provide this capability for a given theater...The Integrated METOC Concept (IMETOC)
    - A volunteering NATO Nation with NWP capability is designated the IMETOC "Lead Nation" (LN)
    - IMETOC LN delivers theater "JOAF" and NWP derived products

- NCS and TCNs are to base all tailored METOC support on approved IMETOC framework products delivered by the LN for a given NATO-led activity

- IMETOC LN Responsibilities
  - Provides Point of Contact (POC) for planning and coordination of framework METOC support to a NATO activity
  - Delivers framework data & products required for a NATO activity
  - Coordinates with Assisting Nations (AN) to incorporate niche or regional expertise not resident in LN capability

- TCN Responsibilities
  - Provide personnel, training, equipment and communications in order to support tactical national units' METOC requirements in accordance with IMETOC Concept

- Summary of IMETOC Objectives

- Guarantee the availability of a single authoritative source of METOC data and products for a given NATO-led activity
- Deliver METOC data and products to NATO and all Troop Contributing Nations participating in a given NATO-led activity
- Nations at unit level, use IMETOC provisioned data and products to derive mission tailored forecasts and support
- Single source of timely and relevant METOC data and products supports unity of effort and enhances decision superiority at Strategic, Operational, and Tactical Level

- Current IMETOC "Lead Nations" Supporting NATO
  - ISAF – USA
    - Assumed responsibility in March 2007
    - Will serve as LN indefinitely
  - BALK/MED – Germany
    - Assumed responsibility in April 2008
    - Will serve as LN indefinitely
  - NATO Response Force (NRF) Cycles
    - NRF 12 - 16 (2009-2011) France

(2) Chief METOC – NATO Theater (CMETOC)

- Chief METOC – NATO Theater (CMETOC)
  - Nationally filled position within the deployed NATO Command Structure
    - HQ ISAF – USA filled position
    - HQ KFOR – Poland filled position
  - Responsible for coordinating theatre METOC support on behalf of NATO
  - IAW OPLAN, liaises with national METOC personnel at geographic CCMDs and multinational force commands in an effort coordinate theater operational METOC requirements and support

- JMO
  - Senior USA METOC Officer in JOA
    - Afghanistan…Dual-hatted as ISAF RC-EAST SMO & CJTF JMO

- Theater CMETOC Relationship with respect to JMO
  - Separate Chains of Command
    - CMETOC ISAF – USA O-4 reporting to COMISAF
    - JMO – USA O-5 reporting to CJTF
  - Cooperation…JMO has no authority over multinational forces operating under NATO flag.
  - Cooperation…CMETOC and JMO (currently both US) should work together to advance theater METOC capability for benefit of combined ops
  - USA METOC personnel operating at units working under the NATO "umbrella" are supposed to derive all Mission Tailored Forecast products from IMETOC forecast guidance provided by the IMETOC Lead Nation (USA – ISAF, Germany – Balkans)

(3) NATO/PfP (Partnership for Peace) OPORD Format

METOC operations can be documented in Annex T or Annex U, METOC Support. The format will probably be finalized by the *ad hoc* Combined Joint Task Force (CJTF). The following layout is similar to what is typically used:

- Plan Identification (operations plan being implemented, if any)
- References
- Task Organization (in an exercise environment, may be Time Zone)
- Situation
- General (can reference the basic Operations Order (OPORD))
  - Strategic Conceptions, Scope, and Objectives (similar to objectives listed in "Mission", para 2 of Annex H of a U.S. OPORD)
  - Risk Assessment and Enemy Forces (probably N/A; could address safety, force protection, supportability, and communications risks)
  - Centers of Gravity (critical aspects of METOC operations)
  - Friendly Forces (can reference basic OPORD)
  - Attachments and Detachments (may not be used)
  - Assumptions (similar to Annex H para 1.b.; may want to include additional NATO factors)
  - Planning Factors and Constraints (similar to Annex H para 1.c.)
  - Include general characteristics of the region (may be included in appendixes to the annex)
- Mission (similar to Annex H para 2, "Mission")
- Can include specific missions being supported, if known
- Execution
- Commander's Intent (JMO's intent)
- Concept of Operations (similar to Annex H para 3.a.)
- Task Allocation (similar to Annex H para 3.b.)
- Coordination and General Tasks (similar to Annex H Para 3.c., "Coordinating Instructions")
- Service Support
- Designate production centers and supporting commands' responsibilities
- Command and Signal
- Communications (circuits, backup, etc.)
- Effectiveness of Support (report deficiencies in support)
- Control of Information (for naval forces, exercise of METCON/OCCON/ICECON)

(4) International METOC

(a) Data Exchange Agreements

Information/Data Exchange Agreements/Program
(IEA, DEA, IEP)

DEA Annex – Government to government exchange of science/technical R&D information/data

- Goal is to create closer alliances; improve operability & standardization
- Valid for 5 years

DEA Annex consists of three parts:
- Overall guidelines
  - Specifies scope, classification, authorities, channels of correspondence, and establishments.

Objectives
- Identify specific information that both US and foreign ally desire to obtain through the agreement

Delegation of Disclosure Authority Letter (DDL)
- Outlines specific authority of Technical Project Officer

(b) ENMOD Treaty

The "ENMOD" Treaty is the Convention on the Prohibition of Military or Any Other Hostile Use of Environmental Modification Techniques. It was ratified in 1980 and contains Ten Articles that state:

"…not to engage in military or any other hostile use of environmental modification techniques having widespread, long-lasting or severe effects …"

The full text can be found at http://www.state.gov/t/ac/trt/4783.htm

11. METOC Document Examples

a. METOC LOI

In developing a METOC LOI, be sensitive to differences between the Services. The Air Force tends to be explicit and will explain and task many items in an LOI. The "plan" is developed, and deviations or additional actions are coordinated as required during the "decentralized execution". The Navy minimizes amplifying guidance, maximizing use of existing internal directives. If the CONOPS or LOI doesn't say *not* to do it, you can do it (command by negation). Each mission is much like the previous, and Navy personnel usually know what to do without need for coordination.

(1) Suggested format for an LOI:

Originator:	
Addressees:	units in the JTF, supporting force commanders, and supporting activities
Classification:	
Subject:	unclassified exercise/operation name, followed by 'METOC LOI'
Reference:	applicable/supporting OPORDs, OPLANs, etc.
Points of contact:	
Purpose:	What does this LOI achieve?
Situation:	Why is a joint force METOC operation required?
Concept of METOC operations:	How will the METOC function operate? Can reference Annex H
Assumptions:	
Planning factors:	METOC conditions that may affect plan execution
Mission:	METOC objectives in support of the Joint Force Commander's plan
Execution:	time period of expected operations, coordinating instructions, tasks and responsibilities. Paragraph B.1.2.3 of the Handbook includes suggestions for paragraph 3 (Execution) of Annex H that are applicable in an LOI
Deployment:	on-station time
OPSEC:	
Coordination instructions:	instructions common to two or more components or subdivisions
Operational constraints:	limiting factors, such as manning or equipment
Administration and Logistics:	
Equipment and Supplies:	
Command and Control:	command relationships
METCON, OCEANCON, ICECON, SPACECON:	conditions for implementation
Communications:	METOC data flow/availability; homepages, KQ identifiers, etc.
Reporting:	after action reports, equipment/personnel status, product assessments, etc.
METOC Assistance Requests:	how to request special products

(2) METOC LOI Example 1

MSGID/GENADMIN/USEUCOM/J33/DEC//

SUBJ/METOC LETTER OF INSTRUCTION-OPERATION JOINT ENDEAVOR//

REF/A/DOC/CJCS1 3810.01, METERORLOGICAL AND OCEANOGRAPHICAL SUPPORT, 30 JUN 93//

REF/B/DOC/JOINT PUB 3-59, JOINT DOCTRINE FOR METEOROLOGICAL AND OCEANOGRAPHIC SUPPORT, 22 DEC 93//

REF/C/DOC/CINCSOUTH OPLAN 40105, 24 NOV 95//

REF/D/DOC/CINCEUR OPLAN 4243, 2 DEC 95//

NARR/REF A AND B DESCRIBE NOTIONAL METOC SUPPORT TO OPERATIONS. REF C IS THE NATO OPLAN DESCRIBING OVERALL NATO FORCES OPERATIONS IN SUPPORT OF "OPERATION JOINT ENDEAVOR", AND REF D IS THE US SUPPORTING OPLAN TO REF C.//

POC/T. E. COE/MAJ/DSN: 314-430-8141//

RMKS/1. PURPOSE. THIS METOC LETTER OF INSTRUCTION (LOI) IS FORWARDED TO AMPLIFY INFORMATION PROVIDED IN REFERENCE D. COORDINATION BETWEEN NATO METEOROLICAL AND OCEANOGRAPHIC (METOC) ELEMENTS IS CRITICAL FOR OPERATION JOINT ENDEAVOR (JE) IN ORDER TO ACHIEVE UNITY OF EFFORT. THIS LOI DESCRIBES US METOC FORCE AUGMENTATION TO NATO HEADQUARTERS AS REQUESTED BY SHAPE IN THEIR CRISIS ESTABLISHMENT DOCUMENT, AND US FORCES DEPLOYING IN SUPPORT JE.

2. CONCEPT OF OPERATIONS (CONOPS). US METOC PERSONNEL WILL PROVIDE METOC SERVICES AND PRODUCTS TO NATO AND US HEADQUATRERS ELEMENTS, AND TO US FORCES SUPPORTING US, NATO, AND UN OPERATIONS IN THE JE AOR IAW REFERENCES A AND B. SINCE JE IS A NATO OPERATION IAW REF C, ALL US METOC FORCES (EXCEPT TACTICAL AIRLIFT CONTROL ELEMENT (TALCE) SUPPORT) WILL BE PLACED UNDER THE OPERATIONAL CONTROL OF THE SENIOR US METOC OFFICER (SMO), LOCATED WITH THE NATO IMPLEMENTATION FORCES (IFOR) COMMANDR. THE FOXX BULLETINS PRODUCED BY THE EUROPEAN METOC CENTER (EMC) AT PAGE 04 RUSNMHS1026 UNCLAS
TRABEN-TRARBACH, GE, ARE THE OFFICIAL LAND FORECASTS FOR US OPERATIONS SUPPORTING JE. THE EMC WILL COORDINATE THESE FORECASTS WITH THE NATO UNIFIED WEATHER FORECAST, PRODUCED BY THE AFSOUTH METOC BRANCH AT NAPLES, ITALY; AND WITH THE NAVY EUROPEAN METOC CENTER (NEMOC) AT ROTA, SPAIN. ANY DEVIATION FROM THESE FORECASTS SHOULD BE COORDINATED IN ADVANCE WITH THE EMC. EACH SERVICE

COMPONENT WILL COLLECT METOC INFORMATION FROM AND DISSEMINATE INFORMATION TO THEIR SUBORDINATE UNITS (SEE PARAGRAPH 4).

3. LOCATIONS AND TASKS. ALL DEPLOYMENT LOCATIONS ARE CURRENT AS OF 12 DEC 95.

A. IFOR HEADQUARTERS, ZAGREB, HR (KQLM). THE IFOR SENIOR US METOC OFFICER (SMO) WILL DEPLOY TO SUPPORT THE NATO IFOR SENIOR US METOC OFFICER (SMO) WILL DEPLOY TO SUPPORT THE NATO IFOR HEADQUARTERS. HE WILL DPLOY WITH THE AFSOUTH NATO CHIEF MET OFFICER (C MET O), AND ONE AF AND ONE NAVY METOC TECHNICIAN (E-6/E-7). HE WILL BE RESPONSIBLE FOR COORDINATING THE COLLECTION AND DISSEMINATION OF NATO AND US OBSERVATIONS AND FORECASTS. THIS INCLUDES DETERMINING WHICH UNIT WILL PROVIDE THE OFFICIAL OBSERVATION AND/OR FORECAST FOR EACH LOCATION WHERE THERE IS MORE THAM ONE UNIT. IT IS IMPERATIVE THAT THIS TIME-SENSITIVE DATA BE TRANSMITTED INTO THE AWN / MIST AS SOON AS POSSIBLE. EUCOM WILL DISSEMINTE THE HQ IFOR KQ IDENTIFIER ONCE THEY DETERMINE THE FINAL HQ IFOR DEPLOYMENT LOCATION.

B. ALLIED RAPID RESPONSE CORPS (ARRC) MAIN, SARAJEVO, HR (KQLR). ONE USAF OFFICER WILL DEPLOY TO SUPPORT THE NATO SENIOR MET OFFICER AT THE ARRC, PROVIDING METOC SUPPORT TO THE LOGISTICAL HEADQUARTERS OF THE NATO MAIN FORCE.

C. USAREUR FORWARD, TASZAR, HU (KQKA; AIRFIELD: KQKB; ISB: KQKH). A TWO-OFFICER ELEMENT WILL DEPLOY TO PROVIDE METOC SUPPORT TO THE NATIONAL SUPPORT ELEMENT ON TH EUS MAIN BODY FORCE.

D. 1ST ARMORED DIVISION (1 AD), TUZLA, HR (TOC: KQAC; AIRFIELD: KQLH). THE 1 AD 18-PERSON STAFF WEATHER OFFICE, DET 2, 617 WS, WILL DEPLOY WITH THE PRIMARY US IFOR UNIT. THEY WILL BE RESPONSIBLE FOR PROVIDING ALL METOC SUPPORT FOR THE DIVISION, INCLUDING ALL AIR ASSETS.

E. THERE WILL BE FOUR USAF TACTICAL AIRLIFT CONTROL ELEMENTS (TALCE), LOCATED AT TUZLA, HR; SARAJEVO, HR; TASZAR, HU, AND RHEIN MAIN AB, GE. MANNING FOR THESE UNITS HAS NOT BEEN FINALIZED AT THIS TIME; AGAIN, EUCOM WILL DISSEMINATE THE TALCE KQ IDENTIFIERS ONCE THEIR MANNING AND LOCATIONS ARE KNOWN.

F. SPECIAL OPERATIONS FORCES WILL ALSO DEPLOY A NUMBER A NUMBER OF TEAMS INTO THE FORWARD AREAS. EUCOM WILL DISSEMINATE THE KQ IDENTIFIERS ONCE FIRM LOCATIONS KNOWN.

G. DETACHMENT 4, 617TH WEATHER SQUADRON (USAFE) AT TRABEN-TRARBACH, GE WILL PRODUCE THE OFFICIAL US OPERATIONAL FORECASTS

(FOXX BULLETINS). THESE BULLETINS ARE/WILL BE ABAILABLE BE VARIOUS MEANS; SEE PARAGRAPH 4.C.

H. THE NAVAL EUROPEAN METOC CENTER (NAVEURMETOCCEN) ROTA, SPAIN WILL PROVIDE THE OFFICIAL ADRIATIC SEA FORECASTS AND SUPPLEMENT DISSEMINATION BY POSTING METOC BULLETINS ON THIER BROADCASTS AND BBS, AS WELL AS COORDINATING SUPPORT WITH COMSIXTHFLT METOC OFFICER FOR FORCES AFLOAT. NAVEURMETOCCEN WILL BE RESPONSIBLE FOR COORDINATING AND POSTING METOC DATA AND THE TAC III SIPRNET (NITES) WORKSTATION FOR ACCESS VIA THEIR HOMEPAGE.

I. MARITIME METOC FORCES: OA DIVISION - USS WASP, MOBILE ENVIRONMENTAL TEAMS: CDS-14 EMBARKED USS SCOTT, USS SOUTH COAROLINA, AND USS NORMANDY. THE SENIOR METOC OFFICER AFLOAT SUPPORTING JOINT ENDEAVOR WILL COORDINATE METOC SUPPORT FOR AFLOAT UNITS, AS DIRECTED BY COMSIXTHFLT METOC OFFICER IN OPTASK METOC.

4. METOC BULLETINS

A. THE OFFICIAL NATO CENTRALIZED FORECAST FOR JE, THE UNIFIED WEATHER FORECAST (UWF), IS ONLY AVAILABLE ON THE NATO COMMAND AND CONTROL SYSTEM (CCIS). SINCE CCIS IS NOT ROUTINELY ACCESSIBLE TO EVERONE, THE EMC AND NEMOC ROTA WILL CONTINUE TO PRODUCE THE FOLLOWING BULLETINS.

(1) FOXX 21 ETTT: FORECASTS FOR SARAJEVO, SPLIT, SKOPJE, DUBROVNIK, BIHAC, BANJA LUKA, MOSTAR, TUZLA, KAPOSVAR/TASZAR, AND AN ADRIATIC SEA FORECAST. AS UNITS DEPLOY TO TESE LOCATIONS AND BEGIN ISSUING TAFS, THAT LOCATION WILL BE DROPPED FROM THE BULLETIN

(2) FOXX 21 EUTT: LONG-RANGE FORECAST FOR THE FRY. NO CHANGE.

(3) FOXX 23 ETTT: GOUND FORECAST AND IMPACTS TO OPERATIONS FOR SARAJEVO. WILL BE TRANSFERED TO DEPLOYED FORCES UPON ARRIVAL.

(4) FOXX 24 ETTT: GROUND FORECAST AND IMPACTS TO PPERATIONS FOR SKOPJE. NO CHANGE.

(5) FOXX 25-26 ETTT: GROUND FORECAST AND IMPACTS TO OPERATIONS FOR ZAGREB AND TUZLA, RESPECTIVELY. WILL BE TRANSFERRED TO DEPLOYED FORCES UPON ARRIVAL.

(6) FOXX 27 ETTT: GROUND AND RAIL MOVEMENT TO THEATER FORECAST. WILL BE EXPANDED TO INCLUDE THEATER LOGISTIC POINTS.

(7) FOXX 35 LERT: ADRIATIC AIR TO AIR REFUELING FORECAST

(8) FOXX 36 LERT: JOINT TASK FORCE PROVIDE PROMISE JOAF, ISSUED BY NEMOC. DISCONTINUED MID-LATE DECEMBER. (COORDINATION REQUIRED BETWEEN EMC, NAVEURMETOCCEN, AND JTFPP METOC OFFICERS.)

(9) MSME 31 LERT: ADRIATIC SEA FORECAST

(10) WWMM 30/31 LERT: MED, BLACK SEA, BALTIC HIGH WINDS AND SEAS FORECAST.

(11) FOXX15 ETAX: UNOFFICIAL WEATHER INFORMATION FOR TUZLA AND TASZAR.

B. THERE WILL BE TWO NEW BULLETINS COMPILED AND TRANSMITTED BY GMGO; NEITHER HAVE YET BEEN ASSIGNED A NUMBER. ONE WILL BE A THEATER KQ TAF OBSERVATIONS BULLETIN, THE OTHER A THERATER KQ TAF BULLETIN. BULLETIN HEADERS WILL BE PASSED AS SOON AS THEY ARE AVAILABLE.

C. BULLETINS AND DATA WILL BE ROUTINELY AVAILABLE ON THE FOLLOWING SYSTEMS: AWN / MIST, NODDS, AWDS, GMGO SATCOM SYSTEM (MATASSIS), STANDARD THEATER COMMAND AND CONTROL ARCHITECTURE, MSE AND DSN 617 WS BBS (DUDS), 617 WS HOMEPAGE ON INTERNET, 66 MI HOMEPAGE ON SIPRNET, NAVEURMETOCCEN ROTA BBS (JEMEDES), AND NAVEURMETOCCEN ROTA HOMEPAGE ON SIPRENET.

5. REPORTS.

A. MANPOWER TRACKING. HQ USEUCOM, INCLUDING THE METOC BRANCH, IS TASKED TO PROVIDE FORCE STATUS AND TRACKING INFORMATION TO CINCEUR AND THE JOINT STAFF FOR ANY DEPLOYMENT, ESPECIALLY THOSE WITH SEVERE MANNING CAPS LIKE JE. TO ACCOMPLISH THIS TASKING, AND TO PREVENT DUPLICATION OF EFFORT AND UNDER-UTILIZATION OF MANPOWER, WE NEED EACH COMPONENT HEADQUARTERS TO PROVIDE A FORCE LIST OF ALL DEPLOYED PERSONNEL, AND THEIR DEPLOYED AND HOME STATION LOCATIONS. WE REQUEST AN INITIAL, BASELINE REPORT NLT 1 JANUARY; THEN FOLLOW-UP REPORTS (IF THERE ARE ANY CHANGES) ONCE PER MONTH NLT THE 10TH.

B. AFTER ACTION REPORTS AND TRIP REPORTS. THE US SMO WILL PROVIDE A REPORT TO HQ USECOM J33-WE WITHIN 10 WORKING DAYS AFTER COMPLETING AN OFFICIAL SMO TDY/TAD TRIP, AFTER BEING REPLACE, OR UPON HQ IFOR DEACTIVATION. THIS REPORT WILL COVER SINIFICANT SMO ACTIVITIES, SIGNIFICANT METOC IMPACTS ON JE OPERATIONS, AREAS OF EXCELLENCE, PROBLEMS ENCOUNTERED/RESOLVED, SHORTFALLS, AND COORDINATION PROBLEMS BETWEEN SMO AND SUBORDINATE METOC SUPPORT ELEMENTS.

C. METOC LESSONS LEARNED. ALL METOC OFFICERS WILL ENSURE ALL SIGNIFICANT LESSONS LEARNED ARE ENTERED IN TO THE JOINT UNIFORMED
PAGE 05 RUSNMHS2636 UNCLAS
LESSONS LEARNED SYSTEM (JULLS).

D. SIGNIFICANT METOC IMPACTS ON OPERATIONS AND SHORTFALLS IN METOC OPERATIONS AND SUPPORT MUST BE INCLUDED IN THE SUPPORTED UNIT'S SITUATION REPORTS (SITREPS). PROVIDE INFORMATION COPIES TO THE SMO, WHO IN TURN WILL PROVIDE THEM TO HQ USECOM METOC BRANCH (USCINEUR VAIHINGEN GE//ECJ33-WE//).//

(3) METOC LOI Example 2

SUBJ: JTF-180 METEOROLGICAL AND OCEANOGRAPHIC (METOC) INITIAL CONCEPT OF OPERATIONS

1. THIS RETRANSMISSION INCLUDES CORRECTED COPY 1, 151530Z SEP 94(S) AND SUPPLEMENT 1, 161514Z SEP 94. THE FOLLOWING REFERENCES STILL APPLY:

A. JOINT PUB 3-59, JOINT DOCTRINE FOR METEOROLOGICAL AND OCEANOGRAPHIC SUPPORT (NOTAL).

B. CJCS INSTRUCTION 3810.01, METEOROLOGICAL AND OCEANOGRAPHIC SUPPORT (NOTAL).

C. CINCUSACOM MSG, 111551Z SEP 94, USACOM ANNEX H TO OPORD UPHOLD DEMOCRACY (NOTAL)

D. CINCUSACOM MSG, 111915Z SEP 94, USACOM OPORD FOR UPHOLD DEMOCRACY (NOTAL)

E. CINCUSACOM MSG, 131656Z SEP 94, JOINT METOC OFFICER (JMO) DESIGNATION (NOTAL).

F. USCINCLANT OPORD 2410-86, WEATHER SUPPORT FOR JOINT OPERATIONS USLANTCOM (NOTAL).

G. NAVOCENCOMINST 3140.1 SERIES, "US NAVY OCEANOGRAPHIC AND METEOROLOGICAL SUPPORT MANUAL" (NOTAL).

H. AR 115-10/AFR 105-3, METEOROLICAL SUPPORT FOR THE US ARMY (NOTAL).

I. ACCR 105-1, AIR COMBAT COMMAND WEATHER SUPPORT (NOTAL).

J. AMCR 105-1, AIR MOBILITY COMMAND WEATHER SUPPORT REQUIREMENTS (NOTAL).

2. PURPOSE: PROVIDE THE CONCEPT OF OPERATION, INSTRUCTIONS AND PLANNING GUIDANCE FOR OPERATION UPHOLD DEMOCRACY PARTICAPANTS.

3. UPHOLD DEMOCRACY IS A CJCS-DIRECTED, US ATLANTIC COMMAND (USACOM) SPONSORED, COMMANDER JOINT TASK FORCE 180 (CJTF-180) EXECUTED, JOINT OPERATION. THE PURPOSE IS TO IMPLEMENT CONTINGENCY FORCES AND STAFF IN SUPPORT OF OTHER CINC'S REQUIREMENTS; IMPLEMENT JTF, COMPONENT TASK FORCES (CTF) AND STAFFS IN PLANNING AND CONDUCTING JOINT OPERATIONS USING CRISIS ACTION PROCEDURES AS WELL AS CONDUCTING JOINT OPERATIONS. THE ENDSTATE WIL RESULT IN

DEMOCRATICALLY ELECTED PRESIDENT OF HAITI, JEAN BERTRAND ARISTIDE, BEING RETURNED AS THE HEAD OF STATE. 10 SEPTEMBER 1994 WAS DECLARED C-DAY. D-DAY IS YET TO BE DETERMINED.

4. METOC SUPPORT OBJECTIVES
A. IMPLEMENT JOINT METOC DOCTRINE CONCEPTS AS DOCUMENTED IN CJCS INSTRUCTION 3810-01 AND JOINT PUB 3-59; ENSURE INTEROPERABILITY AND ACHIEVE METOC OPERATIONAL CONSISTENCY IN SUPPORT OF JOINT FORCES TO PROVIDE UNITY OF EFFORT; AND ENSURE TIMELINESS AND ACCURANCY OF METOC PRODUCTS, IN AN EFFORT TO ENSURE SAFETY OF MILITARY PERSONNEL, AIRCRAFT, AND EQUIPMENT.

5. METOC SUPPORT. DEPLOYED METOC SUPPORT FORCE WILL CONSIST OF: (DEPLOYMENT DATES ARE APPROXIMATE)

	OFF/FCSTR/OBS	SUPPORTED FORCE	LOCATION	DATE
A.	1/1/0	CJTF-180 (MAIN)	FT. BRAGG	C+3
B.	1/0/0	CTF-180 (FORWARD)	MT WHITNEY/PAP	C+4
C.	1/1/0	JFACC/AFFOR	POPE AFB	C+4
(1)	0/3/0	AIR OPS CTR (AOC)	POPE AFB	C+4
(2)	0/3/0	TNKR AIRLIFT CONT ELEMENT (TALCE)-1	PORT-AU-PRINCE	C+10
(3)	0/2/1	TALCE-2	CAP HAITTEN	C+10
(4)	1/2/0	AUGMENTATION	ROSEY RDS PR	C+9
(5)	1/2/0	TANKER SUPPORT	HOMESTEAD, FL	
(6)	0/3/0	MISSION SUPPORT	MACDILL, FL	C+6
D. ARFOR				
(1)	1/2/2	82ND ABN DIV	PORT-AU-PRINCE	C+6
(2)	0/2/2	82ND AVN BDE	HST THEN PEGASUS DZ	C+4
E. NAVFOR				
(1)	6	CTF-185	MT WHITNEY	C+4
(2)	12	CTF-185	EISENHOWER	
(3)	12	CTF-185	WASP	
(4)	12	CTF-185	AMERICA	
F.	1/3/1	JOINT SPECIAL OPS TASK FORCE (JSOTF)	GTMO THEN PAP	C+3
(1)	0/4/0	FORWARD OPERATING BASE (FOB)	PORT-AU-PRINCE	C+12
(2)	1/2/0	AFSOC	GTMO	
(3)	0/1/0	AFSOC	SAVANNAH	C+2

(4)	1/0/0	4TH PSYCHOLGICAL OPS GP (POG)	PORT-AU-PRINCE	C+10
G.	2/5/0	JMFU	GTMO	

6. CONCEPT OF OPERATIONS

A. JTF-180 JOINT METOC OFFICER (JMO). RESPONSIBLE TO THE JTF-180 FOR OVERALL METOC SUPPORT AND FOR EXECUTING METOC SUPPORT FOR OPERATION UPHOLD DEMOCRACY. THE JMO WILL TASK METOC CAPABILITIES AND COORDINATE REQUIRED SUPPORT. THE JTF-180 MAIN JMO WILL REMAIN AT FT BRAGG. ANOTHER WEATHER OFFICER WILL SAIL ON THE USS MT WHITNEY TO SUPPORT THE JTF-180 COMMANDER ON C+4. AT A DESIGNATED TIME PRIOR TO THE D-DAY, THE COMMANDER JTF-180 WILL DEPLOY TO THE USS MT WHITNEY WHERE THE JTF-180 FORWARD WILL FORMALLY STAND-UP AND BE SUPPORTED BY THIS DEPLOYED METOC OFFICER. IF THE CJTF GOES ASHORE, HIS METOC OFFICER WILL ALSO GO ASHORE.

B. JFACC/AFFOR METOC OFFICER. RESPONSIBLE FOR METOC SUPPORT TO ALL SUBORDINATE AIR FORCE UNITS. WILL COORDINATE REQUESTS FOR AIR REFUELING FORECASTS, DROP ZONE FORECAST, AND FLIGHT WEATHER BRIEFINGS AND FORWARD TO THE JMO ANY PRODUCT REQUESTS THAT THE AOC WEATHER CELL CAN NOT FULFILL.

(1) AIR FORCE WINGS FLYING FROM HOME STATION WILL BE SUPPORTED BY THEIR METOC PERSONNEL USING ALL IN-PLACE WEATHER EQUIPEMENT.

(2) TALCE-1. ONE TANKER AIRLIFT CONTROL ELEMENT (TALCE) METOC TEAM WILL DEPLOY WITH A SATELLITE RECEIVER, 9315TRT, AND ESK.

(3) TALCE-2. ANOTHER TALCE METOC TEAM WILL DPLOY WITH A SATELLITE RECEIVER, 9315TRT, AND ESK.

(4) AUGMENTATION. AN AUGMENTATION METOC TEAM WILL DEPLOY TO A FIXED LOCATION
(5) TANKER SUPPORT. A FOURTH METOC TEAM WIL DEPLOY TO A FIXED LOCATION.

(6) MISSION SUPPORT TEAM WILL DEPLOY TO A FIXED LOCATION.

C. ARFOR/82D AIRBORNE DIVISION METOC OFFICER. RESPONSIBLE FOR METOC SUPPORT TO THE 82D AIRBORNE DIVISION (82 ABN DIV0 AND SUBORDINATE UNITS. WILL COORDINATE REQUESTS FOR ANY SPECIAL ARMY PRODUCTS AND FORWARD TO THE JMO ANY PRODUCT REQUESTS THAT THE METOC TEAM AND SUBORDINATE UNITS CANNOT FULFILL. THE 82D ABN DIV METOC TEAM WILL

HAVE AN INMARSAT TERMINAL, PRC104 RADIO, PORTABLE SATELLITE AND BWK.

(1) 82 ABN BDE METOC OFFICER. RESPONSIBLE FOR METOC SUPPORT TO THE 82D AVIATION BRIGADE (82D AVN BDE). THE 82 AVN BDE METOC TEAM WILL DEPLOY WITH A PRC104 RADIO, ESK, AND BWK TO A STAGING BASE. THEN MOVE FORWARD INTO THE AO.

D. NAVFOR METOC OFFICER. RESPONSIBLE FOR METOC SUPPORT TO SPECIAL OPERATIONS COMMAND ATLANTIC (SOCLANT) AND ALL SUBORDINATE SPECIAL OPERATIONS UNITS. WILL COORDINATE REQUESTS FOR SPECIAL OPERATIONS METOC PRODUCTS AND FORWARD TO THE JMO ANY PRODUCT REQUESTS THAT THE JSOTF METOC CELL CAN NOT FULFILL. THE JSOTF METOC CELL WILL DEPLOY WITH AN ESK, GOLDWING, 9315TRT, WRAASE SATELLITE SYSTEM AND BWK.

(1) AFSOC METOC OFFICER. RESPONSIBLE FOR METOC SUPPORT TO THE AIR FORCE SPECIAL OPERATIONS COMMAND AND SUBORDINATE UNITS. WILL COORDINATE REQUESTS FOR SPECIAL PRODUCTS AND FORWARD TO THE JSOTF METOC OFFICER ANY PRODUCT REQUEST THAT THE AFSOC METOC CELL CAN NOT FULFILL.

(2) 3 SFG FOB METOC OFFICER. RESPONSIBLE FOR METOC SUPPORT TO THE 3 SFG FOB. WILL DEPLOY WITH AN ESK, GOLDWING, 9315TRT, AND BELT WEATHER KIT.

(3) 4TH PSYCHOLOGICAL OPERATIONS GROUP (POG) METOC OFFICER. RESPONSIBLE FOR METOC SUPPORT TO THE 4 POG FOR LEAFLET DROPS. WILL DPLOY WITH A MARWIN AND ESK.

F. JMFU. THE JOINT FORECAST METOC UNIT IS COMPOSED OF FORCES DRAWN FROM ALL SERVICES TO ENSURE THAT QUALITY SERVICE-UNIQUE METOC SUPPORT IS PROVIDED. PRODUCTS PROVIDED BY THE JMFU AR LISTED IN PARAGRAPH 9.

7. CENTRALIZED PRODUCTS

A. THE JOINT METOC FORECAST UNIT, ESTABLISHED AT GUANTANAMO BAY, CUBA WILL ISSUE THE JOINT OPERATIONS AREA FORECAST (JOAF) UNDER THE BULLETIN HEADERS FXXX3 JFCA, FXXX4 JFCA, FXXX5 JFCA, FXXX6 JFCA. (AF PIDS 661, 662, 663, 664) THE JOAF IS THE OFFICIAL JOINT FORECAST THAT CAN BE TAILORED FOR USE AT ALL LEVELS. THE JOAF FORECASTS WILL BE IDENTIFIED BY THE HEADERS SWO33, SWO34, SWO35, AND SWO36, RESPECTIVELY. THEY WILL BE ISSUED AT 0201Z, 0202Z. 0203Z, 0204Z (1401Z, 1402Z, 1403Z, 1404Z). THESE BULLETINS ARE AVAILABLE VIA AUTODIN, ON THE AUTOMATED WEATHER NETWORK (AWN) / MIST, AND ON THE AIR FORCE DIAL-IN SYSTEM (AFDIS). ON

AFDIS HEADERS ARE: FXX1 (FOR SWO 34 AND SWO 35) AND FXX8 (FOR SWO 33 AND SWO 36). THE JMFU FORECAST SHOULD BE CONSIDERED THE OFFICIAL FORECAT AND IS TO BE USED BY ALL AGENCIES IN THE JOINT FORCE AREA OF OPERATIONS. SIGNIFICANT DEVIATIONS FROM OFFICIAL FORECASTS BY SUBORDINATE ACTIVITES SHOULD BE COOORDINATED WITH THE JMO AND JMFU PRIOR TO ISSUANCE, EXCEPT TO SATISFY AN IMMEDIATE SAFETY OF PERSONNEL OR EQUIPMENT. UNDER SUCH CONDITIONS, COORDINATION WILL BE ACCOMPLISHED AS SOON AS POSSIBLE. COORDINATION WILL ASSIST IN THE ACCOMPLISHMENT OF THE "ONE THEATER/ONE FORECAST" CONCEPT. THE JOAF WILL BE ISSUED TWICE DAILY AT 02Z AND 14Z. A SPECIFIC FORECAST FOR THE CITY OF PORT-AU-PRINCE WILL BE INCLUDED. THIS FORECAST WILL ALSO BE USED AS THE OFFICIAL DROP ZONE FORECAST IN THE EVENT A DROP OCCURS.

B. THE NAVFOR METOC OFFICER ABOARD THE USS MT WHITNEY WILL ISSUE A TAILORED NAVAL OPERATIONAL AREA FORECAST (NOAF) THAT WILL BE SPECIFIC FOR SEA AND NAVAL OPERATIONS. THE NOAF WILL BE IN AGREEMENT WITH HOAF EXCEPT THAT IT WILL BE MORE SPECIFIC. THE HEADER FOR THE BULLETIN WILL BE FXXX3 XXXX (THE PRODUCT IDENTIFICATION NUMBER FOR AF UNITS IS 3413). THIS BULLETIN WILL BE AVAILABLE VIA AWN / MIST REQUEST, AFDIS (FXX2), AND AUTODIN. THE NOAF WIL BE ISSUED AT O4Z AND 16Z. FORMAT WILL BE STANDARD.

C. THE TANKER AIRLIFT CONTROL CENTER (TACC) AT SCOTT AFB WILL ISSUE ALL AIR REFUELING (AR) FORECAST UNDER THE FOLLOWING BULLETIN HEADER FXXX4 XXXX (PID 9096). ONCE THE AFFOR IS IN PLACE, THEY WILL ASSUME THESE DUTIES FOR INTRA-THEATER REQUIREMENTS AS SOON AS EQUIPMENT IS UP AND OPERATIONAL. SEE PARAGRAPH 9(D). THE TACC WILL CONTINUE TO SUPPORT ALL STRATEGIC AIRLIFT IN AND OUT OF THE AOR. BOTH BULLETINS ARE AVAILABLE VIA THE AWN / MSIT AND AFDIS (FXX2). FOR THE LOCATIONS AND NAMES OF THE AR REFER TO 12 AF AIRSPACE CONTRAOL ORDER (ACO). FOR FURTHER INFORMATION CONTACT THE TACC AT DSN 576-4794/5/6.

D. THE JFACC/AFFOR METOC SUPPORT CELL IN THE AOC WILL TAILOR THE JOAF AND OTHER JMFU PRODUCTS TO PREPARE FORECAST GUIDANCE TO MEET SPECIFIC REQUIREMENTS FOR ALL INTRA-THEATER AIR OPERATIONS: NAVY, AIR FORCE, ARMY AND MARINES. THE BULLETIN HEADER (AND PID FOR AIR FORCE UNITS) IS STILL TO BE DETERMINED). UNITS WILL NEED TO REFER TO THE FRAG ORDER FOR SPECIFIC INFORMATION. THE A/R FORECAST IS NOT A DUPLICATE OF THE FXXX4 JFCA BULLETIN ISSUED BY THE JMFU, OR THE FXXX4 XXXX ISSUED BY THE TACC. THE JFCA/AFFOR METOC CELL A/R FORECAST WILL USE THE JMFU PRODUCT TO PRODUCE A DETAILED A/R FORECAST FOR SPECIFIC MISSIONS.

E. THE NATIONAL HURRICANE CENTER (NHC) , MIAMI , FL, ISSUES CYCLONE BULLETINS WHEN STORMS ARE ACTIVE. BULLETIN HEADERS ARE AVAILABLE ON AFDIS)FXX5). NHC TROPICAL CYCLONE BULLETINS ARE RE-TRANSMITTED

FOR ALL DOD UNITS BY NAVLANTMETOCCEN (NLMOC). NLMOC WILL ALSO ISSUE SPECIFIC RECOMMENDATIONS TO SHIPS FOR EVASION OF ADVERES WEATHER.

F. HAITI DMSP AND NOAA SATELLITE PICTURES CURENTLY LOADED IN AFDIS CAN BE PULLED UP UNDET THE FOLLOWING HEADERS: F10I75, F10I75, F10I76, F11I76, N11I75 AN N11I76 FOR IR PICTURES. F10V75, F11V75, F10V76, F11V76, N11V75 AND N11V76 FOR VISUAL PICTURES.

G. RE-LOCATABLE WINDOW MODEL (RWM): THESE PRODUCTS HAVE BEEN REPLACED BY MM5 MODEL OUTPUT PRODUCTS.

H. NAVLANTMETOCCEN NORFOLK IS THE COORDINATING METOC CENTER SUPPORTING THE JMFU. NLMOC WILL ALSO PROVIDE QUALITY CONTROL AND COORDINATION FOR ALL OPAREA FORECASTS.

I. ALL BULLETINS AND ANY SPECIAL PRODUCTS WILL BE AVAILABLE ON THW AWN / MIST AND AFDIS. ACTION ADDRESSES OF THIS MESSAGE WILL ALSO RECEIVE THE JMFU FORECASTS PRODUCTS VIA AUTODIN MESSAGE. THE BULLETINS AND SPECIAL PRODUCTS WILL ALSO BE BROADCAST ON THE ELKHORN HIGH FREQUENCY RADIO BROADCAST (HFRB). ATTEMPTS TO GET HEMESTEAD HFRB UP AND RUNNING ARE UNDER WAY IF OPERATIONAL.

J. NAVLANTMETOCCEN WILL ALSO TRANSMIT DATA PACKAGES VIA THE NAVY HF FAX.

K. THE FOLLOWING KQ-IDENTIFIERS ARE ASSIGNED TO THE FOLLOWING UNITS:

JSOTF - KQGF	TALCE -1 - KQUE
3 SFG FOB - KQGG	TALCE-2 - KQUW
D MAIN - KQGD	AVN BDE - KQGH
FT DRUM - KQGC	

DEPLOYED UNITS THAT TAKE OBSERVATIONS WILL PASS THESE OBSERVATION USING THEIR ASSIGNED KQ VIA COMM LINES OR HF BACK TO THE JMFU FOR INCLUSION IN THE AWN / MIST. ONLY 2 GOLDWINGS ARE BEING DEPOLYED -- THE JSOTF AND FOB.

L. FLENUMMETOCCEN WILL PROVIDE DETAILED BATHYMENTRIC AND BEACH DATA AS CENTERED ON OPAREA. FILDS WILL BE AVAILABLE VIA NITES AND NODDS.

M. NAVOCEANO WILL PROVIDE DETAILED BATHYMETRIC AND BEACH DATA AS REQUIRED. REQUEST SHOULD BE COORDINATED THROUGH NLMOC.

8. REPORTS. SEND SITUATION REPORTS OF PERSONNEL AND EQUIPMENT STATISTIC TO THE JTF-180 METOC OFFICER, LT SHANNON, ABOARD THE USS MT WHITNEY. HE WILL IN TURN COMPILE THE INFORMATION FOR THE FTF

COMMANDER AND PASS THE INFOR BACK TO THE JMO FOR INCULSION IN JMO SITREP TO USACOM.. IF YOU CAN NOT REACH THE USS MT WHITNEY, ATTEMPT TO PASS THE INFO TO THE JMFU WHO WILL RELAY IT TO THE JMO.

9. SECURITY. ALL PARTCIPANTS MUST ADHERE TO SOUND SECURITY PRACTICES. FAILURE TO DO SO COULD RESULT IN CASUALTIES. PROTECT ALL CLASIFIED MATERIAL. USE COVERSHEETS AND MARK OR STAMP ALL CLASSIFIED. DO NOT TALK AROUND CLASSIFIED AND USE THE STU-III AT ALL TIMES. REMEMBER, THIS IS NOT AN EXCERCISE AND LIVES DEPEND ON OUR KNOWLEDGE AND SAFEGUARD OF CLASSIFIED INFORMATION.

10. SAFETY. IT GOES WITHOUT SAYING THAT THE ENVIRONMENT COULD BE EXTREMELY DANGEROUS. LEARN ABOUT YOUR SURROUNDINGS IN DAY AND NIGHT. DO NOT TAKE CHANCES AND BE ALERT TO ALL KINDS OF SITUATIONS.

11. FOLLOW-ON OPERATIONS. IN THE EVENT THE SITUATION BECOMES SUCH THAT THE ENVIRONMENT BECOMES PERMISSIVE, USACOM OPORDS 2370-95 AND 2375-95 WILL NOT BE EXECUTED, AND THE 82D AIRBORNE DIVISION WILL NOT FORCIBLY ENTER. INSTEAD, USACOM OPORD 2380-95 (JTF-190 WILL BE EXECUTED AND THE 10TH MOUNTAIN DIVISION WILL ENTER HAITI. FT DRUM WEATHER PERSONNEL (2/10/6) WILL SUPPORT THE 10TH MTN DIV COMMANDING GENERAL WHO BECOMES THE JTF-190 COMMANDER. IN THE EVENT 2375-95 (JTF-180) DOES EXECUTE, THE 10TH MTN DIV WILL FOLLOW0ON ANDWILL RECEIVE THE HANDOFF FROM THE JTF-180 COMANDING GENERAL NLT D+14. THE JTF-180 METOC OFFICER AND 82D ABN AND AVN BDE METOC PERSONNEL WILL DEPART WITH THEIR CUSTOMERS. FT DRUM METOC PERSONNEL WILL FORM THE NEW JTF AND PROVIDE SUPPORT WHER NECESSARY. SOF AND AF METOC FORCES WILL REMAIN UNTIL MISSIONS ARE COMPLETE.

12. JMO SENDS/LTC STANLEY/

b. Annex H

Example Annex H to an OPLAN

HQ, U.S. EUROPEAN COMMAND
UNIT 30400
APO AE 09131
15 Jun 06

ANNEX H TO CDR USEUCOM STANDARD PLAN 4000-03 (U)
METEOROLOGICAL AND OCEANOGRAPHIC OPERATIONS (U)

REFERENCES:

a. [U) CJCSI 3810.01B Meteorological and Oceanographic Operations, 25 Aug 03 (U)

b. [U) Joint Pub 3-59, Joint Doctrine, Tactics, Techniques, and Procedures for Meteorological and Oceanographic Operations, 23 Mar 99 (U)

c. [U) USEUCOM Directive 55-11, USEUCOM Theater Command and Control Policy 20 Jun 04 (U)

d. [U) NAVOCEANCOMINST 3140.1L, U.S. Navy Oceanographic & Meteorological Support System Manual, 15 Sep 00 (U)

e. [U) NAVMETOCCOMINST 5450.9G Mission Organization and Functions of the Naval Meteorology and Oceanography Command, 29 Mar 02 (U)

f. [U) AFJI 15-157, Climatic, Hydrological, and Topographical Services. Weather Support for the U.S. Army, 30 Jun 96 (U)

g. [U) AFDD 2-9.1, Weather Operations, 3 May 06 (U)

h. [U) AFMAN 15-128, Air and Space Weather Operations – Roles and Responsibilities, 26 Jul 04 (U)

i. [U) AFMAN 15-129, Air and Space Weather Operations – Processes and Procedures, 21 Jun 04 (U)

1. (U) Situation. To provide or arrange for meteorological and oceanographic (METOC) support to the operations envisioned by this plan.

a. (U) Concept of METOC Support. METOC support is defined as the provision of meteorological, oceanographic, and space environmental information tailored to meet the requirements of contingency operations. Generally, METOC support to joint headquarters is a USEUCOM/joint responsibility while support to service lead components and Service forces is a Service responsibility. The 21st Operational Weather Squadron (21 OWS) will serve as the primary theater METOC support center and will function as the theater reach-back JMFU. Fleet Weather Center Norfolk, Virginia (FWC) will serve as the maritime focused METOC forecast

center. The Naval METOC cell attached to the 21 OWS will provide or arrange for any necessary oceanographic products in support of the JMFU.

b. (U) Assumptions.

(1) (U) Indigenous METOC services may not be available, reliable, or sufficient for METOC forces executing joint and/or coalition operations.

(2) (U) U.S., allied, and coalition METOC products will be available.

(3) (U) Meteorological satellite, specifically European Organization for the Exploitation of Meteorology Satellites (EUMETSAT), data will be available.

(4) (U) Regional METOC data, normally available through World Meteorological Organization (WMO) agreements, may be curtailed due to loss of communications, termination of agreement, meteorological control (METCON), or oceanographic control (OCEANCON).

(5) (U) METOC operations will depend upon the use of interoperable communications for exchange of meteorological, oceanographic, and space environmental data, products, and services. METOC personnel will have access to SIPRNET and NIPRNET with links to the JMFU homepage.

(6) (U) Operations Security (OPSEC) will be maintained at all times.

c. (U) Planning Factors. Environmental and Oceanographic conditions can range from one extreme to the other throughout the USEUCOM AOR and as such could severely impact maritime, land, air, and space operations. Joint planners should contact their respective METOC officers for more detailed, operationally tailored METOC information.

d. (U) Resource Availability. See specific operational plan for details.

2. (U) Mission. Provide coordinated METOC support to contingency and exercise operations by ensuring information is timely, relevant, and accurate.

3. (U) Execution.

a. (U) General. This document is Annex H to the Standard Plan 4000-03. This Standard Plan is a broad plan to cover the range of possible USEUCOM operations. During development of an operational plan (OPLAN) for a specific operation, USEUCOM, the USEUCOM SMO, and the JMO (if one is designated) will coordinate specific requirements (e.g. products, data, and force requirements) and determine limiting factors (LIMFACs) that will affect the plan and ensure they are included in OPLAN development. Due to the size of the USEUCOM area of responsibility and vast areas of limited METOC information, some important considerations are: specific limiting weather factors and their probability of occurrence, instructions for communications outages and back-up procedures, and denial of data to the enemy.

b. (U) Concept of Operations.

(1) (U) Many operational details are fluid and subject to change. Due to the dynamic planning process for operations, a letter of instruction (LOI) may be disseminated, in addition to an Annex H to the order establishing the JTF, by the USEUCOM SMO.

(2) (U) The JMO supports the JTF commander by assessing and forecasting the METOC and space environment in which friendly and threat weapon systems and/or forces operate. The JMO is responsible for accomplishing forecast coordination in the AOR with supporting components and commands under the JTF. The JMO has final authority for all forecasts issued in support of the OPLAN. The geographical region of METOC responsibility will include the AO of the OPLAN as well as beddown locations. The JMO will modify and review the joint METOC product requirements, as required.

(3) (U) The 21 OWS is the lead JMFU for all operations in the USEUCOM AOR. If necessary, the 21 OWS will reach to other centers for support. Additional personnel may be deployed to augment the JMFU.

(4) (U) The USEUCOM SMO will assist in coordination between the JMO, the components, and USEUCOM ECJ1 to provide or arrange for METOC personnel and equipment in support of the JTF. METOC personnel will deploy in accordance with the TPFDD and provide all required METOC support.

(5) (U) The JMFU will select, designate, and fuse a variety of indigenous, regional, and strategic METOC centers' operational products to fill operator's mission support requirements. The JMFU will also issue a JOAF at a minimum of twice daily for use by all components and post the JOAF on the JMFU homepage and/or transmit via SIPRNET or other available communications circuits. The JOAF is the official forecast for the AO, which provides tailored information to meet specific operational requirements. The JMFU will provide specialized METOC and space weather support products as needed based upon the requirements of the JMO and component SMOs.

(6) (U) Weather reports from aircrews and forward-deployed forces are vitally important and will be transmitted to the 21 OWS for further dissemination.

(7) (U) Weather forces will use information provided by the 21 OWS to furnish staff weather support and mission execution products.

c. (U) Tasks and Responsibilities.

(1) (U) USEUCOM SMO. The USEUCOM SMO will:

(a) (U) Coordinate all component METOC support requirements (e.g. climatology/oceanic data, severe weather notification procedures, outline the communication plan, etc.) and inter-Service support procedures to ensure maximum exchange of essential METOC information.

(b) (U) Coordinate an overall theater sensing strategy among the components to optimize the frequency and location of observations to meet theater forecast needs.

(c) (U) In most cases, the JMO will be the METOC officer supporting the JTF. If the JTF lead component is unable to designate a JMO, the SMO will designate the Service component responsible for providing the JMO. In general, when the preponderance of forces and mission are naval, the JMO will be a Navy METOC officer and when the preponderance of forces and mission are air and/or ground, the JMO will be an Air Force METOC officer. It is important to note that the USEUCOM SMO could also be the JMO.

(d) (U) Determine, in coordination with the JMO (if one is designated), whether a JMFU is needed and, if so, posturing the 21 OWS to assume JMFU duties.

(e) (U) Assist the JMO (if one is designated) in manning and equipping of the JTF METOC staff, and other joint functions as required.

(f) (U) Provide weather support guidance for contingency operations and functional oversight of all weather forces, to include combat weather teams (CWTs), battlefield weather teams (BWTs), strike group oceanography teams (SGOTs), weather specialty teams, and special operations weather teams, which support air, ground and maritime operations in the USEUCOM area of operations (AOR).

(g) (U) Coordinate acquisition of environmental information and/or products from METOC support centers.

(h) (U) Manage situation reports, when required, from deployed and garrison weather units.

(i) (U) Assign "EQ" station location identifiers for NATO operations.

(2) (U) JMO. The JMO will support the deployed forces using this annex and references (a) and (b) as guidance. The JMO may issue a more detailed METOC LOI and/or an Annex H to the JTF order as required.

(3) (U) USAFE METOC Officer. The USAFE Component METOC Officer will ensure all subordinate METOC unit requirements are coordinated and specified in USAFE supporting plans. In addition, when CDRUSAFE is the Joint Air Force Component Commander (JFACC), the staff weather officer (SWO) will ensure METOC support is tailored to all air operations, to include intratheater airlift. This information will be provided to other components, as necessary.

(4) (U) USAREUR METOC Officer. The USAF designated USAREUR Component METOC Officer will develop and coordinate concepts for providing and exchanging essential METOC information in support of Army air and ground operations.

(5) (U) USNAVEUR METOC Officer. United States Naval Forces, Europe (USNAVEUR) Component METOC Officer will develop and coordinate concepts for exchanging essential METOC information between all deployed naval assets, ashore and afloat, requiring such information and for Marine air, sea, and ground operations. In addition, when CDRUSNAVEUR is the JFACC, the SWO will ensure METOC support is tailored to all air operations, to include intratheater airlift. When CDRUSNAVEUR is the JFMCC, the SWO will

ensure METOC support is tailored to all maritime operations, to include naval aviation, amphibious and littoral operations. This information will be provided to other components, as necessary.

(6) (U) USSOCEUR METOC Officer. The USSOCEUR METOC Officer will develop and coordinate concepts for providing and exchanging essential METOC information in support of special operations. Concepts will include METOC and space weather support to a joint special operations task force (JSOTF).

(7) (U) USAFE/A3W. USAFE/A3W provides staff weather support to USEUCOM headquarters and management headquarters weather functional responsibilities for HQ USAFE. USAFE/A3W functions as the USEUCOM SMO IAW USEUCOM J3-USAFE/DO Memorandum of Understanding (MOU) and Joint Publication 3-59.

(8) (U) 16 AF/A3 Weather. 16 AF/A3 weather will be responsible for contingency support request consolidation and for coordination with the Air Force Weather Agency (AFWA) on deployed "KQ" weather site identifier management for each AFFOR and Army Forces (ARFOR).

(9) (U) 21 OWS. 21 OWS provides or arranges for meteorological intelligence information and operational level products in support of Joint, Air Force, Navy, and Army forces throughout the USEUCOM AOR, to include resource protection of DoD assets and reachback support at all main, standby, and contingency locations throughout the AOR. Unless specified otherwise by USEUCOM, the 21 OWS will be the JMFU in support of USEUCOM contingency and exercise missions. The meteorological intelligence information provided will enable weather forces to produce mission execution forecasts (MEFs) tailored to the needs of the supported unit. 21 OWS products will be disseminated on common-user communication.

(10) (U) Naval Oceanographic and Anti-Submarine warfare Detachment Naples (NOAD). NOAD provides tactical oceanographic support to USNAVEUR forces.

(11) (U) Naval European Meteorology and Oceanography Detachment, Sigonella (NEMOD). NEMOD provides tactical ISR support to USNAVEUR forces.

(12) (U) 7th Weather Squadron (7 WS). 7 WS provides or arranges for tactical and staff weather support to USAREUR forces. Identifies and provides force requirements for inclusion in operational sourcing documents.

(13) (U) Air Force Forces AFFOR. The AFFOR SWO provides staff weather support to the COMAFFOR and staff. The AFFOR SWO conducts functional oversight of the weather operations supporting the air component of the joint task force

(14) (U) Army Forces ARFOR. The ARFOR SWO provides staff weather support to the ARFOR Commander and staff. The ARFOR SWO conducts functional oversight of the weather operations supporting the ground components of the joint task force.

(15) (U) Navy Forces (NAVFOR). The NAVFOR SWO provides staff weather and oceanographic support to the COMNAVFOR and staff. The NAVFOR SWO conducts functional oversight of the weather and oceanographic operations supporting the naval components of the joint task force.

(16) (U) Marine Forces (MARFOR). Since MARFOR Europe (MARFOREUR) has no standing weather forces in theater, weather support to MARFOREUR operations will be coordinated through USEUCOM, the SMO, the USAFE Operational Weather Squadron, USNAVEUR, and/or any other organizations as necessary.

(17) (U) Combat/Battlefield Weather Teams and Strike Group Oceanography Teams (CWTs/BWTs/SGOTs). At the tactical level provide resource protection as well as tailor and apply 21 OWS and FWC products to provide mission-specific weather and oceanography information to supported units/organizations. Weather forces directly supporting an AF unit are referred to as CWTs. Weather forces directly supporting an Army unit are referred to as BWTs. Weather and oceanography forces directly supporting naval assets are referred to as SGOTs.

d. (U) Deployment.

(1) (U) AFFOR SWO will oversee and support the deployment of USAFE weather forces, to include USAF support to Army units, within the USEUCOM AOR and the deployment of all USAF weather forces into the USEUCOM AOR.

(2) (U) ARFOR SWO, in conjunction with the AFFOR SWO, will oversee and support the deployment of USAFE Army-support weather forces within the USEUCOM AOR and the deployment of USAF Army-support weather forces into the USEUCOM AOR.

(3) (U) NAVFOR SWO, will oversee and support the deployment of Naval Forces Europe (NAVEUR) weather and oceanographic forces within the USEUCOM AOR and the deployment of naval weather and oceanographic forces into the USEUCOM AOR.

(4) (U) SOCEUR SWO, in coordination with EUCOM SMO, will oversee and support the deployment of special operations weather forces within the USEUCOM AOR.

e. (U) Employment.

(1) (U) USAFE/A3W will oversee and support all USEUCOM METOC operations as the USEUCOM Senior METOC Officer.

(2) (U) The AFFOR SWO will oversee and support air and ground component operations. The NAVFOR SWO will oversee and support maritime component operations.

(3) (U) 21 OWS will provide operational and tactical level meteorological information and products as tasked by the USEUCOM SMO, 16 AF/A3 Weather, C6F or the JTF JMO.

(4) (U) NOAD/NEMOD/Naval Oceanographic Office (NAVO) will provide operational and tactical level meteorological and oceanographic information and products as tasked by the USEUCOM SMO, C6F or the JTF JMO.

(5) (U) CWTs/BWTs may be tasked to provide three basic functions as per AFMAN 15-129: Airfield services, staff weather support, and mission weather support.

(a) (U) Airfield Services. The airfield services, base operating support function provides resource protection to the expeditionary base/location and takes/disseminates observations to the 21 OWS. The resources for this function are generally tied to base requirements not operational mission requirements.

(b) (U) Staff Weather Support. Provides environmental support to the Army or air expeditionary unit commander and staff. This support ties directly into the unit's command, control, and planning functions. The resources for this function are not tied to base operating support requirements.

(c) (U) Mission Weather Support. Provides environmental support for mission planning and execution. This function revolves around the production of a MEF to meet the supported unit's mission and tactics. The resources for this function are not tied to base operating support requirements.

(6) (U) Naval Strike Group Oceanography Teams (SGOTs). SGOTs are the sea going arm of Navy METOC support, which provide direct support to aircraft carriers and large deck amphibious platforms. SGOTs embark Operations Aerography (OA) Detachment personnel onboard to support JTF operations as necessary. Naval command ships may also have embarked METOC personnel to support the command staff.

(7) (U) NATO support: The 21 OWS is a designated Military Forecast Center (MFC) in accordance with Allied Weather Publication 2.

(a) (U) When tasked, the 21 OWS will produce a Unified Weather Forecast (UWF) for NATO or the Recognized Environmental Picture (REP).

(b) (U) When not tasked to produce a UWF, 21 OWS is responsible for acquiring NATO weather products and hosting them on webpage.

(c) (U) U.S. Weather forces will acquire NATO products from the 21 OWS.

(8) (U) Communications.

(a) (U) Weather information/data will be passed using web-based technology and/or the most efficient means available. Secure means should be used whenever possible and especially if there is an OPSEC concern.

(9) (U) Equipment.

(a) (U) First-in/Initial Deployment.

1. (U) Regional broadband global area network (RBGAN) (CWTs only) or other satellite internet-link capability.

2. (U) Secure voice (may be satellite based or other supported unit-provided capability).

3. (U) Unsecure voice (may be satellite based or other supported unit-provided capability).

4. (U) NATO automated meteorological information system (NAMIS) (if operations are in the NAMIS footprint).

5. (U) TMQ-53 tactical meteorological observing system.

6. (U) Kestrel 4000 or other standard Weather Weapon System, hand-held, observation instrument.

(b) (U) Employment.

1. (U) SIPRNET access (dedicated preferred).

2. (U) Secure voice (may be satellite-based or other supported unit-provided capability).

3. (U) Unsecure voice (may be satellite-based or other supported unit-provided capability).

4. (U) Joint Worldwide Intelligence Communications System (JWICS) access if required.

5. (U) NIPRNET access (dedicated).

6. (U) Non-secure voice (dedicated).

7. (U) NAMIS (if operations are in the NAMIS footprint).

8. (U) TMQ-53.

9. (U) New Tactical Forecast System (AF & Army units only).

(c) (U) Redeployment.

1. (U) RBGAN (CWTs only) or other satellite internet-link capability.

2. (U) Secure voice (may be satellite-based or other supported unit provided capability).

3. (U) Unsecure voice (may be satellite-based or other supported unit provided capability).

(10) (U) KQ/EQ Weather Site Identifier Management.

(a) (U) Indigenous surface weather observations will be assessed for quality and reporting frequency. The JMO will identify sensing strategy LIMFACs with the AO to the SMO.

(b) (U) When weather forces deploy to an airfield that has an assigned WMO International Civil Aviation Organization (ICAO) identifier, they will evaluate the possibility of using the identifier for disseminating tactical surface weather observations to include security/OPSEC factors.

(c) (U) When weather forces deploy to an airfield that does not have an assigned WMO ICAO identifier, or using the assigned ICAO isn't possible/practical, the USEUCOM SMO will assign an EQ (for NATO operations) identifier to the field site, which will be used as the identifier for the tactical surface weather observations. 16 AF/A3 Weather will coordinate with AFWA to assign "KQ" identifiers to weather sites supporting US operations.

f. (U) Redeployment & Reconstitution.

(1) (U) Weather forces will redeploy when directed to do so. Normally, this will be in conjunction with their supported unit. If the operation is sufficiently descoped where weather operations can be conducted remotely then a unit should request redeployment via the deployed chain of command.

(2) (U) Reconstitution is the responsibility of the home station units.

g. (U) Coordinating Instructions.

(1) (U) This plan is effective upon receipt.

(2) (U) Direct coordination among subordinate units is authorized and encouraged among component METOC officers. Component METOC officers will coordinate METOC support requirements with the JTF JMO. The USEUCOM SMO will coordinate METOC support requirements with combatant commander SMOs as required.

4. (U) Administration and Logistics.

a. (U) USEUCOM component forces will coordinate and identify logistics, messing, billeting, transportation, and administrative support for their assigned or attached METOC personnel. Components will include this support in supporting plans.

b. (U) METOC communications requirements are listed in Annex K.

c. (U) METOC information from space assets are listed in Annex N.

d. (U) Administration and logistics will be provided through appropriate service channels.

e. (U) USAFE-owned tactical equipment assets and war reserve material will be stored at the 21 OWS.

f. (U) Air Force weather forces will coordinate equipment requirements, transfers, maintenance and custodian authorization and custody receipt listing (CA/CRL) accountability through USAFE/A3W.

g. (U) Air Force weather forces will accomplish supply and re-supply through their supported units.

5. (U) Command and Control.

a. (U) METOC personnel, in most cases, are under the operational control (OPCON) of their supported customer.

b. (U) The USEUCOM SMO, at the direction of CDRUSEUCOM or higher authority, will implement METCON and/or OCEANCON IAW ref a.

c. (U) Unless otherwise directed by USEUCOM, COMAFFOR will retain OPCON of Army-support weather units/personnel and ARFOR will retain TACON of Army-support weather units/personnel.

d. (U) Administrative control (ADCON) responsibilities will remain with the respective services.

e. (U) All weather units assigned within the USEUCOM AOR are under the CCDR of CDRUSEUCOM. Weather personnel deploying to the USEUCOM AOR will fall under the command relationship specified in the CJCS order authorizing the deployment.

c. Joint Operational Area Forecast (JOAF)

(1) JOAF Example 1

EXER/JTFEX 95-1//

SUBJ/JOINT OPAREA FORECAST//

POC/FURZE/CDR/J335/(804) 322-5990 EXT 7744/DSN 836-5990 EXT 7744//

RMKS/1. INTENT OF THIS MESSAGE IS ALIGNMENT OF WEATHER FORECASTS THROUGHOUT THE JOINT TASK FORCE. DAILY UPDATES TO THIS OPAREA FORECAST WILL BE ISSUED PRIOR TO 1700Z. DIRECT QUESTIONS TO CJTF 950 METOC.

2. PROGNOSTIC DISCUSSION: HIGH PRESSURE OVER KARTUNA, KORONA AND TELARI MOVES NORTH-NORTHEAST INTO THE LABRADOR SEA. AN INTENSE ARCTIC LOW OVER THE WESTERN GREAT LAKES MOVES EASTWARD. ASSOCIATED COLD FRONT EXTENDING SOUTH THROUGH TELARI MOVES RAPIDLY OFF THE EAST COAST BY SATURDAY EVENING. A NEW LOW DEVELOPS OVER SOUTHEAST KORONA SATURDAY MORNING. MERGES WITH THE FRONTAL SYSTEM (FORE MENTIONED) AND MOVES RAPIDLY NORTH-NORTHEAST ALONG FRONT. 1038MB HIGH OVER MIDWEST MOVES EASTWARD TO WESTERN TELARI SUNDAY, PRODUCING STRONG NORTHWEST FLOW OVER THE OPAREA. HIGH REMAINS IN PLACE THROUGH WEDNESDAY.

3. FORECAST FOR COASTAL REGION AND 150 NAUTICAL MILES OFFSHORE FROM KORONA NAVAL BASE 1 (NORFOLK, VA) TO SABANI AIR BASE 1:

A. SATURDAY- CLOUDY WITH MIXED AND FROZEN PRECIPITATION IN NORTHERN TELARI, NORTHEAST KORONA AND KARTUNA. HEAVY RAIN/ EMBEDDED SHOWERS THROUGHOUT REMAINDER OF THE OPAREA. MODERATE SOUTHEAST FLOW AHEAD OF FRONT WILL VEER AND BECOME STRONG WEST-NORTHWEST AFTER FRONTAL PASSAGE. SEA STATE 5 BECOMING 6, EXCEPT COASTAL, SEA STATE 2.

B. SUNDAY- CLEARING RAPIDLY OVER ENTIRE OPAREA AS HIGH PRESSURE RIDGES SOUTHEAST. STRONG NORTHWEST WINDS OVER NORTHERN TELARI AND ADJACENT WATERS; MODERATE NORTHERLY FLOW OVER SOUTHERN TELARI, KORONA AND KARTUNA; STRONG NORTHERLY FLOW OVER GULF OF SABANI. TEMPERATURES 18-22F, WIND CHILLS -11F INLAND, 28-32F COASTAL. SEA STATE 5 BECOMING 6 OVER THE GULF STREAM, EXCEPT COASTAL.

C. MONDAY- CLEAR TO PARTLY CLOUDY. WINDS LIGHT AND VARIABLE OVER LAND, MODERATE NORTHERLY FLOW OFFSHORE. SEA STATE 5, 4 IN SOUTHERN GULF OF SABANI.

D. TUESDAY- CLEAR TO PARTLY CLOUDY WITH COASTAL MORNING FOG OVER SOUTHERN KORONA AND SOUTHEASTERN TELARI. WINDS LIGHT AND VARIABLE OVER LAND REGIONS OF OPAREA. MODERATE NORTHERLY FLOW OVER GULF OF SABANI. SEA STATE 5 DIMINISHING TO 4 NOON.

E. WEDNESDAY- CLEAR TO PARTLY CLOUDY WITH COASTAL MORNING FOG. WINDS LIGHT AND VARIABLE OVER ENTIRE OPAREA. SEA STATE 4 DIMINISHING TO 2.

4. WEATHER IMPACTS ON WARFARE THRU FIVE DAYS:

	SAT	SUN	MON	TUE	WED
AIROPS	RED	GREEN	GREEN	GREEN	GREEN
AMPHIB OPSRED	YELLOW	GREEN	GREEN	GREEN	GREEN
AIR/LAND OPS	RED	YELLOW	GREEN	GREEN	GREEN
MARITIME	RED	RED	YELLOW	GREEN	GREEN//

(2) JOAF Example 2

/OPER/UPHOLD DEMOCRACY/

MSGID/GENADMIN/NAVLANTMETOCDET GTMO//

SUBJ/JOINT OPAREA FORECAST/ JOAF (PART TWO)//

RMKS/1. SYNOPTIC SITUATION AT 050000Z: AREA OF LOW PRESSURE NR 29N 76W IS MVG EAST AT 08 KTS. ASSOCIATED TROF XTNDS SWD FROM LOW THROUGH THE FL STRAITS INTO THE EASTERN GULF OF MEXICO AND IS SLOWLY MVG SOUTH, AND WILL INFLUENCE THE HAITI AND GTMO OPAREAS ON THURSDAY. EASTERLY TRADES PREVAIL OVER THE CARIBBEAN WITH RIDGING FROM THE MIDDLE ATLANTIC HIGH INFLUENCING THE NORTH-CENTRAL AND NORTHEASTERN CARIBBEAN. WAVE PREVIOUSLY ALONG 70W IS NOW NR 75W SOUTH OF 17N MVG W AT 12 KTS AND WILL NOT AFFECT THE HAITI OR GTMO OPAREAS. ANOTHER WAVE ALONG 64W MVG W AT 10-15 KTS WILL WEAKEN AS IT MOVES UNDER AN AREA OF UPPER LEVEL CONVERGENCE AND WILL NOT AFFECT THE OPAREAS. ELSEWHERE, WAVES ARE LOCATED ALG 53W, AND 35W MVG W AT 10-15KTS.//

2. 24 HR FCST COMMENCING AT 050600Z OCT 94 FOR THE FOLLOWING AREAS:

3. CITY OF PORT-AU-PRINCE:

A. SKY/WX: PTLY CLDY OCNL MSTLY CLDY WITH ISOLD RASH/TSTMS THRU EARLY AFTN AND EVENING HOURS.

B. VIS (NM): UNRSTD, 1-3 IN PRECIP

C. SFC WINDS (KTS): ESE 4-8, INCRG 6-12 BY MID MRNG, THEN BCMG WESTERLY 10-15 BY MID AFTN (SEABREEZE). ESE 4-8 AFT SUNSET.

D. MAX/MIN TEMP (F/C): 95/35, 78/26.

E. ASTRONOMICAL DATA (ALL TIMES ZULU) COMPUTED FOR 18.5N 72.3W
SUNRISE: 05/1041 SUNSET: 05/2235
MORNING NAUTICAL TWILIGHT: 05/0954
EVENING NAUTICAL TWILIGHT: 05/2322
MOONRISE: 05/1100 MOONSET: 05/2300
PCT MOON ILLUM: 00
SUNRISE: 06/1041 SUNSET: 06/2234
MORNING NAUTICAL TWILIGHT: 06/0954
EVENING NAUTICAL TWILIGHT: 06/2321
MOONRISE: 06/1204 MOONSET: 06/2351
PCT MOON ILLUM: 04

F. PORT-AU-PRINCE TIDES (FT) VALID 05 OCT - 08 OCT (ALL TIMES ZULU)

HIGH:TIME	HEIGHT	LOW: TIME	HEIGHT
		05/0636	.22
05/1318	1.91	05/1942	.48
06/0112	1.44	06/0718	.12
06/1412	2.02	06/2036	.52
07/0154	1.39	07/1506	2.08
08/0242	1.34		

4. 24 HR FCST COMMENCING 050600Z FOR FOLLOWING AREAS:

THE GULF OF GONAIVES TO INCLUDE SEAWARD OF PORT-AU-PRINCE (EAST OF A LINE FROM 19.6N 73.4W TO 18.4N 74.5W).

NORTH OF HAITI AND NORTHERN WINDWARD PASSAGE (NORTH COAST OF CUBA AT 75.4W TO 21.5N 75.4W TO 21.5N 70.6W TO NORTH COAST OF HAITI AT 70.6W COASTAL TO 19.6N 73.4W TO 20.2N 74.2W COASTAL TO COAST OF CUBA AT 75.4W)

SOUTH OF HAITI (18.4N 74.5W TO 18.4N 75.4W TO 17.3N 75.4W to 17.3N 70.6W TO SOUTH COAST OF DOMINICAN REPUBLIC AT 70.6W COASTAL TO 18.4N 74.5W)

A. SKY/WX: PTLY CLDY OCNL MSTLY CLDY WITH ISOLD RASH/TSTMS OVER LAND AREAS MID AFTN/'EARLY EVENING, AND OVER WATER AREAS MIDNIGHT TO SUNRISE.

B. VIS (NM): UNRESTRICTED, 1-3 IN PRECIP.

C. SFC WINDS (KTS): ESE 10-15 KT, XCPT SSW 10-15 KTS NORTH OF HAITI AND THE WINDWARD PASSAGE DUE TO RIDGING FROM THE MIDDLE ATLANTIC HIGH.

D. SEAS (FT): ESE 2-4, XCPT EAST 1-2 IN EASTERN GULF OF GONAIVES. SSW 2-4 NORTH OF HAITI AND WINDWARD PASSAGE.

5. 24 TO 48 HR OUTLOOK: DEVELOPING WAVE ALONG SURFACE TROF NR 25N 74W WILL CREATE AN AREA OF LOW LEVEL CONVERGENCE OVER HAITI AND EASTERN CUBA ENHANCING CONVECTIVE ACTIVITY THURSDAY. EXPECT MSTLY CLDY SKIES WITH SCATTERED RASH/ISOLD TSTMS. WINDS SSW 10-15 KTS, SEAS SSW 3-5 FT.

6. 48 TO 72 HR OUTLOOK: NORMAL DIURNAL CONDITIONS RETURN AS WAVE TRACKS NE AND WEAKENS. PTLY CLDY TO MSTLY CLDY SKIES WITH ISOLD RASH/TSTMS. WINDS E 10-15 KTS, SEAS E 2-4 FT.

7. 3 TO 5 DAY OUTLOOK: XPCT CONTD NORMAL DIURNAL CONDITIONS THROUGH THE PERIOD. WAVE NEAR 53W WILL APPROACH THE HAITI OPAREA BY SUNDAY WITH MOST OF THE CONVECTIVE ACTIVITY REMAINING SOUTH OF 18N.

8. REQ SHIPS IN OPAREA AND WATERS SURROUNDING HISPANIOLA PROVIDE 6 HRLY/3HRLY WX OBS AND UA SOUNDINGS TO:
NAVLANTMETOC DET GUANTANAMO BAY CU//00//JMFU//

9. 24 HR TAFS (02Z, 08Z, 14Z, 20Z) AND HOURLY OBS FOR PORT AU PRINCE AND CAP HATIEN ARE AVAILABLE UNDER HEADERS KQUU AND KQUW, RESPECTIVELY.

10. NEXT JOAF 060202Z.

11. MINIMIZE CONSIDERED. RELEASED BY LCDR HELM//

SUBJ/JOINT OPAREA FORECAST/JOAF (PART THREE)//

RMKS/24 HR TAFS FOR THE FOLLOWING LOCATIONS:

1. PORT AU PRINCE:
TAF 1818 27005KT 9999 SCT010 SCT030 BKN100 QNH 2980INS CIG100 BCMG 2223 09005KT 9999 SCT010 BKN030 BKN100 QNH2984INS CIG030 VCTSRA TILL 03

2. CAMP D APPLICATION:
TAF 1818 2800515KT 9999 SCT015 SCT030 BKN080 QNH2980INS CIG100 VCSHRA TEMPO 2203 3200 TSRA BKN020 OVC030 CIG020 BCMG 0506 12009KT 9999 SCT030 SCT080 BKN250 QNH2983INS CIG250

3. CAP HAITIEN:
TAF 1818 32007KT 9999 SCT030 BKN080 QNH2980INS CIG080 VCSHRA WND VRBO4 AFT 05
TEMPO 2002 VRB10G15KT 4800 TSRA SCT020 BKN030CB OVC055 CIG030 BCMG 1415 03009KT 9999 SCT030 SCT250 QNH2984INS

4. GONAIVES:
TAF 1818 27005KT 9999 BKN030 BKN100 BKN250 QNH2985INS CIG030 VCSHRA TEMPO 2202 VRB10G15KT 4800 -TSRA BKN020CB BKN030 OVC080 CIG020 BCMG 0405 12003KT 9999 SCT030 SCT080 BKN250 QNH2985INS

5. JACMEL:
TAF 1818 16012G15KT BKN030 BKN080 BKN250 QNH2985INS CIG030 VCSHRA TEMPO 2003 VRB15G20KT 3200 TSRA BKN015CB BKN030 OVC080 CIG015 BCMG 0506 18005KT 9999 SCT030 BKN080 BKN250 QNH2983INS CIG080

6. TAFS WILL BE ISSUED AT 00Z, 06Z, 12Z, 18Z

7. MINIMIZE CONSIDERED. RELEASED BY CAPT REINS//
BT

(3) JOAF Example 3

SUBJ/JOINT AREA FCST (JOAF)//

RMKS/ THE MISSION PLANNING FORECAST WILL BE METWATCHED AND AMENDED AS REQUIRED//

1. FLIGHT MINIMUM DEFINITIONS:
   VFR: GTE CIG040, VIS 8000
   MVFR: CIG039-020, VIS 7000-6000
   IFR: LT CIG020, VIS 6000

2. JOAF NUMBER 347. VALID 100900Z TO 110900Z DEC 95.

A. SYNOPTIC SITUATION: HI PRES CONTS TO RDG SOUTHEAST ACRS REGION PRDCG XTNSV LO CLDS AND HVY FOG.

B. MARITIME ADRIATIC FORECAST
WEATHER: MSTLY CLDY OCNLY OVC
WIND (KTS): NORTH: NORTHEAST 10-15 CNTRL/SOUTH: EASTLY 6-12
TURBC: NONE
ICING: NONE
MAX/MIN TEMP (F/C): 50/10 46/08
MIN ALTSTG: 30.49
SEAS (FT): NORTH: NORTHLY 1-3 CNTRL/SOUTH: NORTHEAST 1-2
SEA SURFACE TEMP (C): NORTH: 15 CNTRL: 15-16 SOUTH: 16
DITCH HEADING (MAGNETIC): NORTH: 330 CNTRL/SOUTH: 110

C. COASTAL REGION UP TO DINARIC ALPS
AREA FORECAST: 2000 BR SCTVBKN050/010 BKNOVC020/040 TEMPO 0921 0800 FG OVC006 BECMG 2123 0800 F BKNOVC005/010 TEMPO 2109 2000 BR SCTVBKN 010/020
TURBC: NONE
ICING: NONE
MAX/MIN TEMP (F/C): 46/08 43/06
MIN ALTSTG: 30.47

D. CENTRAL MOUNTAIN REGION AROUND SARAJEVO AND TUZLA
AREA FORECAST: 0400 FG BKNVOVC005/008 BKNOVC 015/030 TEMPO 1021 2000 BR SCTVBKN010/030
TURBC: NONE
ICING: NONE
MAX/MIN TEMP (F/C): 36/02 32/00
MIN ALTSTG: 30.39

E. ZAGREB AND NORTHERN REGION
AREA FORECAST: 0400 FG BKNVOVC010/030 TEMPO 1120 2000 BR SCTVBKN010/030

TURBC: NONE
ICING: NONE
MAX/MIN (F/C): 34/02 30/M01
MIN ALTSTG; 30.38

F. 48 HOUR OUTLOOK VALID 110900Z DEC 95: HI PRES CONTS TO RDG SOUTHEAST DOMINATG REGION PRDCG 15-20KT BORA WINDS ACRS ENTIRE EASTRN SHORE EARLY IN PRD. FOG AND XTNSV LO CLDS LIFT OVR WATER WHILE LO CLDS AND HVY FOG RMN OVR MTN AREAS.

G. 72 HOUR OUTLOOK VALID 120900Z DEC 95: HI PRES PRESISTS THRU PRD PRDCG SLIGHTLY INCRG BORA WNDS. HVT FOG RMNS OVR MTN REGIONS.

H. FOR ADDITIONAL INFORMATION CONTACT NAVEURMETOCCEN ROTA SP BY MSG OR DSN 727-2410/3985.
FORECASTER: SMITH//

d. Briefing Slides

These are examples of previously used briefing slides and tools successfully used in various exercises. These are in predominately in Power Point and Excel. As future operations unfold, other formats like GIS based information systems may be used. Flexibility and working closely with the Information Management (IM) personnel is critical to make sure that METOC information is widely available to those individuals that must have it.

Caution! Take care to ensure the definitions of red, yellow, and green are widely understood and properly annotated on all briefing packages. Also remember that graphics take a lot of bandwidth to transmit—beware of communications limitations.

(1) Slide Weather Briefer (aka Geyerware)

Geyerware is not a DOD program of record, but has come to be a standard for METOC support to some Army units in CENTCOM, so JMOs are advised to be familiar with it. The application is a Microsoft Excel spreadsheet that uses macros to create multiple weather forecast products from TAWS light data and a user-created weather forecast text file (TAF). It is available for download from the Air Force portal and the JMB portal.

Geyerware macros that create XML output were created by Dr. Jim Ballas at the Naval Research Laboratory. Unless otherwise noted, all other code was created by Capt Andrew J. Geyer, USAF. This program began as a project at the 18th Weather Squadron (ACC) in April 2002.

Because the application makes extensive use of macros, it can be very machine-specific in its requirements and it can also be problematic to email or post due to firewall restrictions. System and Software Requirements:

- Any computer that can run Microsoft Windows 2003 or newer
- Microsoft Office 2003 or newer with macros enabled (use Microsoft Office Help to find out how to enable macros)
- USAF Target Acquisition Weather Software (TAWS)
- Network connection to JAAWIN or JAAWIN-S with CAC card reader installed (if forecaster wants to use “Get GFS” or METWATCH macros)

Threshold information for each of the mission areas indicated is user-configurable, as well as the selection of the missions themselves. The following is an example of a 4-day forecast slide produced by the program:

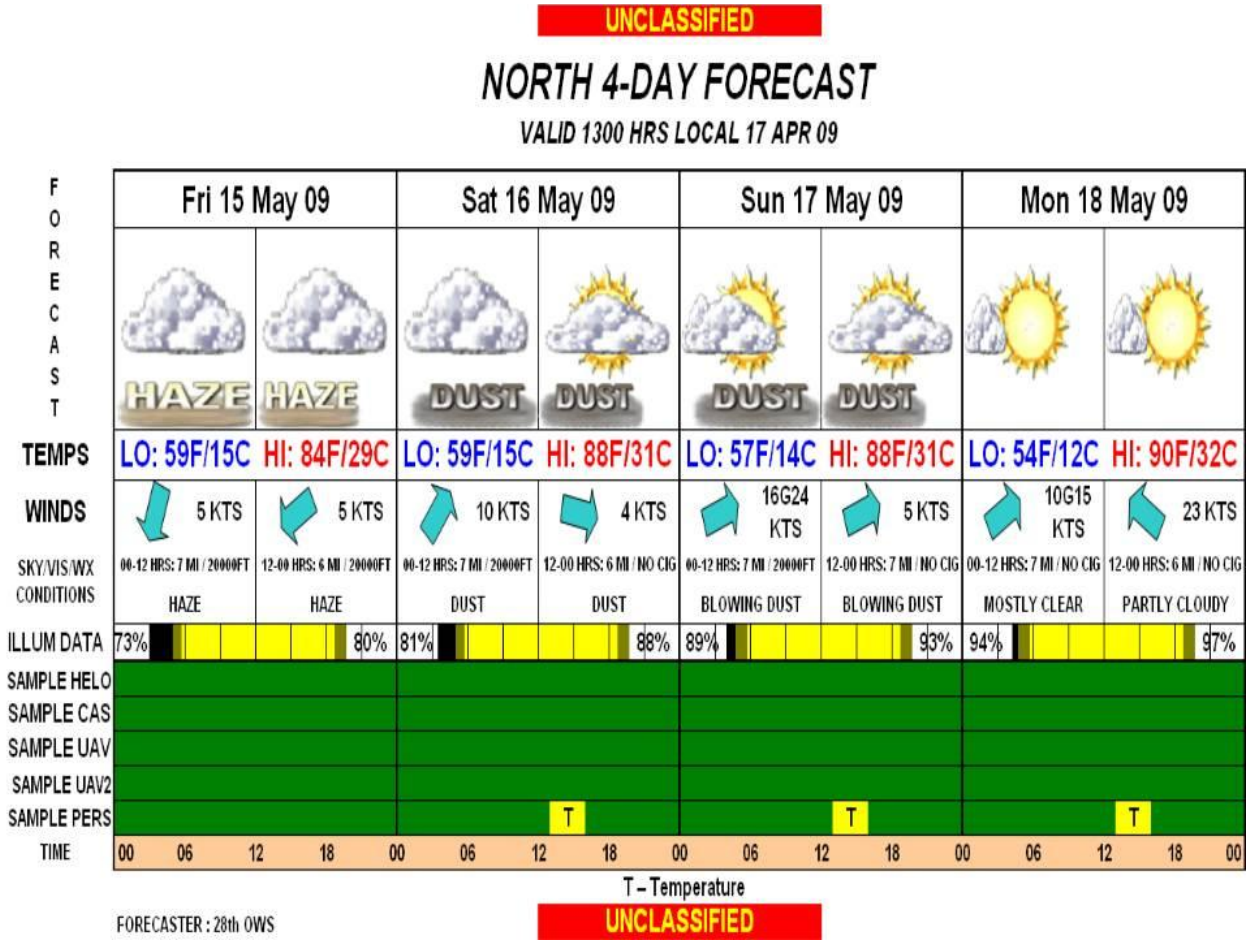

Figure 34: Sample "Geyerware" Slide

(2) Example JTF Command Brief Slides

These are examples of some slides used for briefing the JTF Commander and Staff on overall METOC conditions.

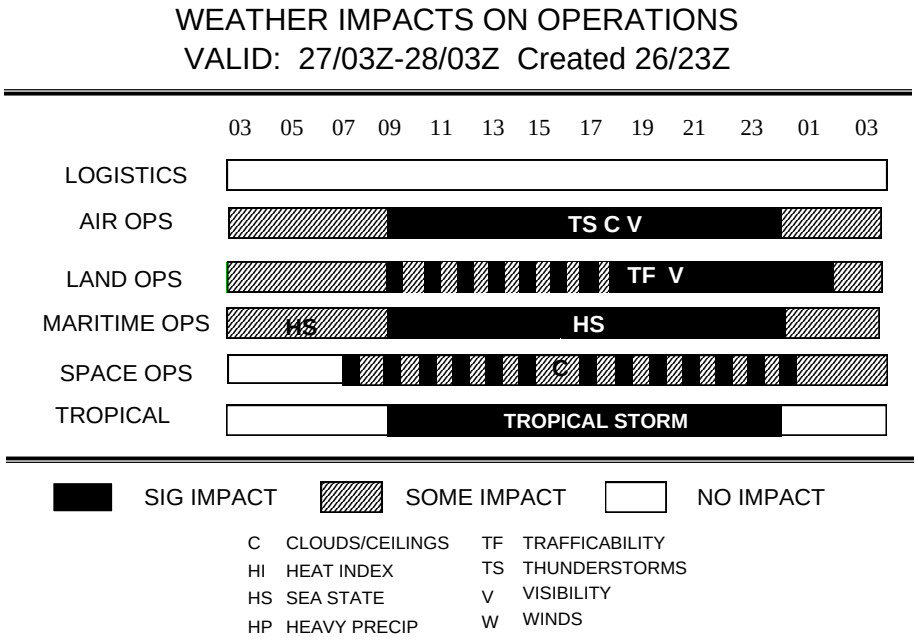

Figure 35: Example Impacts on Operations Slide – Bar Graph

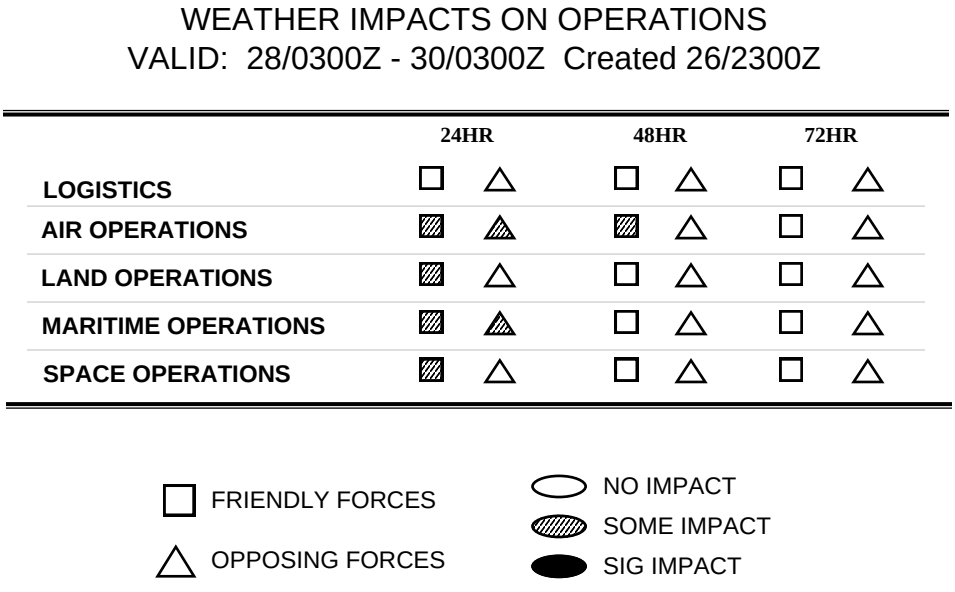

Figure 36: Example Impacts on Operations – 3-Day

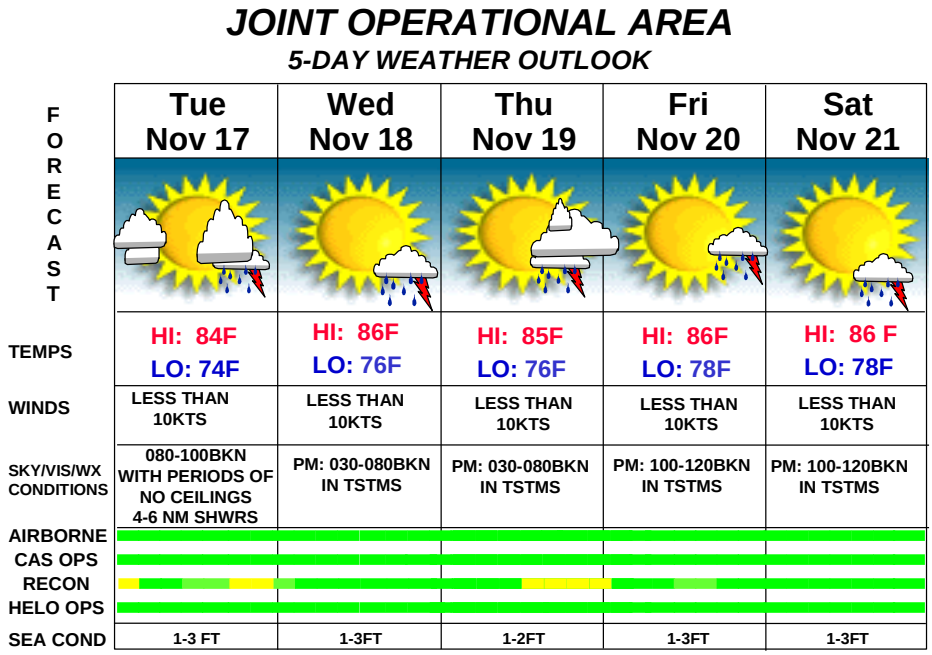

Figure 37: Example Impacts on Operations – 5-Day outlook

This is an example of an Excel Spreadsheet tool useful for staff planners:

MISSION	OPERATION	EVOLUTION	PARAMETER	MARGINAL	SEVERE	T00	T12	T24	T36	T48	T60
GROUND	LAND	NBC CHEMICAL	WIND	5-10KTS	>10KTS						
GROUND	LAND	NBC CHEMICAL	WIND		WIND FROM ENEMY						
GROUND	LAND	NBC CHEMICAL	PRECIPITATION	LGT PRECIP	MDT PRECIP						
GROUND	LAND	NBC CHEMICAL	CEILING		<5000						
GROUND	LAND	NBC CHEMICAL	LIGHTING	N/A	LTNG<3.1NM						
GROUND	LAND	NBC CHEMICAL	HUMIDITY	30%<HUM60%	<30%						
GROUND	LAND	NBC SMOKE	WIND	5-18 KT	>18KTS						
GROUND	LAND	NBS SMOKE	TEMPERATURE		>120F						
GROUND	LAND	NBS SMOKE	PRECIPITATION	MDT	HEAVY						
GROUND	LAND	NBC SMOKE	VISIBILITY	400M-1000M	<400M						
GROUND	LAND	NBC SMOKE	INVERSION		INVERSION PRESENT						
GROUND	LAND	PERSONNEL	TEMPERATURE	neg 15F to -20F	< neg 15F						
GROUND	LAND	PERSONNEL	TEMPERATURE		>95F						
GROUND	LAND	PERSONNEL	PRECIPITATION	MODERATE (0.1	HEAVY (.0.3 in/hr)						
GROUND	AIRBORNE	PERSONNEL	WIND	13-15 KT	>18KTS						
GROUND	AIRBORNE	PERSONNEL	PRECIPITATION	LGT PRECIP	MDT PRECIP						
GROUND	HELO/REFUELING	FARP	THUNDERSTORMS	WITHIN 5-25NM	WINTHIN 5NM						
GROUND	LAND	ARMOR GUN SIGHTING	VISIBILITY	1000M-2000M	<1000M						
GROUND	AIRBORNE	PARADROP	SURFACE WIND	13-18 KT	> 18 KT						
GROUND	AIRBORNE	ARTILLERY	CEILING	600-1499FT	<600FT						
GROUND	AIRBORNE	ARTILLERY	VISIBILITY	1000-2999M	<1000M						
GROUND	AIRBORNE	ARTILLERY	WIND	30-35 KT	>35 KT						
GROUND	AIRBORNE	ARTILLERY	PRECIPITATION	MDT	HEAVY						
GROUND	AIRBORNE	AIR DEFENSE	CEILING	2500-4999FT	<2500FT						
GROUND	AIRBORNE	AIR DEFENSE	VISIBILITY		<5000M						
GROUND	AIRBORNE	AIR DEFENSE	TEMPERATURE		>120F						
GROUND	AIRBORNE	AIR DEFENSE	WIND	20-30 KT	>30KT						

Figure 38: Example Impacts on Operations: Spreadsheet Format

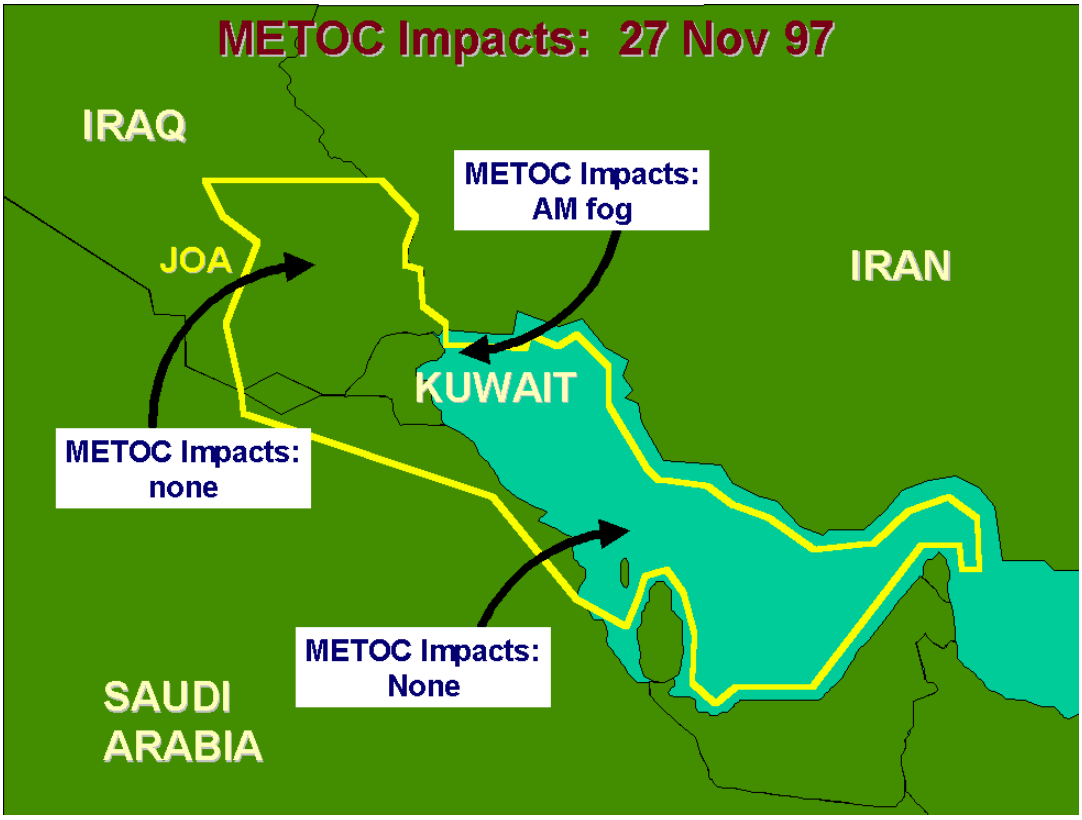

Figure 39: Example Impacts on Operations: Geographic Overlay

BEDDOWN FIELD CONDITIONS

24 Hour Forecast Predominant Conditions

CECIL FIELD	○	MACDILL	○
JACKSONVILLE	○	OPA LOCKA	○
EGLIN	○	HOMESTEAD	○
PATRICK	○	POPE	○
KEY WEST	○	BARKSDALE	○

○ VFR CONDITIONS

▨ IFR CONDITIONS

● BELOW FIELD MINS

Figure 40: Example Impacts on Operations: Beddown Conditions

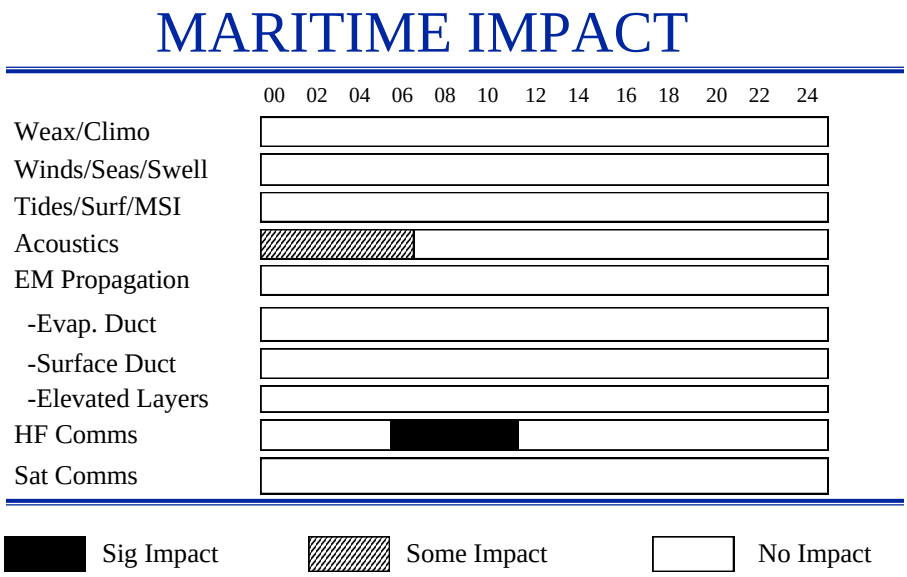

Figure 41: Example Impacts on Operations: Maritime

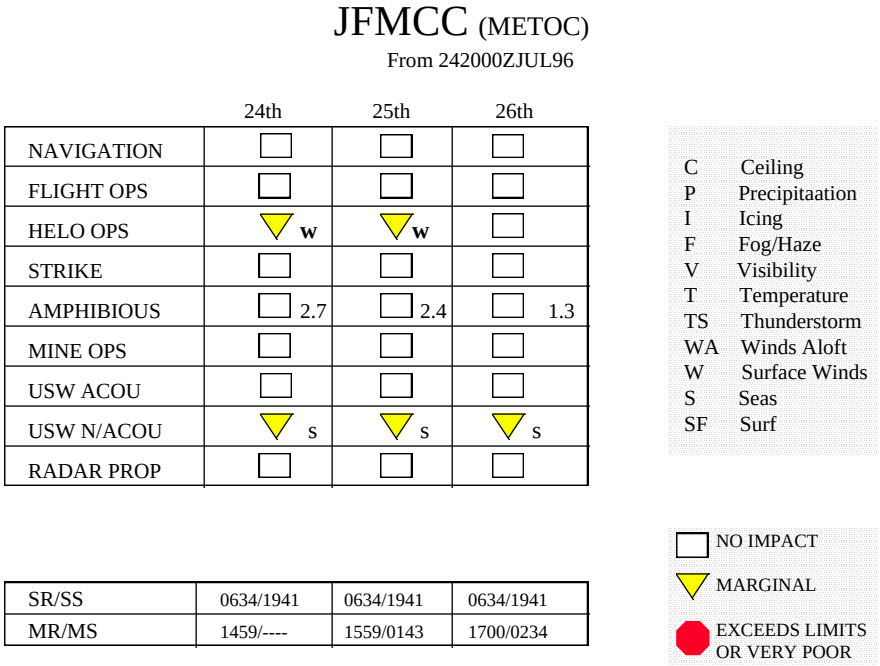

Figure 42: Example Impacts on Operations: JFMCC

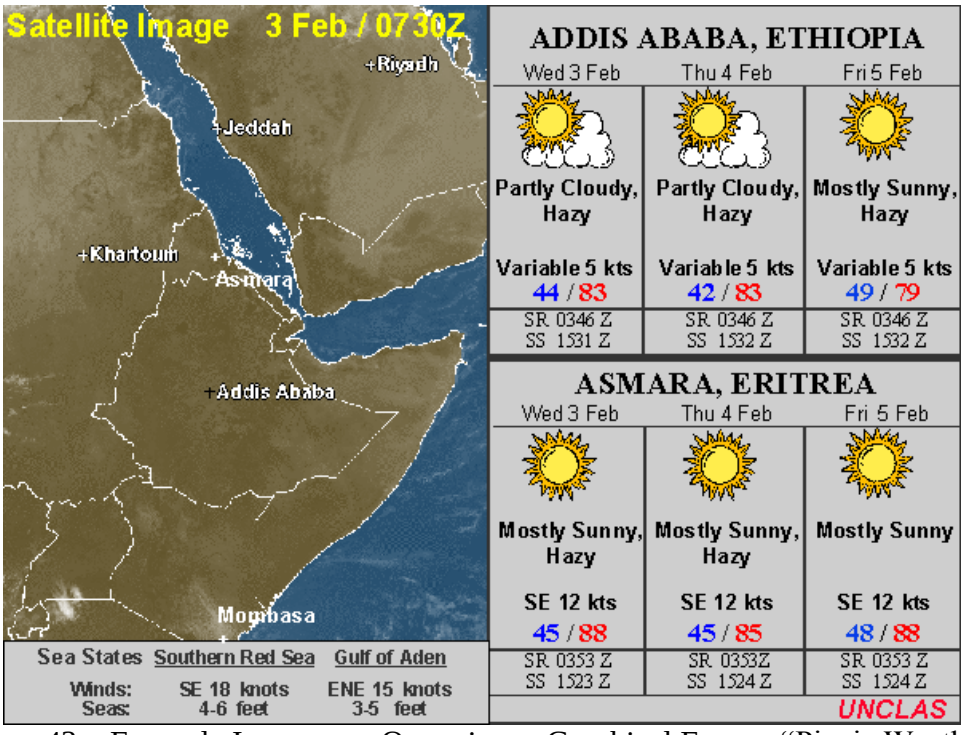

Figure 43: Example Impacts on Operations: Graphical Format "Picnic Weather"

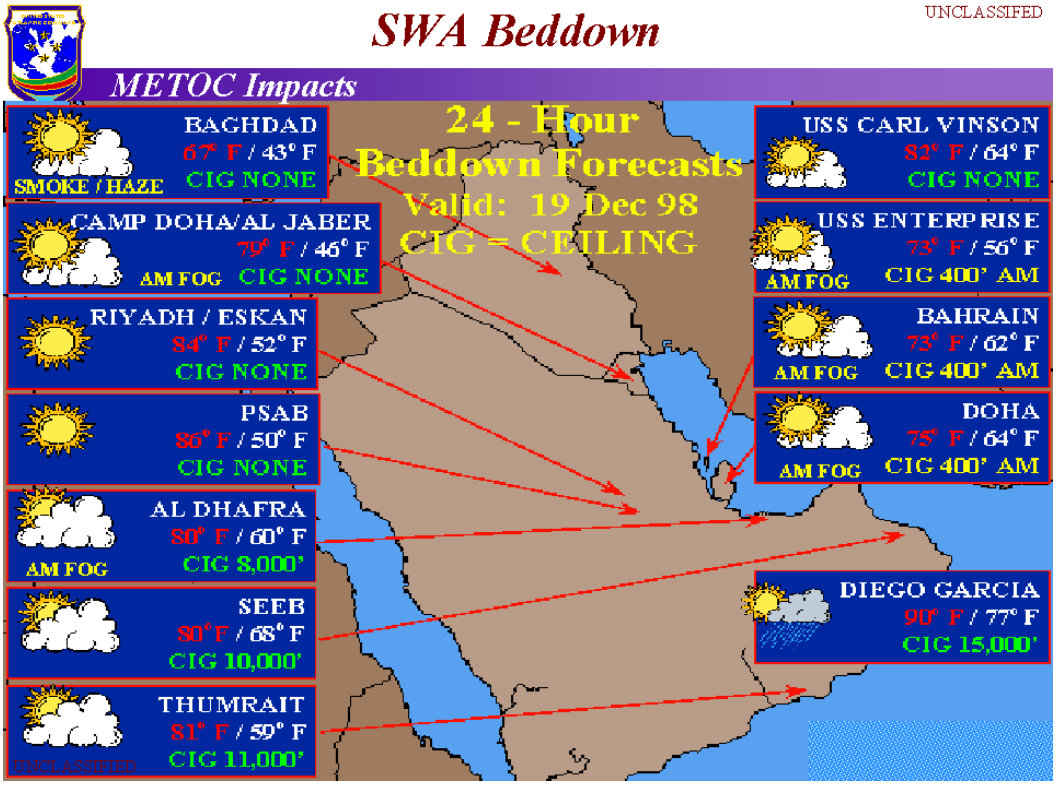

Figure 44: Example Impacts on Operations: Graphical Beddown

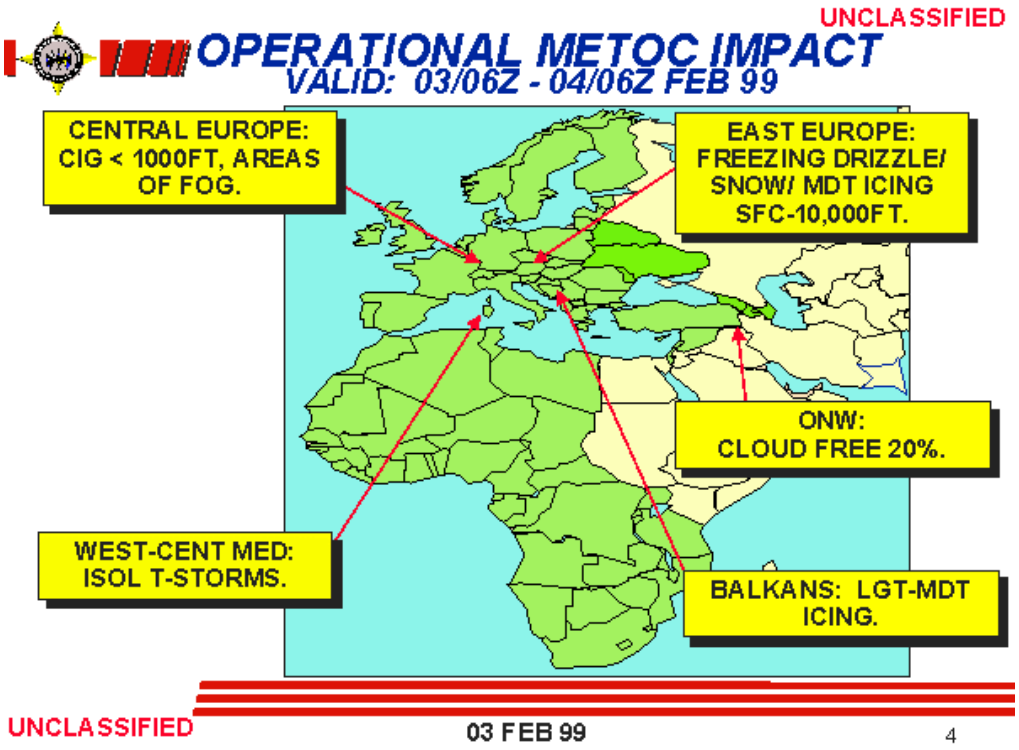

Figure 45: Example Impacts on Operations: Operational Level

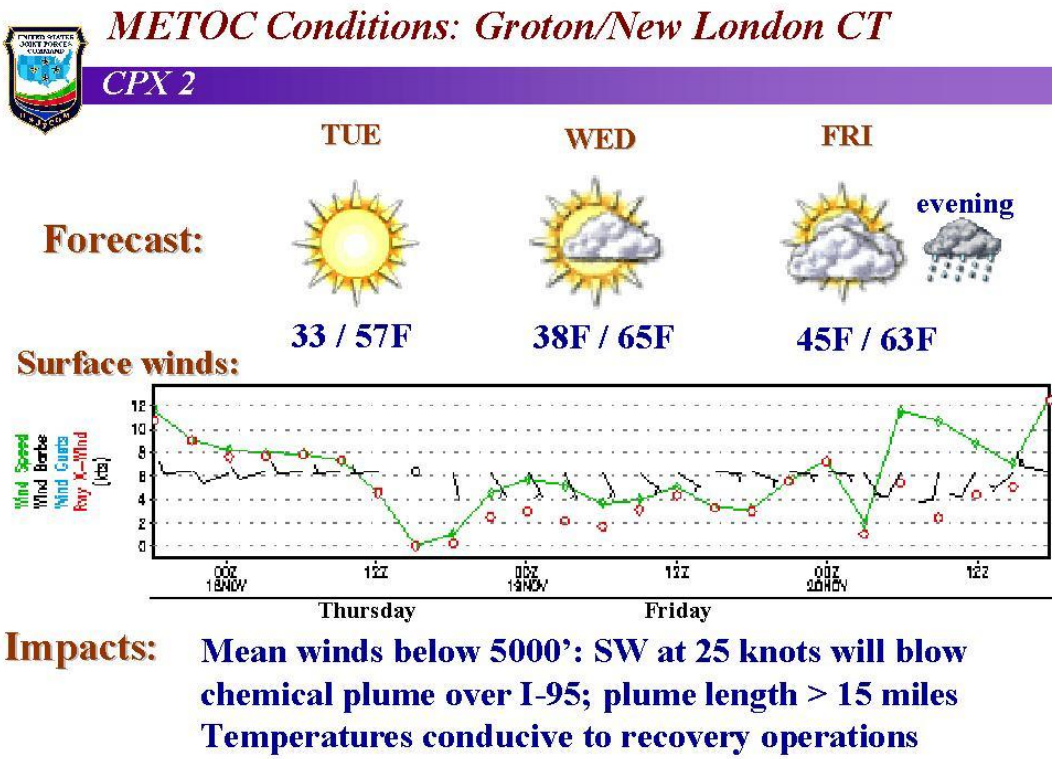

Figure 46: Example Impacts on Operations: Meteogram

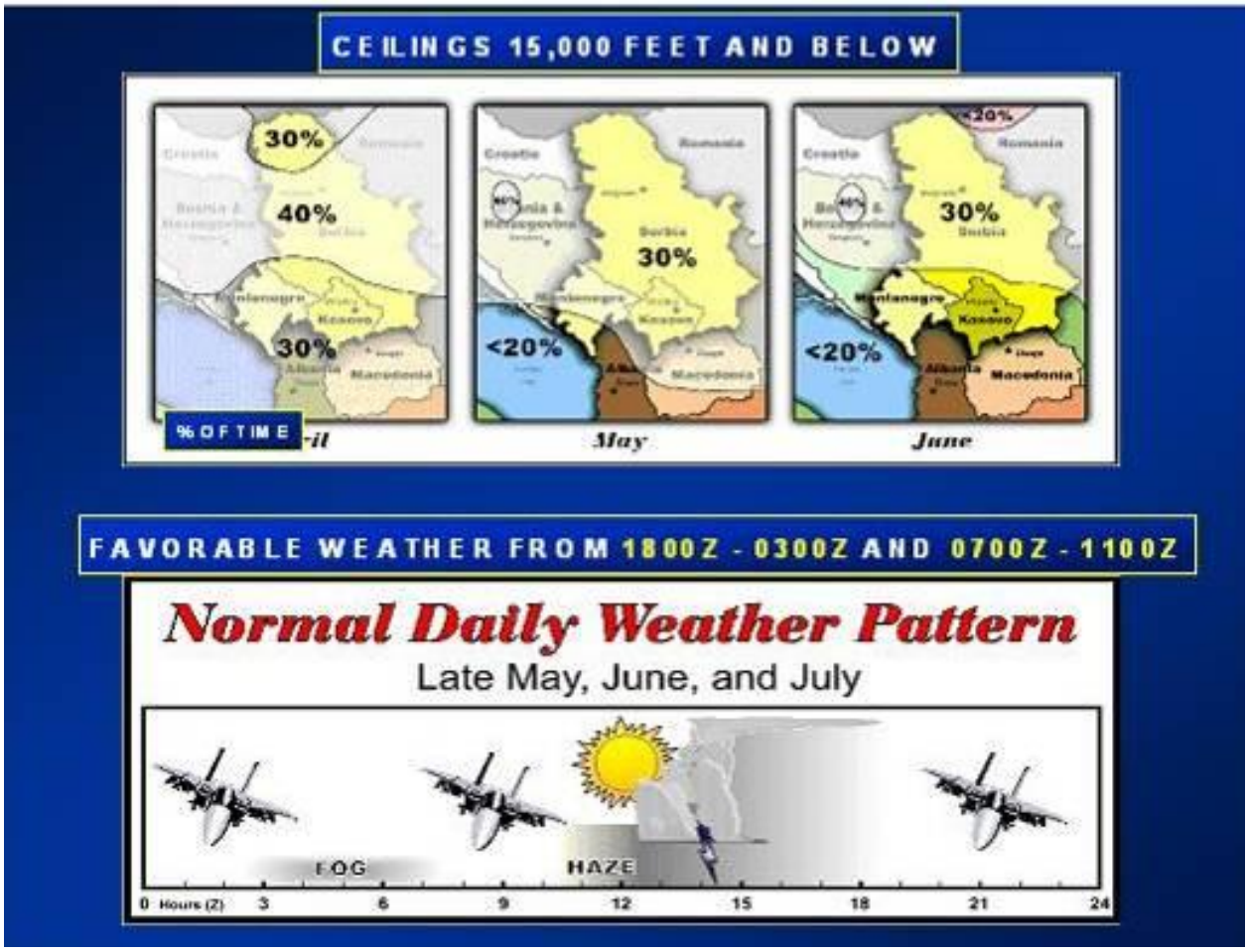

Figure 47: Example Impacts on Operations: Climate

12. METOC Impacts on Operations

a. METOC Thresholds: Characterizing Environmental Threats to Operations

Purpose: This appendix (chapter) provides a "starting point" list of UNCLASSIFIED critical METOC thresholds for typical operations (ground, air, naval, amphibious), various platforms, and weapons systems (see also JP 3-59, *Meteorological and Oceanographic Operations*, Appendix G).

Operational commanders combine weapon-system specific STAN/EVAL guidance, TTPs, operational lessons learned, and experience/skill level of their operators to assess, accept, and manage mission risk, which means that METOC critical thresholds will not always be the same for every mission, even within a single mission set. Therefore, this chapter is not an all-inclusive list, and should not be utilized as a sole-source document. During the planning phase of an exercise or operation, METOC personnel should start with these tables, but team with their operational customer to capture more specific threshold criteria peculiar to their operational customers' current mission profiles.

Joint missions are affected by a wide variety of METOC conditions, requiring operational commanders and mission planning experts to have a basic understanding of critical METOC thresholds in order to maximize mission effectiveness and personnel safety. By the same token, METOC experts must have a basic understanding of the missions they support in order to maximize injection of effective METOC threat information into the planning process. For this to be realized, METOC personnel must proactively integrate themselves into the operational planning process as early as possible. This will both expand METOC personnel mission expertise and enable mission planners to be alerted to pertinent METOC threats in sufficient time to mitigate them prior to execution, maximizing the likelihood of mission success.

Weather impacts/threats to operations are typically provided in "stoplight" format:

green	(Favorable)	minimal operational impacts
amber	(Marginal)	moderate operational impact
red	(Unfavorable)	severe operational impact

b. Tri-Service Integrated Weather Effects Decision Aid (T-IWEDA)

(1) T-IWEDA Background

T-IWEDA employs observed METOC impacts to military assets in the form of *rules*. These impacts are collected from service-specific field manuals, training centers and schools, as well as subject matter experts. T-IWEDA provides information (in the form of stoplight charts) concerning which weapon systems will work best under forecast METOC conditions; no information is provided concerning target acquisition range, as would be provided by USAF's Target Acquisition Weather Software (TAWS).

Services provide verified and validated rules for implementation into the Centralized Rules Data Base (CRDB).

T-IWEDA is fielded to the US Army, Navy and Air Force and provides METOC (focus on weather) impacts on military assets (missions, operations, systems, equipment, and resources/infrastructure) by comparing critical environmental thresholds (rules) against forecast values for environmental data parameters by way of an impact code.

Table 11: IWEDA Impact Code

IMPACT	CRITERIA
GREEN (Favorable)	Degradation < 25-30 % or Effectiveness > 70-75 %.
AMBER (Marginal)	Degradation = 25-30 % to 70-75 % or Effectiveness = 70-75 % to 25-30 %.
RED (Unfavorable)	Degradation > 70-75 % or Effectiveness < 25-30 %.

Notes:
GREEN = Favorable: little or no impact (little or no degradation; minimal operational impacts); weather has no restrictions; a GO decision.
AMBER = Marginal: marginal or moderate impact (some degradation; moderate operational impacts); weather degrades or limits (weather that is sufficiently adverse to a military operation so as to require the imposition of procedural limitations); either a GO/NO GO decision or GO with CAUTION decision. May require corrective/protective reaction or remedial action/procedure to mitigate or compensate for the impact/effect.
RED = Unfavorable: adverse or severe impact (significant degradation; severe operational impacts); weather prohibits (weather in which military operations are generally restricted or impeded); generally a NO GO decision (or GO with DANGER decision).

(2) T-IWEDA Availability

The CRDB is hosted on the AKO/DKO website, Unclassified FOUO (CRDB v09-05-27 (CRDB version 2.0) and AKO-S/DKO-S website, Classified SECRET CRDB-S v09-02-17 (CRDB-S version 1.0).
The CRDB and Rules Encoding Application (REA) are available at: https://www.us.army.mil/suite/page/494483

You must request permission from ARL to gain access. Follow the website instructions to request access, then download the zip file containing the CRDB & REA.

(3) T-IWEDA POCs

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Army Lead on Weather Impact Rules Development
(575) 678-0634; Richard.Szymber@us.army.mil ; rszymber@arl.army.mil

Dr. Richard Shirkey

Lead DoD Tri-Service IWEDA Consortium
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US Army Research Laboratory
CISD/Battlefield Environment Division
RDRL-CIE-M
White Sands Missile Range, NM 88002-5501

c. Special Operations Thresholds

The U.S. Special Operations Command (USSOCOM) publishes USSOCOM Manual 525-6, Critical Meteorological and Oceanographic thresholds for SOF Operations, 29 May 2009. The current version is on the USSOCOM SIPRNET homepage (http://sofrel.socom.smil.mil/sites/SOCS/SJS/FormsandPubs/Publications/Series%20525/M%20525-6.pdf).

METOC elements, critical thresholds, and impacts on operations are provided for the following areas:

- USASOC Critical METOC Thresholds
  - Army Special Operations Aviation/Airdrop
  - Surface Operations
  - Communications/Electro-Optical/Infrared Operations
  - Maritime/SCUBA/Swim Operations
  - Psychological Operations/Civil Affairs
- AFSOC Critical METOC Thresholds
  - MC-130E/H, Combat Talon I & II
  - MC-130P Combat Shadow
  - AC-130H/U Specter
  - C-130 Pathfinder
  - CASA 212
  - CV 22
  - PC12
  - MQ-1/MQ-9
- Airborne Operations: Personnel
- Airborne Operations: Equipment
- Naval Special Warfare Critical METOC Thresholds
  - Parachute Operations
  - Ground Operations
  - SEAL Delivery Vehicle (SDV) Operations
  - Combat Rubber Raiding Craft (CRRC):
  - Patrol Boat, Light (PBL)
  - Rigid hull inflatable boat (RHIB
  - MK V Special Operations Craft (MK V SOC)
  - Combat Swimmer Operations
  - Small Personnel Watercraft (Jet Ski type craft)

- Unmanned Aerial Vehicles (UAV)
- Unmanned Underwater Vehicles (UUV)
- Special Operations Craft – Riverine (SOC-R)
- Advanced SEAL Delivery System (ASDS)

d. The Maritime Domain

Physical METOC effects in the maritime domain include:

- Sea States
- Currents
- Tropical Storm Systems
- Acoustics (a function of temperature, pressure, and salinity)

The primary effect is clearly wind-driven sea state, which affects maritime maneuver, stability for launching and recovering aircraft, and stability for firing weapons.

Undersea warfare is primarily an acoustic problem. Sound speed is a function of temperature, pressure, and salinity. The vertical and horizontal description of the water column will define the motion (bending) of sound waves and is critical information in the placement of assets and sensors. Also important are ambient noise and bottom type.

Typical UNCLASSIFIED Thresholds for USN Operations
The following tables list typical METOC thresholds for Maritime Operations.

(1) Carrier Operations

Table 12: Typical UNCLAS METOC Impacts on Carrier Ops

Parameter	Favorable	Marginal	Unfavorable
Wave Height	< 7 ft	7 – 12 ft	> 12 ft
Surface Winds	< 20 kts	20 – 30 kts	> 30 kts
Visibility	> 3 nm	½ - 3 nm	< ½ nm
Ceilings	> 1500 ft	200 – 1500 ft	< 200 ft
Rainfall Rate	< .01 “/hr	.01 - .51 “/hr	> .51 “/hr
Lightning	> 5 nm	½ - 5 nm	< ½ nm
Temperature			> 90 or < 32 F

(2) Replenishment at Sea

Table 13: Typical UNCLAS METOC Impacts on RAS Ops

Parameter	Favorable	Marginal	Unfavorable
Wave Height	< 5 ft	5 – 9 ft	> 9 ft

Surface Winds	< 20 kts	20 – 30 kts	> 30 kts

(3) Amphibious Operations

Table 14: Typical UNCLAS METOC Impacts on Amphibious Ops

Parameter	Favorable	Marginal	Unfavorable
Wave Height	< 6 ft	7 – 8 ft	> 8 ft
Surface Winds	< 20 kts	20 – 30 kts	> 30 kts
Ceilings	> 3000 ft	1000 – 3000 ft	< 1000 ft
Thunderstorms	None		TSTMS w/in 3 nm
Currents			> 3 kts
Breaker Type	Spilling	Surging	Plunging (steep)
Temperature			> 90 or < 32 F

(4) LCAC Operations

Table 15: Typical UNCLAS METOC Impacts on LCAC Ops

Characteristics	Low	Medium	High
Surf	0 - 4 ft	4 – 8 ft	8 – 12 ft
Total Craft Weight	368,350 lb	338,250 lb	308,250 lb
Max Speed Approach	50 kts	30 kts	20 kts
Max Speed Departure	25 kts	20 kts	10 kts

(5) Minesweeper Aviation

Table 16: Typical UNCLAS METOC Impacts on Minesweeper Ops

Parameter	Favorable	Marginal	Unfavorable
Ceilings	> 1000 ft	300 – 1000 ft	< 300 ft
Visibility			> 1000 m
Surface Winds	< 25 kts	25 – 35 kts	> 35 kts

(6) Mine Warfare Explosive Ordance Disposal (EOD) Operations

Table 17: Typical UNCLAS METOC Impacts on Mine Warfare Ops

Parameter	Favorable	Marginal	Unfavorable
Currents	< 1 kt	1 – 2 kts	> 2 kts
Seas	< 3 ft	3 – 5 ft	> 5 ft

e. The Land Domain

(1) Personnel

A primary METOC impact in the land domain is on personnel. Parameters include:

- Temperature (extremes) and humidity
- Moderate or Greater Precipitation
- Winds (wind chill, blowing aerosols)
- Visibility
- Lightning
- Light Data
-

(2) Ground Maneuver

Expanding this to the METOC effects on Ground Maneuver, include:

- Surface temperature and precipitation (weather and terrain interaction – trafficability: can decrease maneuverability and transport)
- Winds and visibility; blowing snow and dust; snow depth
- Lightning
- Cumulative precipitation; floods and mud; snow melt
- Effects on armor/infantry weapons systems acquisition
- Concealment and camouflage impacts (green uniforms in snow…)
-

(3) Acoustics

Many new Army systems use microphone arrays to estimate target bearings. Atmospheric turbulence and fluctuations in winds, temperature and other factors can introduce error in estimating target bearings.

Acoustic detection range is affected by METOC as sound waves are refracted by wind and temperature gradients, reflected and absorbed by the ground, scattered by turbulence, and diffracted by terrain features.

(4) Engineering

For engineering operations, consider:

- Engineer ops are influenced by current environmental conditions, forecasted conditions and climatology.
- Climatology for construction projects
- Resource Protection
- Tides, river stages, water temperature
- Ice/snow thickness/depth and cover
- Daily weather for trafficability (mobility of equipment & personnel)

(5) CBRN

For CBRN operations, consider:

- CBRN ops have become increasingly reliant upon hazard-prediction modeling tools that ingest sensitive environmental data to rapidly assess the rate of atmospheric transport and dispersion (ATD) of chemical, biological, and nuclear fallout.

- The DoD-approved JWARN suite of CBRN hazard-prediction models (HPAC, VLSTRACK, ALOHA, and CAMEO) are valuable yet complex tools to understand and employ for event characterization, consequence assessment, and decision assistance for consequence management.

Three Critical Areas of Understanding (CAUs) required to ensure accurate CBRN model hazard prediction for initial consequence assessment:

- **CBRN source terms**—type, concentration, delivery method, yield, height of burst, time of release and/or detonation, etc.

- **ATD code**--idiosyncrasies of the physics in different CBRN hazard-prediction models chosen to characterize transport and dispersion for a particular CBRN event.

- **Meteorological input to the model—**according to DTRA, 80% of the uncertainty in determining how/where CBRN hazards will spread is due to weather. Therefore, the "right" type of meteorological input data is critical for an accurate model output. Unfortunately, the "right" type of meteorological input data is different for every type of CBRN event. Nuclear, chemical, and biological dispersion are each driven differently than the other. Therefore, before trying to assess how/where the hazard is going to spread, it is critically important to match the correct type of meteorological input data to each CBRN event. Otherwise, garbage in = garbage out.

  Temperature and Atmospheric Stability also affect dispersion.

  Precipitation may affect aerosol washout.

  Humidity and sunlight affect both biological and chemical agents.

  But let's consider "winds" for a moment.

  Nuclear event: wind speed and direction at the steering level of a stabilized mushroom cloud is a major fallout dispersion driver and good first indicator of the direction and speed with which the hazard will initially spread. If the yield of a surface-burst weapon is known, steering level wind heights can be estimated using Figure 48 from Samuel Glasstone's and Phillip J. Dolan's *The Effects of Nuclear Weapons, Third Edition*, 1977 (below).

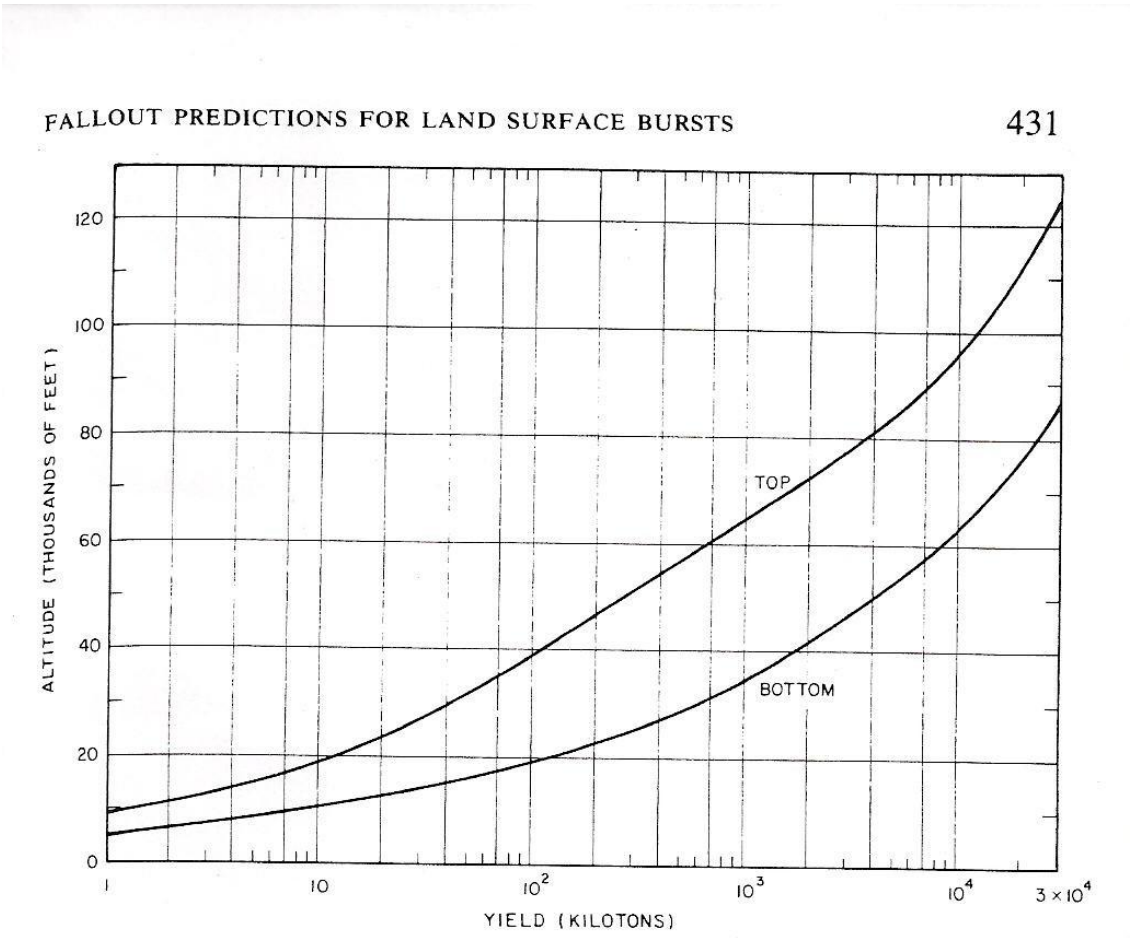

Figure 48: Altitudes of the stabilized cloud top and cloud bottom as a function of total energy yield for surface or low air bursts.

However, winds from steering level to the surface will all play a part in driving downstream fallout dispersion until approximately 99% of the resultant fallout has reached the ground within the first 48 hours. Therefore, multi-level global gridded atmospheric data is usually more representative for determining fallout dispersion than a fixed steering-level wind as indicated by Figures 49 and 50, also from *The Effects of Nuclear Weapons*, 1977 (below).

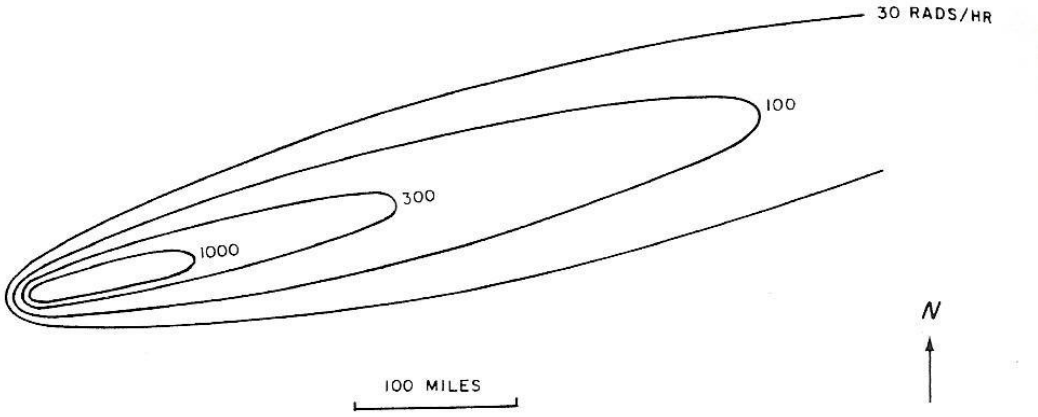

Figure 49: Idealized unit-time reference dose-rate contours for a 10-megaton, 50-percent fission, surface burst (30 mph effective wind speed).

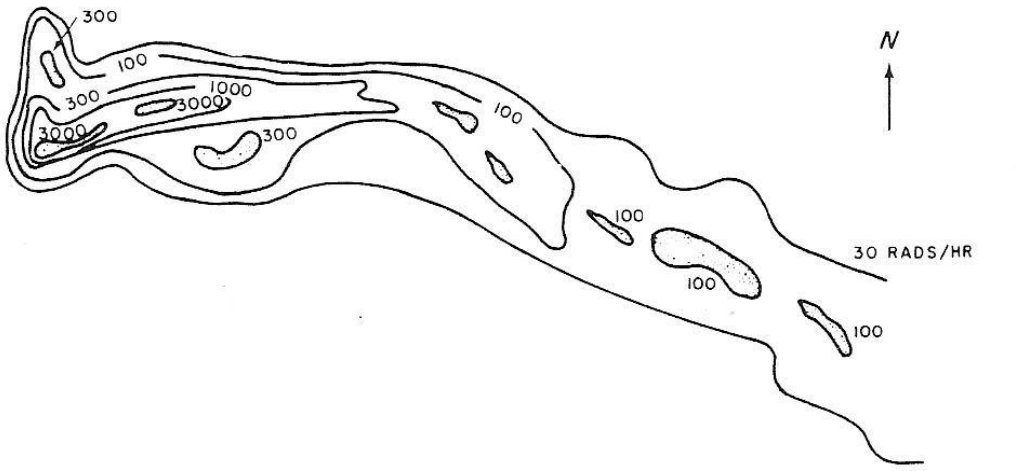

Figure 50: Corresponding actual dose-rate contours (hypothetical).

Chemical event: Boundary layer winds/terrain are usually more representative for determining dispersion of this type.

Biological event: Winds play a part in dispersion, but the "human vector/carrier" can add a frustrating amount of uncertainty in determining dispersion/spread of this type of contaminant.

If you are not proficient in the 3 CAUs for a particular CBRN event, you can contact DTRA Reachback to submit RFIs, request CBRN modeling support, or coordinate CBRN-related weather issues.

DTRA 24-hour contact DSN 427-3445 / comm (703) 767-3445
DTRA's AF Weather representative: DSN 427-3024
Email: REACHBACK@cnttr.dtra.mil; REACHBACK@cnttr.dtra.smil.mil

For further information on technical reachback capabilities, see Chapter 3 of **AFTTP3-2.56,** ***Multiservice Tactics, Techniques, and Procedures for Chemical, Biological, Radiological, and Nuclear Contamination Avoidance.***

(6) Artillery

The greatest improvements in artillery accuracy can be achieved by reducing METOC-induced errors - winds (speed and direction) along trajectory as well as pressure, humidity and temperature (air density) for ballistic calculations.

Table 18: Typical UNCLAS METOC Impacts to Army Operations

OPERATION	FAVORABLE (No Degradation)	MARGINAL (Some Degradation)	UNFAVORABLE (Significant Degradation)
AIR ASSAULT	CIG > 1000 FT	CIG 300 - 1000 FT	CIG < 300 FT
	VIS > 5500 METERS	VIS 900 - 5500 METERS	VIS < 900 METERS
	WIND < 25 KTS	WIND 25 - 40 KTS	WIND > 40 KTS
AIR ASSAULT (FLT LVL < 3000 FT)	NO TURB / ICG	LGT - MDT TURB / ICG	SVR TURB / ICG
BRIDGING	WIND < 10 KTS	WIND 10 - 34 KTS	WIND > 34 KTS
ARMOR GUN SIGHTS	VIS > 2000 METERS	VIS 1000 - 2000 METERS	VIS < 1000 METERS
TOW MISSILE	VIS > 3000 METERS	VIS 2000 - 3000 METERS	VIS < 2000 METERS
HELO LIFT (NO SPECIFIC AIRFRAME)	CIG > 500 FT	CIG 300 - 500 FT	CIG < 300 FT
	VIS > 1600 METERS	VIS 800 - 1600 METERS	VIS < 800 METERS
HELO LIFT (FLT LVL < 10000 FT)	NO TURB / ICG	LGT - MDT TURB / ICG	SVR TURB / ICG
	CIG > 2600 FT	CIG 1100 - 2600 FT	CIG < 1100 FT

HELO ATTACK (NO SPECIFIC AIRFRAME)	**VIS > 4000 METERS**	**VIS 1000 - 4000 METERS**	**VIS < 1000 METERS**
	WIND < 25 KTS	**WIND 25 - 40 KTS**	**WIND > 40 KTS**
			TEMP > 90 F
	NO PRECIP	**MDT PRECIP**	**HVY PRECIP**
	NO TSTMS	**FEW TSTMS**	**SCT TSTMS**
HELLFIRE	**CIG > 2000 FT**	**CIG 800 - 2000 FT**	**CIG < 800 FT**
	VIS > 5000 METERS	**VIS 3000 - 5000 METERS**	**VIS < 3000 METERS**
CAS (FOR ARMY PLANNING PURPOSES)	**CIG > 2000 FT**	**CIG 1000 - 2000 FT**	**CIG < 1000 FT**
	VIS > 8000 METERS	**VIS 3200 - 8000 METERS**	**VIS < 3200 METERS**
STRAT RECON	**VIS > 8000 METERS**	**VIS 4800 - 8000 METERS**	**VIS < 4800 METERS**
STRAT RECON (FLT LEVEL > 25000 FT)	**CLD COVER: SKC OR FEW**	**CLD COVER: SCT**	**CLD COVER: BKN OR OVC**
HIGH RECON	**VIS > 8000 METERS**	**VIS 4800 - 8000 METERS**	**VIS < 4800 METERS**
HIGH RECON (FLT LEVEL > 8000 FT)	**CLD COVER: SKC OR FEW**	**CLD COVER: SCT**	**CLD COVER: BKN OR OVC**
LOW RECON	**VIS > 8000 METERS**	**VIS 4800 - 8000 METERS**	**VIS < 4800 METERS**
LOW RECON (FLT LEVEL > 3000 FT)	**CLD COVER: SKC OR FEW**	**CLD COVER: SCT**	**CLD COVER: BKN OR OVC**
GROUND RECCE	**VIS > 3000 METERS**	**VIS 1000 - 3000 METERS**	**VIS < 1000 METERS**
AIRBORNE	**WIND < 13 KTS**	**WIND 13 - 18 KTS**	**WIND > 18 KTS**
			CIG < 1000 FT
	NO PRECIP	**LGT PRECIP**	**MDT - HVY PRECIP**
	DA < 4000 FT	**DA 4000 - 6900 FT**	**DA > 6900 FT**
NBC OPS		**WIND < 10 KTS**	**WIND > 30 KTS**
			WIND CALM
			WIND FROM ENEMY

	NO PRECIP	**LGT PRECIP**	**MDT - HVY PRECIP**
	STABLE ATMOSPHERE	**NEUTRAL ATMOSPHERE**	**UNSTABLE ATMOSPHERE**
SMOKE		**WIND 5 - 10 KTS**	**WIND < 5 KTS**
			WIND > 19 KTS
			TEMP > 120 F
			WIND FROM ENEMY
	NO PRECIP	**MDT PRECIP**	**HVY PRECIP**
PERSONNEL	**NO PRECIP**	**LGT PRECIP**	**MDT - HVY PRECIP**
(TEMP - HEAT AND/OR WINDCHILL INDICES)	**TEMP 20 - 85 F**	**TEMP -15 - 20 F**	**TEMP < -15 F**
		TEMP 85 - 95 F	**TEMP > 95 F**
LOCK ON BEFORE LAUNCH	**CIG > 1900 FT**	**CIG 400 - 1900 FT**	**CIG < 400 FT**
	VIS > 7000 METERS	**VIS 500 - 7000 METERS**	**VIS < 500 METERS**
LOCK ON AFTER LAUNCH	**CIG > 1700 FT**	**CIG 800 - 1700 FT**	**CIG < 800 FT**
	VIS > 7000 METERS	**VIS 1700 - 7000 METERS**	**VIS < 1700 METERS**
COPPERHEAD	**CIG > 3000 FT**	**CIG 1000 - 3000 FT**	**CIG < 1000 FT**
	VIS > 2500 METERS	**VIS 1000 - 2500 METERS**	**VIS < 1000 METERS**
	NO PRECIP	**LGT - MDT PRECIP**	**HVY PRECIP**
SEA PORTS	**WIND < 20 KTS**	**WIND 20 - 35 KTS**	**WIND > 35 KTS**
AIR PORTS	**CIG > 1500 FT**	**CIG 200 - 1500 FT**	**CIG < 200 FT**
	VIS > 4800 METERS	**VIS 900 - 4800 METERS**	**VIS < 900 METERS**
AIR DEFENSE	**CIG > 5000 FT**	**CIG 2500 - 5000 FT**	**CIG < 2500 FT**
	VIS >= 5000 METERS	**VIS < 5000 METERS**	
			TEMP > 120 F
ARTILLERY	**CIG > 1500 FT**	**CIG 600 - 1500**	**CIG < 600 FT**

FIRES		FT	
	VIS > 3000 METERS	VIS 1000 - 3000 METERS	VIS < 1000 METERS
	WIND < 30 KTS	WIND 30 - 35 KTS	WIND > 35 KTS
ARTILLERY FIRES			TEMP < 20 F
			TEMP > 125 F
	NO - LGT PRECIP	MDT PRECIP	HVY PRECIP
SIGINT	WIND < 30 KTS	WIND 30 - 45 KTS	WIND > 45 KTS
		TEMP 85 - 120 F	TEMP < 32 F
			TEMP > 120 F
TRAFFICABILITY	NO PRECIP	LGT - MDT PRECIP	HVY PRECIP
HUNTER UAV	CIG > 6000 FT	CIG 4000 - 6000 FT	CIG < 4000 FT
	VIS > 8000 METERS	VIS 5000 - 8000 METERS	VIS < 5000 METERS
	SFC WIND <= 15 KTS		SFC WIND > 15 KTS
	TEMP 25 - 125 F		TEMP < 25 F
			TEMP > 125 F
	NO PRECIP	LGT PRECIP	MDT - HVY PRECIP
MANEUVER	DRY ROADS	WET ROADS	SNOW / ICE ON ROADS
	LGT PRECIP	MDT PRECIP	HVY PRECIP
	VIS > 3200 METERS	VIS 1000 - 3200 METERS	VIS < 1000 METERS
	CIG > 3000 FT	CIG 1000 - 3000 FT	CIG < 1000 FT
	WIND < 20 KTS	WIND 20 - 30 KTS	WIND > 30 KTS
AH-64 ENROUTE	WIND < 25 KTS	WIND 25 - 30 KTS	WIND > 30 KTS
	CIG > 700 FT	CIG 500 - 700 FT	CIG < 500 FT
	VIS > 3200 METERS	VIS 1600 - 3200 METERS	VIS < 1600 METERS
AH-64 ATTACK	WIND < 10 KTS	WIND 10 - 25 KTS	WIND > 25 KTS
	VIS > 4800 METERS	VIS 3200 - 4800 METERS	VIS < 3200 METERS

f. The Air Domain

Sensible weather in the air domain can impact military operations of all Services. Some specific parameters and their impacts follow:

(1) Upper Level & Surface Winds

Operations:

- Airdrops/Paradrops /Paratroop Ops
- Optimal Flight Levels (fuel use/efficiency)
- SAR (pilot ejection/recovery)
- CBRN plume dispersion
- Low Level Wind Shear
- Cross Winds (Take off/Landing, UAS/UAV)

Threshold Examples

- Jump Threshold: Sfc Winds >13 KT Land (AF); 17 KT water
- LLWS > +/-20 KT/2000 feet
- F-15 T/O threshold: >25 KT cross wind on wet runway

(2) Icing

Icing destroys smooth flow of air, increases drag, degrades control, and decreases the ability of an airfoil to lift. There are three meteorological factors in icing:

- cloud liquid water
- droplet size
- air temperature (highest risk 0 to -20 F)

There are two basic types of icing: Clear & Rime (mixed) and there are three categories of ice based on accumulation rate: light/Moderate/Severe.

Table 19: Intensities of Aircraft Icing

INTENSITY	CRITERIA
Trace	Icing becomes perceptible. Rate of accumulation is slightly greater than rate of sublimation. It is not hazardous even though de-icing/anti-icing equipment is not used, unless encountered for an extended period of time (over 1 hour).
Light	The rate of accumulation may create a problem if flight is prolonged in this environment (over 1 hour). Occasional use of de-icing/anti-icing equipment removes accumulation. It does not present a problem if equipment is used.
Moderate	The rate of accumulation is such that even short encounters become potentially hazardous, and use of de-icing/anti-icing equipment or diversion i necessary.
Severe	The rate of accumulation is such that de-icing/anti-icing equipment fails to reduce or control the hazard. Immediate diversion is necessary.

Table 20: Icing Severity Conditions

INTENSITY	CRITERIA
Trace	Liquid Water Content < 0.25 grams per cubic meter
Light	Liquid Water Content = 0.25 to 0.5 grams per cubic meter
Moderate	Liquid Water Content = 0.5 to 1.0 grams per cubic meter
Severe/Heavy	Liquid Water Content > 1.0 grams per cubic meter

Note: When the ambient air temperature is 39°F (4°C) or below and visible liquid moisture is present, icing may occur.

Sample Impacts:
- Aircraft de-icing capabilities (all not created equal)
- UAV/UAS (most have 'no icing' threshold)

(3) Turbulence

Turbulence is abrupt or irregular movement of air that creates sharp, quick updrafts or downdrafts.

There are two types of turbulence:
- Convective - Due to surface heating
- Mechanical - Due to vertical or horizontal shear

There are four categories of turbulence:

Table 21: Intensity of Turbulence (Aircraft)

INTENSITY	CRITERIA
Light	Wind Speed Fluctuations = 5 to 15 knots and Gust Velocities = 5 to 20 feet per second.
Moderate	Wind Speed Fluctuations = 15 to 25 knots and Gust Velocities = 20 to 35 feet per second.
Severe	Wind Speed Fluctuations > 25 knots and Gust Velocities = 35 to 50 feet per second.
Extreme	Wind Speed Fluctuations > 25 knots and Gust Velocities > 50 feet per second

Note: Forecasts of turbulence intensity for Category II aircraft (forecast turbulence is ½ an intensity level higher for Category I aircraft). Turbulence reported must be extrapolated for the category of aircraft to which the forecast applies (i.e., turbulence forecasts used for the operation of CAT I aircraft should be reported as CAT I extrapolated from CAT II). The three main types of turbulence are mechanical, mountain wave, and clear air turbulence.

Table 22: This is Table 2.5 from AFWA/TN-98/002 (rev 31 March 2008)

Military Aircraft Turbulence Categories	
Aircraft Type	**Turbulence Category**
OH-58 UH-1 AH-1	I
AH-64 B-52H C-37 C-130 C-141 C-20 C-12 C-5A/B C-9A/C CH-47 CT-43A E-3B E-4B F-15 F-16 KC-135 RAH-66 T-1A T-6 T-38 T-43A U-25 U-21 H-3 H-69	II
A-10 C-17A C-21A C-32A/B EA-6B F-117A F-14 (wings unswept) F-18 KC-10 RQ-1A (see note 4 below) RQ-4A T-37 UV-18A/B	III
B-1B (wings swept and unswept) B-2A F-14 (wings swept) F-22 V-22	IV
Civilian Aircraft Turbulence Categories	
Aircraft Type	**Turbulence Category**
A-319 A-320 A-321 A-300 A-340 (200 - 300) A-340 (500-600) B-737 (600 - 900) B-747 B-777 C-208 CRJ DHC-6	II
B-737-200 B-757 B-767 E-145 LJ-25 LJ-35 LJ-60 MD-11	III
*Note 1: Turbulence categories for aircraft with auto gust alleviation systems may not be accurately depicted by the above table. *Note 2: An aircraft's weight, airspeed, and/or altitude may change its turbulence category from its default value. *Note 3: M/RQ-1 is CAT III in strong wind and mountain wave environments, but CAT I in proximity to strong wind directional shear or operating near the LCL.	

Table 23: Turbulence intensities for different categories of aircraft (based on Table 2.5 from AFWA/TN-98/002 (rev 31 March 2008)

	I	II	III	IV
	N	N	N	N
	(L)	N	N	N
	L	(L)	N	N
	L-(M)	L	(L)	N
Turbulence	M	L-(M)	L	(L)
Reported As	M-(S)	M	L-(M)	L
	S	M-(S)	M	L-(M)
	S-(X)	S	M-(S)	M
	X	S-(X)	S	M-(S)
	X	X	S-(X)	S
	X	X	X	S-(X)
	X	X	X	X

N = None ( ) = Occasional (less than 1/3 of the time)
L = Light M = Moderate S = Severe X = Extreme

Note: Use caution when converting extreme turbulence reports between various aircraft types. Extreme turbulence causes a range of effects from a minimum threshold (rapid airspeed fluctuations greater than 25 knots) to a maximum threshold (structural damage). Even though the table considers this, the design is more for the sake of "completeness" rather than observational or scientific evidence.

Sample Impacts:
- Aerial Refueling
- UAS/UAV
- Strike/CAS (lock-on)
- Low-level (mountain-wave turbulence)

(4) Cloud Cover/Ceilings and In-Cloud/Surface Visibility

Cloud Cover/Ceilings and In-Cloud/Surface Visibility affects operations:
- Launch and Recovery
- Strike/CAS
- UAV
- Aerial refueling
- Airdrops/Paradrops (DZ identification)

Example Thresholds - Launch/Recovery:
- Airfield minimums vary by pilot category (AF)
  - 700/2
  - 500/1 ½
  - 300/1
  - 200/ ½

Example Thresholds – Refueling:
- In flight vis of 1 NM

(5) Solar/Lunar

Solar/Lunar states affect operations:
- General Flight Ops
- NVG Ops
- Moonlight/star/city illlumination
- Strike/CAS (PGM selection & silhouetting)

Threshold Example
- NVGs: > 2.5 millilux illumination

(6) Temperature/Relative & Absolute Humidity

Temperature/Relative & Absolute Humidity affect operations:
- General Flight Ops (Density Altitude/DA)
- Strike/ISR (Contrail formation) [-35F or below]
- Airdrops/Paradrops
- Strike/CAS (PGM impacts)
- Radar performance (temperature inversion)

Threshold Examples

- IR PGMs: Abs Humidity >18 g/m3
- Temperature of target/background ('crossover')
- DA: hot/humid conditions limit aircraft take off weight

(7) Precipitation/Thunderstorms

Precipitation/Thunderstorms affect operations:

- General Flight Ops
- Strike/CAS
- UAV/UAS
- Aerial/Ground
- Refueling
- Weapons onload

Threshold Example

- IR PGMs – moderate or greater precipitation

Typical UNCLASSIFIED Thresholds for USAF Operations

Table 24: Typical UNCLAS METOC Impacts on USAF Operations

OPERATION	FAVORABLE (No Degradation)	MARGINAL (Some Degradation)	UNFAVORABLE (Significant Degradation)
(NO SPECIFIC AIRFRAME)	TURBC = None	TURBC >= LGT-MDT	TURBC >= SVR
FLIGHT OPERATIONS (Close Air Support, Deep Attack, and/or Air Interdiction; No Specific Airframe)	CIG > 3,500 feet	CIG <= 3,500 feet	CIG < 1,000 feet
	VIS > 3,200 meters	VIS <= 3,200 meters	VIS < 1,600 meters
	WIND < 25 knots	WIND >= 25 knots	WIND > 35 knots
	TURBC = None	TURBC = LGT - MDT	TURBC >= SVR
A-10 CAS	CIG > 2000 FT	CIG 1000 - 2000 FT	CIG < 1000 FT
	VIS > 9000 METERS	VIS 3600 - 9000 METERS	VIS < 3600 METERS
ELECTRO OPTIC SUPPORT	CIG = CLR	CIG = BKN	CIG = OVC
(Absolute Humidity Limitations)	< 14 g/m3	14-18 g/m3	> 18 g/m3
(Transmittance)	> 0.4	0.2-0.4	< 0.2
(Moon Illumination)		Moonrise/Moonset	No Moon
(no specific system)			HVY PRECIP
PREDATOR	CIG > 2000 FT	CIG 800 - 2000 FT	CIG < 800 FT
	VIS > 4800 METERS	VIS 3200 - 4800 METERS	VIS < 3200 METERS

	XWIND < 10 KTS	XWIND 10 - 15 KTS	XWIND > 15 KTS
AIR REFUELING (No Specific Airframe)	Clouds (at flight level) >= Clear	Clouds (at flight level) >= Scattered - Broken	Clouds (at flight level) = Overcast
	TSTMS <= Isolated	TSTMS = Few	TSTMS >= Scattered
	TSTMS = None within 25 nm	TSTMS = Any within 25 nm	TSTMS = Any within 10 nm
	VIS (at flight level) >= 6 nm	VIS (at flight level) < 6 nm	VIS (at flight level) <= 1 nm
	TURBC = None	TURBC = LGT	TURBC >= MDT
	ICING <= Trace	ICING = LGT	ICING >= MDT
AIRLIFT (No Specific Airframe)	CIG > 1,000 FT	CIG <= 1,000 FT	CIG < 500 FT
	VIS > 8,000 M	VIS <= 8,000 M	VIS < 4,800 M
	ICING <= LGT	ICING = MDT	ICING = SVR
	TURBC <= LGT	TURBC = MDT	TURBC >= SVR
	FZPRECIP >= None	FZPRECIP = Light	FZPRECIP = Any which closes runway
			FZPRECIP > Light
AIRLIFT (C-17)			XWIND > 30 KTS (DRY RWY)
			XWIND > 25 KTS (WET RWY)
			HEADWIND > 40 KTS
			TAILWIND > 10 KTS
AIRLIFT (C-130)	CIG > 3000 FT	CIG 1500 - 3000 FT	CIG < 1500 FT
	VIS > 8000 METERS	VIS 4800 - 8000 METERS	VIS < 4800 METERS
			XWIND > 35 KTS (DRY RWY)
			XWIND > 27 KTS (WET RWY w/ max load)
AIRLIFT (C-5)			XWIND > 20 KTS (DRY RWY)
			XWND > 17 KTS (WET)
			HEADWIND > 50 KTS
			TAILWIND > 10 KTS

g. Operational Application of Critical METOC Thresholds

These threshold criteria are very useful for putting weather effects into mission-specific context for an operational customer. Every effort should be made to present environmental threats in a

format which maximizes clarity of impacts to operations and minimizes "weather-speak." The following are a few examples:

EXAMPLE 1: Figure 51 is a course of action (COA) decision matrix prepared by an OEF-TS JMO at SOCEUR to help identify the optimum time of year to send a team down to Niger to provide Intelligence training and equipment for host-nation forces.

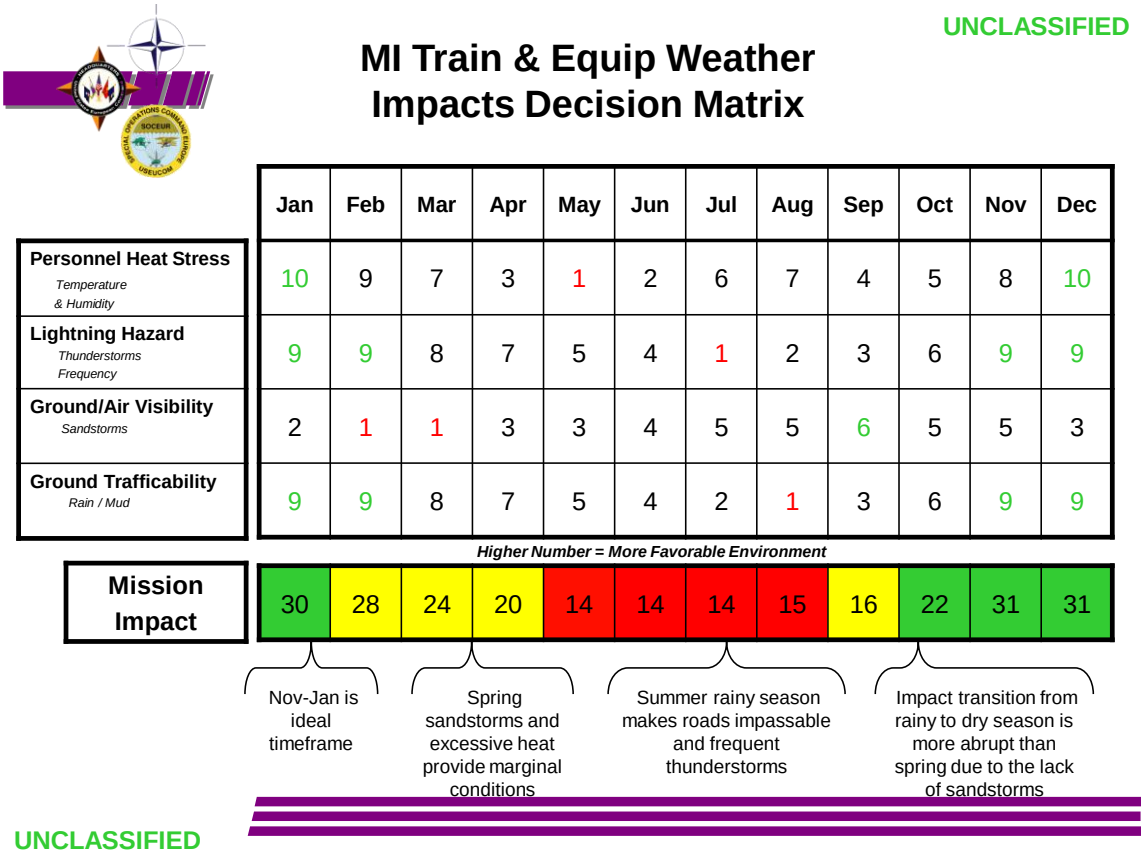

Figure 51: Example course of action (COA) decision matrix

Specific METOC criteria determined to be limiting planning factors are identified on the left column and the months being considered appear across the top row. Weighted scores for each environmental limiting factor are totaled for each month in the mission impact row at the bottom of the matrix, and a red/yellow/green color scheme is used to rank the months from most favorable (green) to least favorable (red).

A more typical application of this matrix could have the columns represent COAs rather than months of the year to help identify the best COA for a particular operation based upon the environmental threat analysis. The bottom line is to provide the Joint Operational Planning Process with a "de-geeked" weather impacts tool to facilitate an objective assessment that optimizes COA selection.

Example 2: Figure 52 is an example of a long-range planning tool tailored to specific aircraft thresholds. The tool aids deliberate and crisis action planners in determining an airfield's

viability as an aircraft beddown location for sustaining long-term flight operations. It can also be used to optimize mission flow around historically no-go weather times.

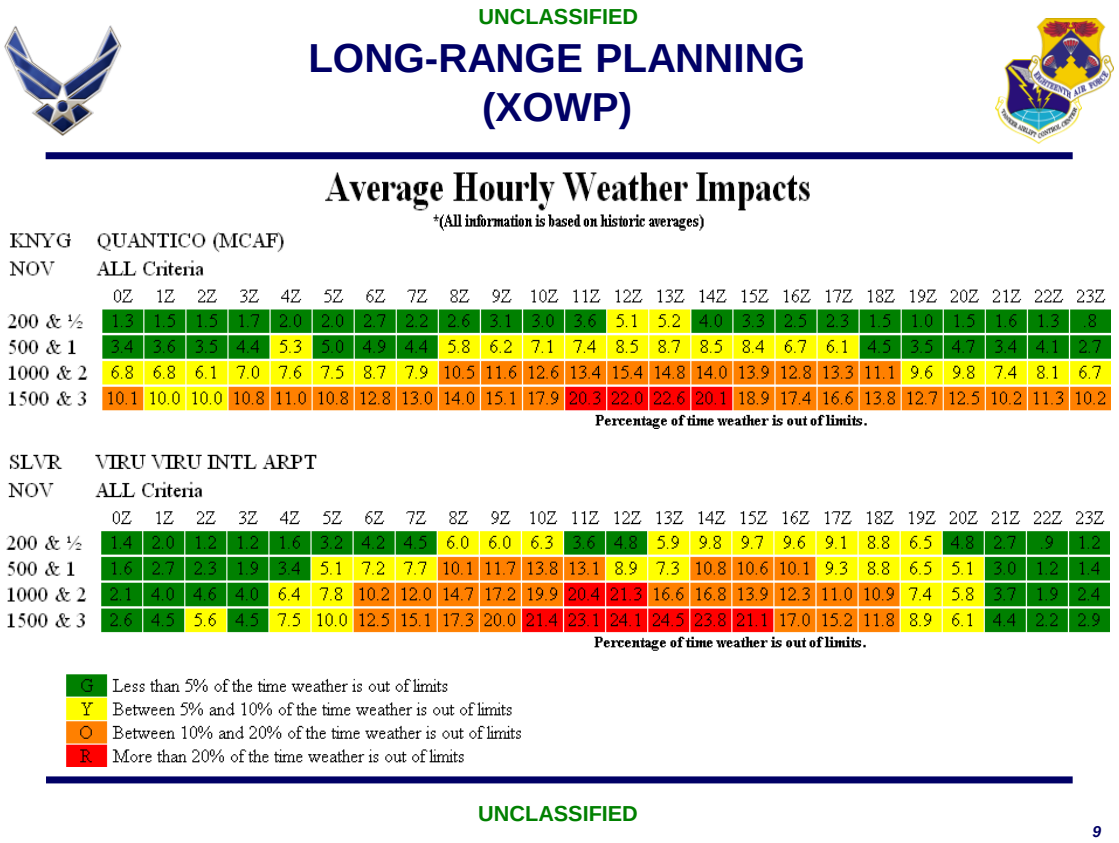

Figure 52: Long-range planning matrix example

Example 3: In September 2005, Hurricane Rita came into the Gulf of Mexico hot on the heels of the recent devastation wrought by Hurricane Katrina, necessitating the first pre-landfall hurricane aeromedical evacuation in history. Tanker Airlift Control Center (TACC) Weather Directorate personnel warned TACC/CC and Rita evac planners early in the planning process that pre-landfall crosswinds, not landfall itself, would be the major threat to AMC C-5s, C-17s, and C-130s being considered for flow into Beaumont TX and Chennault LA to evacuate approximately 1,170 litter patients. The concern was that though aircraft might get into the airfields, the early onset of strong crosswinds ahead of Hurricane Rita might trap aircraft on the ground with their precious cargo.

Based on this information, TACC/CC directed planners to plan the entire aeromedical evacuation around TACC/XOW's assessment that target-area crosswinds would be out of limits for all available air frames by 23/1600Z (see Figure 53; by this time in the mission planning process, C-130s and C-17s were no longer available for allocation to this mission, so C-5s had to be chose for the operation).

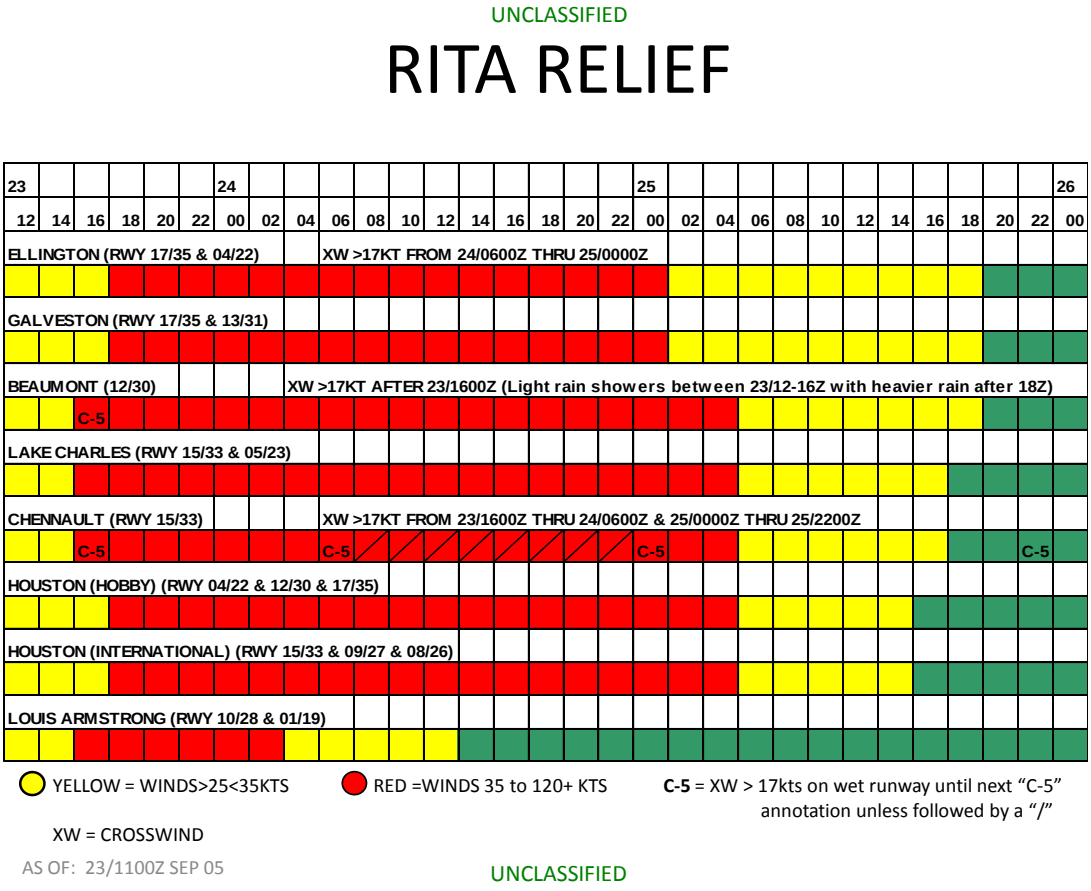

Figure 53: Aeromedical evacuation decision aid

TACC/XOW updated this product every 12 hours during initial planning, every six hours inside 36 hours from execution, every 3 hours within 24 hours of execution and then tracked real-time sustained and gust crosswind observations for the TACC Senior Controller to verify crosswind threat assessments were still on track and to make certain the window for safe evac did not slam shut unexpectedly.

RESULT: TACC/XOW optimized TACC's timetable and order of evac enabling 43 missions comprising 141 sorties, moving 83 short tons of cargo and 1,068 pax to rescue 1,170 litter patients with the last aircraft safely extracting the last litter patient minutes before airfield crosswinds went severely out of limits.

Example 4: Here is a weather threat analysis for a typical MC-130P Combat Shadow mission from AFSOC. The "Critical Thresholds" column is only used if mission "Expected Conditions" will put parts of the mission profile into "Marginal" or "NO GO" status. This draws the operator's eye only to mission areas of concern and then lets them know "why" in terms of their airframe and equipment limitations.

MISSION # _____

WEATHER THREAT ANALYSIS

MISSION PROFILE	EXPECTED CONDITIONS	CRITICAL THRESHOLDS	IMPACT
T/O	See AFSOC Form 87		
LOW-LEVEL	See AFSOC Form 87		
AIR DROP (Personnel)	WNDS 20013KTS from FL005 to SFC	Sfc wnd (including gust) >13 KTS for static line land jump	
RECOVERY	22036G46KT ¼ RA OVC001	MC-130P: CIG/VIS below 200/1/2 XWIND > 35 KTS (WET)	
ALTERNATE	ETAR (See Form 87)		
ALTERNATE	ETAD (See Form 87)		

GO MARGINAL NO GO

Figure 54: Weather threat Analysis for typical MC-130P mission profile (AFSOC)

h. Space Weather and Impacts on Systems.

A highly informative lesson on space weather fundamentals is located on the Air Force Weather Knowledge Center (AFWKC) at the following link: https://afwkc.csd.disa.mil

To access the CBT, select the "My Courses" button on the left, then select the Crossfeed list and click on the “Solar Maximum Refresher Training 2009”. (Note: make sure the pop-up blocker is turned off so the training will launch).

(1) Space Weather Basics

The Sun is a large, rotating, gaseous sphere with an observable surface that contains many identifiable features, including dark (cooler) spots called sunspots. Scientists have found the number of observed sunspots follows a roughly 11-year cycle, called the “Sunspot” or “Solar Cycle”. The solar cycle is generally characterized by a 4-year rise to “Solar Maximum”, followed by a gradual 7-year decline to “Solar Minimum”. The last Solar Max was October of 2001 and the last Solar Min was in December of 2008. The next Solar Max is projected to be in the year 2013.

(2) Solar Flares

The most common form of solar activity is a Flare. A Flare is an explosive release of energy (both electromagnetic and charged particles) within a relatively small (but greater than earth-sized) region of the solar atmosphere. While the energy released during a flare is very substantial; it represents at most 1/100,000th of the total solar output. Consequently, our daily personal lives appear to be unaffected. However, a flare's enhanced X-ray, EUV, radiowave, and particle emissions are sufficient to adversely impact DoD radar, communications, and space systems operating in or through the near-Earth environment.

Flares usually occur in the vicinity of Sunspots or their pre-cursors, bright active regions called "Plage". The reason is that the energy released by a flare is the energy stored in the intense, complex magnetic fields which produce those plage and sunspots. Solar and geophysical activity can and does occur even during Solar Minimum. That is because not all solar activity is solar-flare induced; flares are only the primary cause.

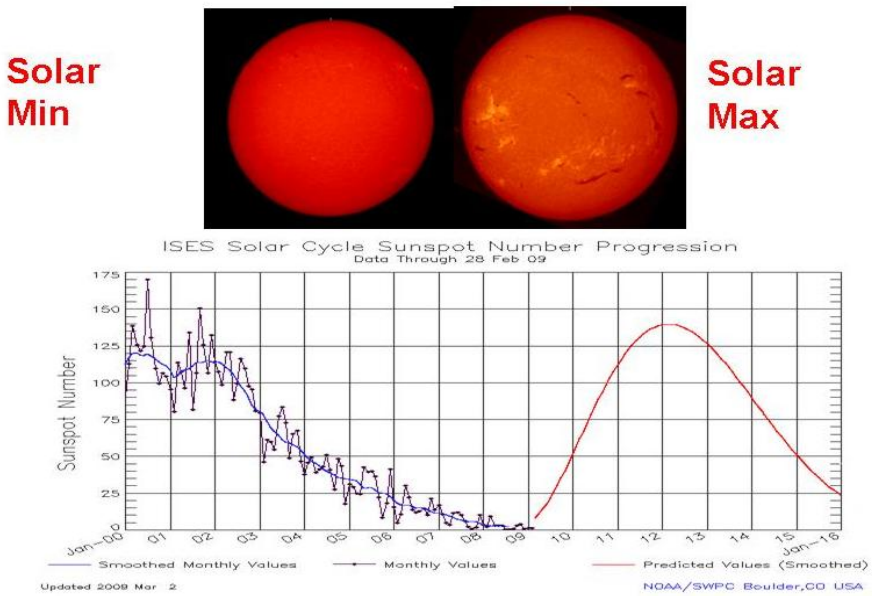

Figure 55: Solar Cycle (From 2WS/WXZ SMO Brief)

(3) The Aerospace Environment

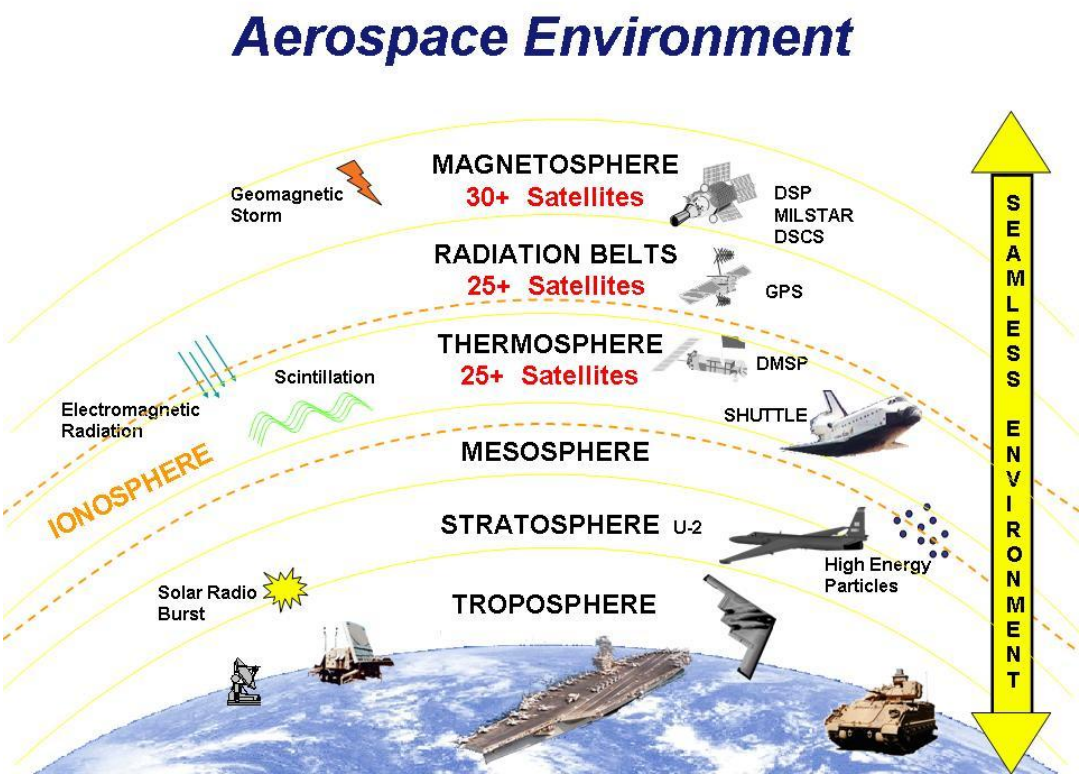

Figure 56: Aerospace Environment (From 2WS/WXZ SMO Brief)

Space weather within the troposphere introduces three phenomena that may potentially impact military operations. Solar radio emissions penetrate all layers of the Earth's atmosphere, and secondly solar particles penetrate deep into the atmosphere, causing variations in the Earth's magnetic (geomagnetic) field and posing a radiation hazard to humans at higher altitudes.

The radio emissions may be at the same frequencies used in various communication and ground-based space tracking systems, causing impacts such as interference. Further, magnetic storms can confuse sensors that rely on the Earth's normally steady magnetic field. Last, electrically charged particles emitted by the Sun can also penetrate to altitudes at which manned aviation occurs. This phenomenon increases risk for high-altitude flight operations globally and for commercial routes over the poles.

The ionosphere is a layer of electrons created within the mesosphere and thermosphere primarily as a result of the Sun's x-ray and ultraviolet radiation ionizing the atoms and molecules located there. The ionosphere is not homogenous from one location to another -- it is very irregular, having large numbers of electrons in some locations while having fewer in other locations. Sharp horizontal and vertical electron density gradients exist.
Note that the satellites shown in the figure above are located at the top or above the ionosphere. This means that any radio wave signals a satellite sends to or receives from Earth must go through the ionosphere and are subject to ionospheric effects.

(4) Types of Space Weather

There are three general types of space weather that can impact DoD operations.

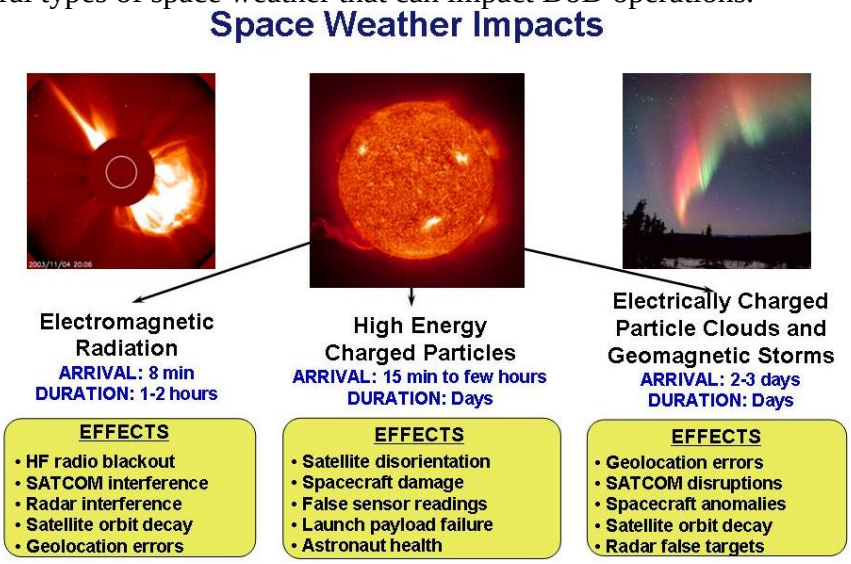

Figure 57: Space Weather Impacts (From 2WS WXZ SMO Brief)

(5) Electromagnetic Radiation

Electromagnetic radiation in the form of solar flare enhanced X-rays, extreme UV, and radio waves reach the Earth at the speed of light (in about 8 minutes), and can cause environmental and DoD system impacts anywhere over the Earth's sunlit hemisphere. They tend to last about tens of minutes to hours.

Impacts: Radio bursts can cause SATCOM and radar interference/noise; x-ray flares disrupt the earth's ionosphere, which causes loss of HF (3-30 MHz) signals, possible GPS error, and drag on low earth satellite orbits.

(6) High Energy Particles

High Energy Particles (primarily protons) can reach the Earth within 15 minutes to a few hours after the occurrence of a strong solar flare. Major impact of energetic protons is generally concentrated over the polar caps and northern latitudes, where they have ready access into the atmosphere. Impact of a proton event can last from a few hours to days.

Impacts: "single event upsets" (e.g., bit flip) in satellite systems; false satellite sensor readings; satellite disorientation; solar panel degradation; space-lift failure from computer glitches; radiation hazard to STS/ISS astronauts (especially while performing extra-vehicular activity); radiation hazard to hi-flyer operations.

(7) Low to Medium Energy Particles

Particle streams (protons and electrons) may arrive at the Earth about 2 to 4 days after a flare. Such particle streams can also occur at any time due to other, non-flare solar activity. These particles cause geomagnetic and ionospheric disruptions that can last for a few hours to several days.

Impacts: missile defense radars may suffer auroral clutter/noise; low earth satellites experience increased orbital drag, HF propagation degraded; GPS navigation errors increase; overload on commercial power grids.

(8) AFWA Space Weather Products

There are space weather analyses and forecasts produced by the AF Weather Agency and disseminated to DoD and other agency users worldwide.

The Events and Impact slides are a series of four charts (Space Environment, Discussion, Recent Events, and Reported Space Weather Impacts) regarding space environmental conditions and their potential impacts to worldwide military operations. The Space Environment slide is a color-coded "stop-light" chart indicating the space weather events and their impacts on operations. The Discussion slide is a narrative discussion of the events and impacts shown on the Space Environment slide. The Events slide describes significant events for the past 7 days that directly drive changes in the Space Environment slide. The Impacts slide lists reported impacts on DoD operations for the past 7 days.

The Events and Impact slides are posted daily at 0000Z, no later than half past and every six hours thereafter via JAAWIN and JAAWIN-S.

(9) Space Environment Slide

The space environment slide is divided into thirds. The top portion of this slide reports the space weather events that could cause impacts to operations. The events can be solar flares/radio bursts, energetic particles, or geomagnetic storming.

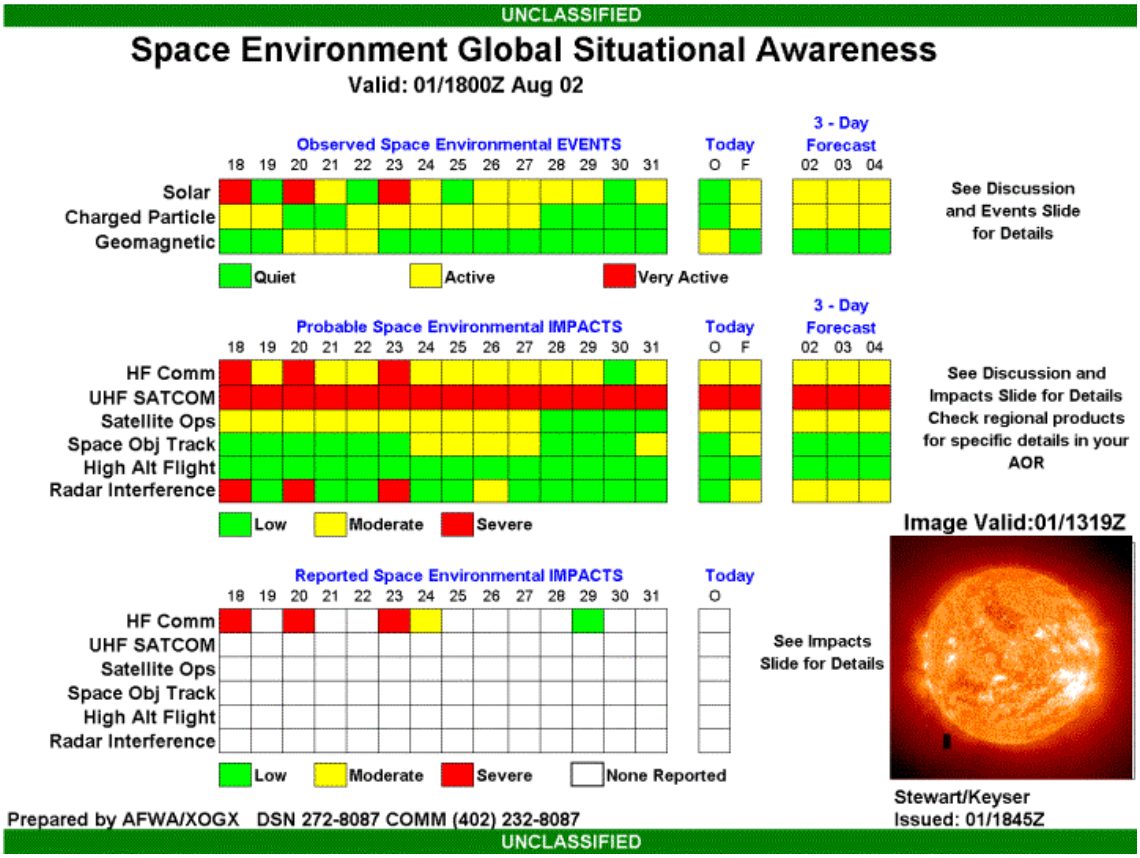

Figure 58 : Space Environment Slide (From JAAWIN-S Space)

Solar Activity

This category shows the overall activity level of the sun and its likelihood to impact systems. Criteria analyzed to determine the state of this category are the occurrence of moderate or greater x-ray flares and significant solar radio bursts.

Charged Particle Environment

This category shows the observed or forecast potential for system impacts from charged particles significantly above normal background levels. Charged particle enhancements occur due to solar events or enhanced geomagnetic activity.

Geomagnetic Activity

This category shows the overall geomagnetic activity level of the Earth's magnetic field. A measured or forecast planetary geomagnetic activity index is used to determine the likelihood of system impacts.

The middle portion of this slide reports probable (unconfirmed) space environment impacts to six major categories of space related operations. These include: 1) HF communications, 2) UHF SATCOM Communications, 3) Satellite Ops/Health, 4) Space Object Tracking/Satellite Drag, 5) High-Altitude Flight, and 6) Radar Interference/Anomalous Returns.

The bottom portion of the slide highlights reported space environment impacts from users. It is divided into the same six categories.

HF Communications

This category depicts degradation of HF communications due to changes in the ionosphere where long-range HF signals are usually reflected. Moderate or greater solar flares are considered in assessing the observed and forecast conditions. These solar flares emit x-rays which enhance the lower levels of the ionosphere resulting in absorption of HF signals. Solar flares usually affect the lower portion of the HF spectrum, but can blackout the entire spectrum if sufficiently energetic. Also considered in assessing or forecasting HF communications is the level of geomagnetic activity. Strong geomagnetic activity often results in a decrease in the ionosphere's ability to reflect HF signals. Strong geomagnetic activity also leads to enhanced aurora in the northern and southern high latitudes which can significantly degrade HF communications.

UHF SATCOM Communications

This category depicts degradation of UHF SATCOM communications due to changes in the ionosphere. UHF signals are transmitted through the ionosphere ("transionospheric") for communications to satellites. UHF scintillation occurs mainly in the equatorial region and the auroral region. In the equatorial region, the greatest impacts usually occur just after local sunset to approximately 0200L and have a seasonal dependence. During quiet geomagnetic activity, the scintillation is usually stronger, with moderate to strong geomagnetic activity working to suppress the equatorial UHF scintillation. Strong geomagnetic activity also leads to enhanced aurora in the northern and southern high latitudes which can significantly degrade UHF communications.

Satellite Operations/Health

This category depicts the potential for or observed degradation or damage to satellites themselves. This damage or degradation usually results from particle interactions with the spacecraft. Particles can deposit electrical charge on or within a spacecraft and cause damage through a discharge, or can damage the satellite through collision or by overwhelming or disorienting the satellite's sensors. Information considered in determining the state of this category are the number and energy of particles in the space environment, geomagnetic activity which can enhance and accelerate particles in the space environment, and reported observations of satellite anomalies thought to be the result of the satellite environment.

Space Object Tracking/Satellite Drag

This category indicates the observed and forecast potential for unexpected changes in the orbits of satellites. Changes in satellite orbits result from an increase or decrease in the drag normally experienced at a satellite's orbit. This change in drag results from the heating or cooling of the upper atmosphere due to changes in the sun's radiation output, or to geomagnetic activity.

High Altitude Flight

This category indicates the maximum level of radiation exposure at an altitude of 67,000 ft. It will be YELLOW for dose rates greater than 10 millirems per hour and RED for dose rates exceeding 100 millirems per hour. This radiation is a product of cosmic rays from outside the

solar system as well as very high-energy protons occasionally produced by explosive events on the sun.

Radar Interference/Anomalous Returns
This category depicts observed and forecast degraded operation of radars used to track objects in space. Radio frequency bursts from the sun can cause interference to radars when the sun is in their field of view. Additionally, anomalous returns can occur when geomagnetic activity disturbs the ionosphere.

These slides use a stoplight color scheme defined as follows:
GREEN The environment is unlikely to contribute to operational problems
YELLOW The environment will cause moderate impacts to operations
RED The environment will cause severe impacts to operations
Contact the Space Weather Flight to obtain more information on the thresholds relating to space weather.

The slide is also divided from left to right. The left portion of the slide represents activity, probable impacts and reported impacts that were observed in the last fourteen days. This portion of the slide is only updated for the 00Z product. The right side of the slide shows the forecast for the next three days. This portion of the slide is usually updated during the 18Z forecast, when most of the new data is available to the forecast center. The center column represents the observed ("O") and Forecasted ("F") conditions for the current day. It is updated throughout the day.

(10) Space Environment Discussion Slide

This slide discusses forecasted and observed reasons related to the Space Environment slide. These slides are designed for non-space weather experts.

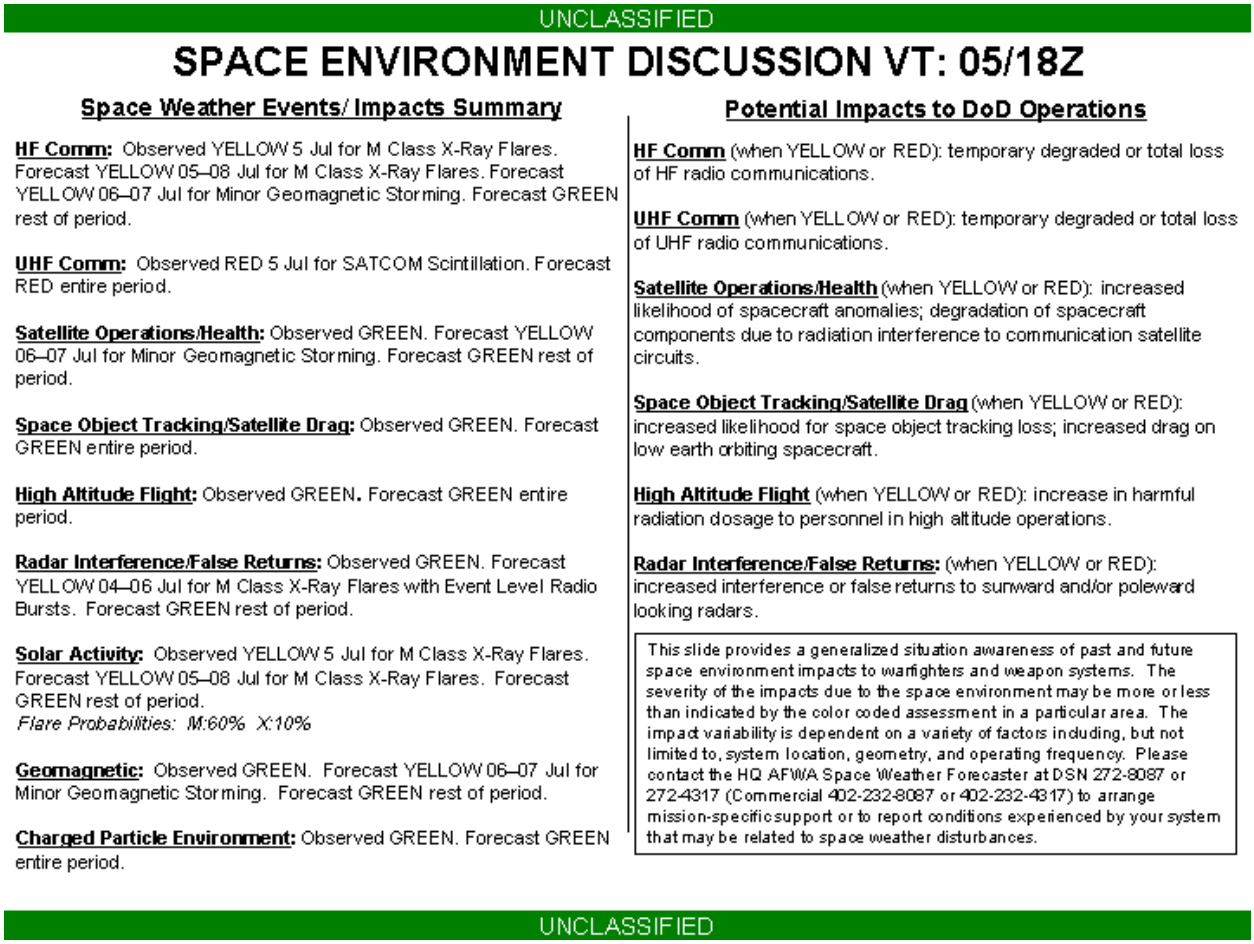

Figure 59: Space Environment Discussion Slide (From JAAWIN-S Space)

(11) Additional Information

The Recent Events slide presents a plain language summary of significant solar events for the past 7 days. Significant events that are listed are those that could pose an impact to satellites and/or communications in the near Earth space environment. The Reported Space Weather Impacts slide presents in plain language all space environment related impacts to DoD assets.

Additional information about space weather, the ionosphere, and its effects can be found on the AFWA JAAWIN-S site.

If you require more tailored products than what are currently available, please call Requirements (AFWA/XOR) at DSN 271-1631 COMM (402) 294-1631. If you have any questions regarding the E&I slide or other space weather, please contact the Space Weather Operations Center at DSN 272-8087 or COM 402-232-8087.

Appendix A – Environment definitions with the JCA numbering scheme

A full list of the Environment definitions, with the JCA numbering scheme

2.1 Environment – The ability to characterize and exploit the meteorological, space and oceanographic information from the subbottom of the earth's oceans up to and including space.

2.1.1 Collect – The ability to sense or acquire meteorological, oceanographic and space environmental data.

2.1.1.1 Collect Land Environmental Measurements – The ability to sense and observe the ground, soil, and/or terrain measurements to develop surface parameters.

2.1.1.2 Collect Ocean Environmental Measurements – The ability to sense and observe the oceanographic measurements to include the physical, chemical and biological aspects of oceanic and coastal processes.

2.1.1.3 Collect Hydrographic Measurements – The ability to sense and observe the maritime characteristics to aid in navigation.

2.1.1.4 Collect Bathymetric Measurements – The ability to sense and observe the precise ocean depths to determine sea floor topography.

2.1.1.5 Collect Astrometry Measurements – The ability to sense and observe the precise location, motion and intensity of celestial objects.

2.1.1.6 Collect Atmospheric Environmental Measurements – The ability to sense and observe the environmental properties of the air.

2.1.1.7 Collect Space Environmental Measurements – The ability to sense and observe space weather characteristics in the region that extends out from the atmosphere of the Earth.

2.1.2 Analyze – The ability to transform meteorological, oceanographic and space environmental data into information.

2.1.2.1 Analyze Land Environment – The ability to interpret, fuse and evaluate environmental data into an integrated depiction of the past and current state of the ground, soil, or terrain.

2.1.2.2 Analyze Ocean Environment – The ability to interpret, fuse and evaluate environmental data into an integrated depiction of the past and current state of the oceanographic measurements to include the physical, geological, chemical and biological aspects of oceanic and coastal processes.

2.1.2.3 Analyze Hydrographic Measurements – The ability to interpret, fuse and evaluate maritime characteristics to aid in navigation.

2.1.2.4 Analyze Bathymetric Measurements – The ability to interpret, fuse and evaluate precise ocean depths and sea floor topography.

2.1.2.5 Analyze Atmospheric Environment – The ability to interpret, fuse and evaluate environmental data into an integrated depiction of the past and current state of the air surrounding the Earth.

2.1.2.6 Analyze Space Environment – The ability to interpret, fuse and evaluate environmental data into an integrated depiction of the past and current state of the region that extends out from the atmosphere of the Earth.

2.1.3 Predict – The ability to describe the anticipated future state of the meteorological, oceanographic and space environment.

2.1.3.1 Predict Land Environment – The ability to describe the future state of the geologic and/or hydrologic conditions of the ground.

2.1.3.2 Predict Ocean Environment – The ability to describe the future state of oceanographic conditions to include the physical, geological, chemical and biological aspects of oceanic and coastal characteristics.

2.1.3.3 Predict Atmospheric Environment – The ability to describe the future state of the air surrounding the Earth.

2.1.3.4 Predict Space Environment – The ability to describe the future state of the region that extends out from the atmosphere of the Earth.

2.1.4 Exploit – The ability to provide relevant meteorological, oceanographic and space environmental information for integration into operational activities.

2.1.4.1 Determine Environmental Impacts – The ability to derive actionable decision parameters from environmental information.

2.1.4.2 Assess Environmental Effects – The ability to couple thresholds with actionable decision parameters to convey operation-impacting environmental knowledge to decision makers.

2.1.4.3 Produce Environmental Decision Aids – The ability to package environmental products that are discoverable and accessible.

Appendix B – JTFHQ METOC Tasks

Listing of JTFHQ METOC Tasks and Related Tasks

METOC Tasks on the MTG, TASK 215J

TASK 215J: Develop Operations Estimate - METOC SUPPORT Operations

ELEMENT: J2/J3/METOC Officer (JMO)
(Relates to UJTL Task OP 2.2, 2.3, 2.4, 2.5)

TASK SITUATION: CJTF has received a planning directive (e.g., CCDR's Warning Order, Planning Order, etc.). A Joint Planning Group has been assembled, and the planning of an operation is ongoing. The JTF JMO has been assigned.

TASK PURPOSE: Provide METOC input into the JTF planning effort. METOC incorporates all facets of meteorological, oceanographic, and space environmental phenomena from the bottom of the earth's oceans into the space environment. Climatology, real-time data, and accurate forecasts prepare the JTF to exploit environmental windows of opportunity. The structure of this input is the same as the overall planning process described in this MTG.

REFERENCES: JP 2-0, *Joint Intelligence*; JP 3-0, *Joint Operations Change 2*; JP 3-59, *Meteorological and Oceanographic Operations;* JP 5-0, *Joint Operations Planning*; JP 5-00.2, *Joint Task Force Planning Guidance and Procedures*.

Task Steps

1. Contribute to JTF's overall mission analysis (Task 215J-01-JMO)

    a. Determine known facts, current status, or conditions.
        (1) Conduct an initial METOC analysis. Provide past, present, and future states of space, air, and ocean environments to JTF staff. Consider climatology of operational area, observations, and forecasts, including forecast product accuracy and limitations.
        (2) Provide METOC input into the Joint Intelligence Preparation of the Battlespace.
        (3) Provide METOC input to the Joint Planning Group (JPG).
        (4) Provide METOC input to the J4/JLRC affecting logistics.
        (5) Provide METOC input to the J6 affecting communication.
    b. Develop assumptions to replace missing or unknown facts.
        (1) Consider effects of METOC in operational area.
        (2) Determine status of friendly METOC support.
        (3) Identify METOC data requirements for METOC support operations.
    c. Analyze the Combatant Commander's mission and intent from a METOC perspective.
    d. Determine limitations caused by METOC conditions.
        (1) Things the JTF's METOC forces must do (constraints).

(2) Things the JTF's METOC forces cannot do (restraints).
(3) Others (*e.g.*, use of riot control agents--see CJCSI 3110.07 for advance authorization to use these agents).

e. Identify tasks to be performed by joint METOC forces.
(1) Determine *specified* tasks.
(2) Determine *implied* tasks.
(3) From (1) and (2) above, determine *essential* tasks.

f. Conduct an *initial* METOC force structure analysis. Determine shortfalls in forces or capabilities, which will impact the conduct of METOC support operations.
g. Conduct an *initial* risk assessment based on METOC conditions.
h. Assist in development of the mission analysis briefing for the CJTF.

2. Receive CJTF planning guidance (Task 215J-02-JMO).
CJTF should provide guidance at this point (see Task 202). Planning guidance should be disseminated to METOC personnel and the components. If needed, ask the CJTF for any guidance necessary for continued planning.

3. Develop METOC support options to support the JTF's COAs (Task 215J-03-JMO).
The JTF staff should now develop multiple friendly COAs. METOC personnel should advise JTF planners on how METOC conditions impact each developing JTF COA. See Task 206 for more information.

a. Determine METOC impacts on land forces, air forces, maritime forces, special operations forces, and space operations conducting maneuver, firepower, protection, support, and establishment of command & control.
b. Test the validity of each COA. Conduct a preliminary test for feasibility within the constraints of the physical environment.
c. Provide input to other staff estimates:
(1) Prepare METOC input to the Intelligence Estimate. Provide METOC characteristics of area of operations and effect on military operations.
(2) Prepare METOC input to the Operations Estimate. Provide METOC impacts on combat operations.
(3) Prepare METOC input to the Logistics Estimate. Provide METOC impacts on logistics situation (key installations, transportation routes).
(4) Prepare METOC input to the Command, Control, Communications, and Computers (C4) Estimate. Provide METOC impacts on C4 systems (line of sight, satellite (SATCOM), UHF SATCOM, ground mobile command post, Defense Satellite Communications System (DSCS) ground mobile segment, and Defense Communications System (DCS) interface).
(5) Provide input to JTF COA statement and sketches.

4. Participate in COA analysis (war-gaming) (Task 215J-04-JMO).
Be prepared to contribute to the process of wargaming by mentally "fighting the battle" in time and space. The process may use the structure of action-reaction-counteraction sequences for critical events (e.g., D-Day actions).

a. METOC impacts on critical events and decision points.
b. METOC impacts on the duration and timing of critical events.
c. Opportunities for deception and surprise using expected METOC conditions.
d. METOC impacts on high payoff targets.
e. METOC impacts on required reconnaissance and surveillance.
f. METOC impacts on required logistics support and constraints.
g. METOC impacts on communications requirements.

5. Participate in COA comparison (Task 215J-05-JMO).
Provide quantitative impact of METOC conditions on the COAs.

a. Participate in determining the criteria to be used for comparing COAs. Criteria could come from:
(1) Commander's intent.
(2) Factors of METT-T:
(a) Mission accomplishment.
(b) Enemy.
(c) Terrain and Weather
(d) Troops available.
(e) Time available.
b. Ensure that recommendations for METOC have been coordinated with components of the JTF, as well as the CCDR SMO, the Service METOC planners, and the JMCO, as appropriate.

6. Receive CJTF's decision on COAs (Task 215J-06-JMO).
The CJTF may select or modify the recommended COA. Based on that decision, the JTF Commander's Estimate document (or slides) will normally be sent/briefed to the supported Combatant Commander for approval.

7. Develop Annex H and METOC perspective in JTF plan/order (Task 215J-07-JMO).
After the COA is selected the plan/order is physically developed. Most of the information needed for this task should have already been developed through the estimate process (mission analysis through COA selection). METOC input can be in many sections of the plan/order. See Task 209 for the joint (JOPES) plan/order format.

a. Prepare Annex H.
b. Provide METOC input to Annex B. Identify METOC characteristics of the operational area.
c. Provide METOC input to Annex C. Identify METOC conditions relating to conduct of combat and supporting operations.
d. Provide METOC input to Annex D. Identify transportation and logistic requirements for METOC support operations.
e. Provide METOC input to Annex J. Indicate channels for command and control of METOC operations if different from the command relationships outlined in the Basic Plan or Annex J.

f. Provide METOC input to Annex K. Identify METOC initial and sustaining communications requirements.
g. Provide METOC input to Annex M. Identify METOC GIS requirements. This is important to identify those elements of METOC information that is expected to be on the Commanders Common Relevant Operating Picture (CROP)
h. Provide METOC input to Annex N. Identify METOC space requirements.
i. Provide METOC input to the Basic Plan. Use "Coordinating Instructions" to include instructions common to two or more components or subdivisions, and "Administration and Logistics" for broad guidance on how logistics and administration support for METOC forces is to be furnished (can reference Annex D).
j. Coordinate (during execution planning) with supporting commands and METOC planners to identify and task METOC personnel and equipment.

METOC Tasks on the MTG, TASK 432

TASK 432 Control METOC Operations

(Relates to UJTL Task OP 2.2)

TASK SITUATION: The President and SECDEF and the supported CCDR have issued execution orders for JTF operations that will include Meteorological and Oceanographic (METOC) operations. Sufficient elements of the joint force have deployed to begin operations, or the whole joint force has deployed. Operations have begun, in accordance with the CJTF's concept, and are continuing.

TASK PURPOSE: The JTF HQ monitors, assesses and controls METOC operations and directs changes in accordance with the CJTF's intent. The CJTF and his staff control current METOC operations and plan and direct future operations. METOC operations provide the JTF with real-time climatology data and accurate forecasts.

REFERENCES: JP 3-0, *Joint Operations, Change 2*; JP 3-59 *Meteorological and Oceanographic Operations.*

Task Steps

1. Monitor METOC operations in support of the JTF (Task 431-01-J3).

a. Collect information from all sources. Keyed to:
(1) Predetermined information plan -- requirements, sources, and timing.
(2) CJTF's information requirements.
b. Maintain awareness of operations under other staff proponency.
c. Monitor deployment status of Service component METOC assets.
(1) Balance requirements for initial METOC operations, reception and buildup, and timing of required follow-on operations.
(2) Recommend changes to Time-Phased Force and Deployment List (TPFDL) for METOC assets, as required.

d. Monitor operations directed at enemy centers of gravity and METOC support contributions. Include:

(1) Task organization of Joint Force METOC Forecast Unit (JMFU)

(a) METOC Forecast Centers (MFC)

(b) Service component assets

(2) Past, present, and future states of space, air, and ocean environments. Include:

(a) Climatology of the region

(b) Observations

Land and ship reports
Upper air soundings
Satellite earth sensors
Weather radars
Lightning detection systems
Profilers
Solar telescopes
Ionosphere sensors
Buoys
Aircraft
Bathythermograph
Refractometers

(3) Forecasts

(a) Global

(b) Regional

(c) Tactical

2. Assess the effectiveness of METOC operations (Task 431-02-J3).

a. Information architecture.

(1) Incorporate METOC information systems.

(2) Operational information and forces status.

(3) Information exchange.

b. Organization of METOC operations.

(1) Simple, clear, responsive command lines, in accordance with the CJTF intent.

(2) Unity of effort -- Joint Force METOC Officer.

(3) Apportionment of METOC assets.

c. Support missions assigned to METOC assets.

(1) Missions are appropriate for tasked components/units.

(2) Missions are integrated with operational missions.

(3) Missions are supported by sufficient JTF resources.

d. Deconfliction of METOC operations with conventional operations. Consider:

(1) METOC reporting requirements.

(2) Command, Control, Communications, and Computers (C4) interoperability.

(3) Frequency allocation.

(4) Reconnaissance/intelligence collection efforts.

(5) Surface and airspace deconfliction.

(6) Coordination of logistic support.

3. Prepare plans and orders related to METOC operations (Task 431-03-J3/J5).

a. Maintain a current estimate of METOC operations.
b. Assess the progress of current METOC operations.
(1) Relate information to attainment of desired conditions.
(a) Current operations and phase.
(b) Future operations and phases.
(c) Campaign end state and/or termination conditions.
(2) Relate to decision points for current or future operations.
c. Develop friendly Courses of Action (COA) with regard to METOC operations.
(1) Continuation of METOC operations in accordance with the current apportionment, guidance, and prioritized targets.
(2) Branches and sequels for METOC operations based on changing situation or additional requirements.
d. Develop enemy COAs that impact on or affect METOC operations, or current and future environmental or civil conditions.
(1) Current, apparent operations/conditions.
(2) Branches to current, apparent operations/conditions.
e. Analyze friendly COAs.
(1) Analyze wargame results against enemy COAs or current and future environmental or civil conditions.
(2) Analyze all feasible alternatives, using the best information available.
f. Compare friendly COAs.
(1) The COA that best achieves objectives against the most probable and/or most dangerous enemy COA, or against the most likely or most dangerous/complex environmental or civil condition.
(2) Feasible alternatives, using the best information available and determining the advantages/disadvantages of each.
g. Prepare a discussion and/or recommendation for the current estimate.
(1) Prepare any recommendations in a manner that requires only CJTF or supervisor's approval.
(2) May be a formal or informal format, depending on the forum and supervisor directions.

4. Direct and lead subordinate operational METOC operations (Task 431-04-CJTF/J3).

a. Approve plans and orders related to METOC operations.
b. Synchronize actions in accordance with established time lines and conditions (see Task 401D-05-J3/Staff (Synchronize/Integrate Operations).
c. Coordinate actions and/or operations, where lines of authority and responsibility overlap and/or conflict.
(1) Advise components/units of adjacent or related actions/operations.
(2) Direct supporting operations, as required.
(3) Resolve conflicts.

d. Adjust control measures, as required, or relays component adjustments to adjacent, supported, or supporting units.
e. Decide on operational actions/direction.
f. Change, recommend change, or continue METOC operations and priorities.
(1) Seek CJTF/supervisor's guidance if a change appears necessary.
(2) Ensure changes remain supportive of the current mission and intent, based on a continuing estimate of the situation.
3) Coordinate and conduct appropriate planning for change.
(4) Write plans and orders for change.
g. Approve plans and orders.
h. Issue plans/orders.

5. Acquire and communicate operational information about METOC operations (Task 431-05-J3).

a. Display the information.
b. Brief the information.
c. Inform supervisors, decision makers, other JTF staff, and staff counterparts. Based on:
(1) Preplanned hierarchy of significant information.
(2) Information that could affect a commander's decision.
(3) Understanding of information requirements of commanders and other staff.
d. Report -- formal (required, periodic) and informal (hasty, as required).
e. Develop general military information -- briefings, reports, analyses, etc.
f. Supervise SIGSEC and COMPUSEC related to METOC operations.
g. Conduct public affairs operations related to METOC operations.

METOC-related MTG Tasks

The MTG cross references many operational tasks that may require METOC inputs. These Task areas should be examined in detail and support tailored for a specific operation.

Task 100	Establish the JTF Command Group
Task 102	Establish the J2 (Intelligence) Section
Task 103	Establish the J3 (Operations) Section
Task 105	Establish the J5 (Plans and Policy) Section
Task 115	Establish/operate the Joint Targeting Coordination Board (JTCB)
Task 118	Establish/operate the Joint Personnel Reception Center (JPRC)
Task 127	Establish/operate the Joint Operations Center (JOC)
Task 130	Establish/operate the Joint Personnel Recovery Center (JPRC)
Task 201	Conduct Operational Mission Analysis
Task 209	Prepare Operational Plans and Orders
Task 212	Conduct Rehearsals
Task 213	Conduct the Personnel Estimate
Task 215	Develop the Operations Estimate - Overview
Task 215A	Land Operations
Task 215B	Air Operations

Task 215C Maritime Operations
Task 215D Special Operations
Task 215E Space Support Operations
Task 215F Reconnaissance and Surveillance operations
Task 215G Multi-national Operations
Task 215H Interagency Operations
Task 215I Civil Affairs (CA) Operations
Task 215K Combat Camera Operations
Task 215L Joint Fires and Targeting
Task 215M Nuclear, Chemical, and Biological (NBC) Operations
Task 215N Personnel Recovery (PR) Operations
Task 215O Combating Terrorism
Task 215P Military Police Operations
Task 215R Explosive Ordnance Disposal
Task 215S Information Operations (IO)/Information Warfare (IW)
Task 215S-1 Develop the IO/IW Estimate - Operations Security
Task 215S-2 Develop the IO/IW Estimate - Psychological Operations
Task 215S-3 Develop the IO/IW Estimate – Deception Operations
Task 214S-5 Develop the IO/IW Estimate – Electronic Warfare
Task 214S-5 Develop the IO/IW Estimate – Physical Attack/Destruction
Task 214S-6 Develop the IO/IW Estimate – Defensive Information Ops
Task 214S-7 Develop the IO/IW Estimate – Computer Network Attack
Task 214S-7 Develop the IO/IW Estimate – Special Information Ops
Task 216A Develop the Logistics Estimate – Transportation
Task 216B Develop the Logistics Estimate – Supply and Services
Task 216C Develop the Logistics Estimate – Fuels
Task 216D Develop the Logistics Estimate – Engineering
Task 217 Develop the Medical Services Estimate
Task 218 Develop the (C4) Estimate
Task 221 Develop the Religious Ministries Estimate
Task 223 Develop the Headquarters Support Estimate
Task 301 Prepare for Deployment
Task 302 Control Deployment
Task 401A Monitor Operations (Maintain Status)
Task 401B Assess Operations
Task 404 Control Land Operations
Task 405 Control Air Operations
Task 406 Control Maritime Operations
Task 407 Control Special Operations
Task 408 Control Space Support Operations
Task 409 Control Air Defense Operations
Task 410 Control Airspace
Task 411 Control Joint Fire Support
Task 412 Control Forcible Entry operations
Task 414 Control Nuclear Biological Chemical (NBC) Defense operations
Task 416 Control Electronic Warfare Operations

Task 417	Control Psychological Operations
Task 418	Control Operational Security Operations
Task 419	Control Military Deception Operations
Task 420	Control Personnel Recovery Operations
Task 421	Control Reconnaissance Operations
Task 422	Control Non-Combatant Evacuation Operations (NEO)
Task 424	Control Civil-Military Operations (CMO)
Task 426	Control Short-Notice Counter-Drug Operations
Task 427	Control Operations to Combat Terrorism
Task 432	Control Visual Information/Combat Camera Documentation Ops
Task 433	Control Explosive Ordnance Disposal Operations
Task 434	Control Military Police Operations
Task 435	Control Logistics Operations
Task 436	Control Health Service Support
Task 437	Control Personnel Support
Task 441	Control C4 Operations
Task 442	Conduct Public Affairs Operations
Task 444	Provide Headquarters Support
Task 445	Project Future Campaigns or Major Operations
Task 502	Conduct Transition
Task 601	Prepare for Redeployment

Appendix C – Recommended Reading

Items marked with an asterisk (*) are PRIMARY METOC REFERENCES

Joint / DOD / Government

Joint Strategic Capabilities Plan (JSCP)

Office of the Federal Coordinator for Meteorology (OFCM) Federal Directory of Mobile Meteorological Equipment and Capabilities

Unified Command Plan (UCP)

CJCSI 3500.01C	Joint Training Policy for the Armed Forces of the United States, 15 March 2006
CJCSI 3810.01C	Meteorological and Oceanographic Operations, 18 September 2009
CJCSM 3122.01	Joint Operation Planning and Execution System, Vol. I, Planning Policies and Procedures, 14 July 2000
CJCSM 3122.02C	Joint Operation Planning and Execution System, Vol. III, Crisis Action Time-Phased Force and Deployment Data Development and Deployment Execution", 19 June 2006
CJCJM 3122.03B	Joint Operation Planning and Execution System Vol. II, Planning Formats and Guidance", 28 February 2006
CJCSM 3500.04B	Universal Joint Task List (UJTL)
CJCSM 3500.3A	Joint Training Manual for the Armed Forces of the United States, 1 September 2002
CJCSM 3500.05	Joint Task Force Headquarters Master Training Guide, 15 April 1997
DOD Directive 5100.1	Functions of the Department of Defense and its Major Components, 1 August 2002
Joint Pub 1	Joint Warfare of the Armed Forces of the United States, 14 November 2000
Joint Pub 1-02	Department of Defense, Dictionary of Military and Associated Terms, 12 April 2001

Joint Pub 2-0	Doctrine for Intelligence Support to Joint Operations, 9 March 2000
Joint Pub 2-01	Joint Intelligence Support to Military Operations, 7 October 2004
Joint Pub 2-01.3	Joint Tactics, Techniques, and Procedures for Joint Intelligence Preparation of the Battlespace, 24 May 2000
Joint Pub 3-0	Doctrine for Joint Operations, 17 September 2006
Joint Pub 3-33	Joint Force Capabilities, 13 October 1999
Joint Pub 3-59	Joint Meteorological and Oceanographic Operations, 24 March 2008
Joint Pub 4-05	Joint Tactics, Techniques, and Procedures for Manpower Mobilization and Demobilization Operations: Reserve Component (RC) Callup, 11 November 1998
Joint Pub 5-0	Doctrine for Planning Joint Operations, 13 April 1995
Joint Pub 5-0.1	Joint Tactics, Techniques, and Procedures for Joint Campaign Planning (Draft)
Joint Pub 5-00.2	Joint Task Force Planning Guidance and Procedures, 1January 1999
Joint Pub 6-0	Doctrine for C4 Systems Support to Joint Operations, 30 May 1995

USAF

AR 115-10/AFI 15-157	Weather Support for the U.S. Army, 6 January 2010 (Interservice Publication)
AFI 15-128*	Air and Space Weather Operations - Roles and Responsibilities
AFPD 15-1	Atmospheric and Space Environmental Support
AFMAN 15-111*	Surface Weather Observations
AFMAN 15-125	Weather Station Operations
AFMAN 15-129*	Air and Space Weather Operations – Processes and Procedures

AFMAN 15-135	Combat Weather Team Operations
AFCCC/TN 95/005	Capabilities, Products and Services of the AFCCC [now 14th Weather Squadron]
AFCCC/TN 96-001	Directory of Climatic Databases
ACCI 15-150	ACC Weather Operations
AMCI 10-404	Air Mobility Element/Tanker Task Force/Tanker Airlift Control Element
AMCI 10-406	Tanker Task Force/Tanker Airlift Control Element
617 WSR 16-2	Weather Support
617 WSP 16-X	Weather Communications

USA

AR 115-10/AFI 15-157	Weather Support for the U.S. Army, 6 January 2010 (Interservice Publication)
FM 1-230	Meteorology for Army Aviators
FM 3-3	Chemical Downwind Messages
FM 6-15	Field Artillery Meteorology
FM 34-81/AFJPM 15-127	Weather Support to Army Operations
FM 34-81-1*	Battlefield Weather Effects
FM 34-130	Intelligence Preparation of the Battlefield (IPB)
FM 100-5	Operations
FM 100-16	Support Operations: EAC
FM 101-5	Staff Organization and Operations

USN

RP 1	Environmental Effects on Naval Weapons Systems and Naval Warfare

RP 33	Fleet Oceanographic and Acoustic Reference Manual
RP 50	Catalog of Classified Naval Oceanographic Office Publications
RP 51	Catalog of Naval Oceanographic Office Unclassified Publications
OPNAVINST 3710.7	Aviation Weather Briefs
NAVOCEANOINST 3140	METOC Products Available From Warfighting Support Center Classified Services Branch
FNMOD Asheville (3146)	Climatology Program Services and Publications
CNMOCINST 3140.1()	U.S. Navy Oceanographic and Meteorological Support System Manual

USMC

NAVAIR 19-25-158	Meteorological Mobile Facility
MCWP 3-35.7*	Marine Corps Warfighting Publication; MAGTFMeteorological and Oceanographic Support

SOF

USSOCOM M 115-2*	METOC Support to SOF Operations
USSOCOM M 525-6	Critical METOC Thresholds for SOF Operations

Allied/Coalition/Foreign

AJP-3.11 (STANAG 2507)	Allied Doctrine for Meteorological and Oceanographic Support to Joint Forces
ATP 32 (STANAG 1171)	NATO Handbook of Military Oceanographic Information Services
AWP-01 (STANAG 6006)	NATO Maritime Meteorological Procedures and Services
AWP-02 (STANAG 6013)	NATO Meteorological Support Manual
AWP-03 (STANAG 6014)	NATO Meteorological Communications Manual
AWP-04 (STANAG 6015)	NATO Meteorological Codes Manual
AWP-05	NATO Library of Meteorological Tactical Decision Aids

Table 25: NATO documents with METOC relevance

Security Classification	Document	Date of issue	Custodian	Owner
N/PfPU	*List of NATO documents with METOC relevance*	*06/08*	*JFC HQ Brunssum*	*SHAPE*
N/PfPU	MC 115/26 Meteorological Support to NATO Forces	03/07	MCMG	MCMG
N/PfPU	MCMG Members' Handbook, 6TH EDITION	01/03	IMS	MCMG
NR	MC 126/11 Policy for the Provision of Military Oceanographic Services to NATO Forces	07/03	MILOC	MILOC
NR	MILOC Members' Handbook, 3RD EDITION	05/04	HQ SACT	MILOC
N/PfPU	AWP-1 (C) NATO Maritime Meteorological Procedures and Services Manual	06/01	MCMG	MCMG
NR	AWP-2 (Change 3) NATO Meteorological Support Manual	12/96	MCMG	MCMG
NR	AWP-3 (B) NATO Meteorological Communications Manual	06/02	DEU	MCMG
N/PfPU	AWP-4 (B) NATO Meteorological Codes Manual	07/05	DEU	MCMG
N/PfPU	AWP-5 NATO Library of Meteorological Tactical Decision Aids	06/01	BMWG	MCMG
NU	EXTAC 1014 Meteorological Support Manual	10/96	MCMG	MCMG
NR/ Rel PfP	ATP-32 (D) NATO Handbook of Military Oceanographic Information Services	04/08	CC Mar Naples	MILOC
NU	MCM 0178-2005 IMETOC Support Concept and Implementation Plan	10/05	SHAPE	SHAPE
NU	IMSTAM(MET)-0030-2005 IMETOC Requirements (NRF and Routine Ops)	12/05	ACO REP WG	SHAPE
N/PfPU	AJP 3.11 Allied Doctrine for Meteorological and Oceanographic Support to Joint Forces	05/04	HQ SACT	HQ SACT
NR	FPG Geo/METOC Functional Planning Guide (FPG) for Geo-Spatial/METOC Support	05/01	SHAPE	SHAPE
NU	Bi-SC 80-30 Recognised Environmental Picture (REP) Concept to Support NATO Combined and Joint Component Operations	04/03	HQ SACT	Bi-SC
N/PfPU	ACT Directive 75-2/G METOC Support Joint Functional Area Training Guide (JFATG)	06/07	HQ SACT	HQ SACT

Security Classification	Document	Date of issue	Custodian	Owner
N/PfPR	AD 80-34 Meteorological and Oceanographic (METOC) Services for ACE	03/02	SHAPE	SHAPE
NU	Bi-SC Skill Requirements and Training Guidelines for Deployed METOC Personnel in NATO Operations	06/03	HQ SACT	Bi-SC
N/PfPU	NRD 80-33, UWF	07/02	UWF WG	JFC HQ Brunssum
N/PfPU	ACOMEX Handbook	04/08	ACOMEX WG	SHAPE
NR	MC 0547 (draft) NATO Military Policy on the Avoidance of Harm to Marine Mammals within the Framework of Alliance Operations.	01/06	IMS	IMS
NU	MCM-51-00 Maritime Rapid Environmental Assessment (REA) Concept of Operations	03/00	HQ SACT	MILOC
NU	EXTAC 777 REA Rapid Environmental Assessment Warfare Support	02/01	CC Mar Northwood	MILOC
NC	STANFORGEN 306 Marine Mammal Risk Mitigation Guidelines For Exercises And Operations	02/06	SNMG1	SNMG1
NU	STANAG 1317 NATO Oceanographic Data Exchange Format 1 (NODEF 1)	02/99	GBR	MILOC
N/PfPU	STANAG 4044 Adoption of Standard Atmosphere	07/95	USA	MCMG
N/PfPU	STANAG 4061 Adoption of Standard Ballistic Message	10/00	USA	MCMG
N/PfPU	STANAG 4082 Standard Artillery Computer Met Message	04/00	USA	MCMG
N/PfPU	STANAG 4103 Requests for Ballistic and Special Purposes	05/01	USA	MCMG
N/PfPU	STANAG 4131 Standard Character by Character Met Message Format	04/98	USA	MCMG
N/PfPU	STANAG 4140 Standard Target Acquisition Met Message	05/01	GBR	MCMG
N/PfPU	STANAG 4168 Characteristics of Hydrogen Generating Equipment	03/98	USA	MCMG
N/PfPU	STANAG 6021 Smoke Munitions Expenditure Model – ATP 66	02/03	IMS	IMS
N/PfPU	STANAG 6022 Standard Gridded Data Meteorological Message	06/05	IMS	MCMG

Interagency References

Stafford Act, as amended, 42 USC 5121	Provides for federal assistance during a major disaster
Economy Act, as amended, 31 USC 1535-36	The statutory authority under which DoD is reimbursed for goods and services provided to another federal agency
National Response Framework (NRF)	The U.S. governments single, comprehensive, all-hazard, all-discipline response plan for domestic incident management
Deputy Secretary of Defense memo: Implementation guidance regarding the Office of the Assistant Secretary of Defense for Homeland Defense /YMD: 20030325	A memorandum terminating the executive agent authority for homeland defense from the Secretary of the Army. The duties and authorities associated with these DoD executive agent assignments are delegated to the ASD (HD) effective 16 may 03
DoDD 3025.18, Defense Support of Civil Authorities (DSCA) /ymd:20101229	Policy that guides for DSCA operations
DoD Financial Management Regulation (FMR), DoD 7000.14-R, volume 11b, Dec 2010	The DoD reimbursable operations, policy, and procedures – working capital funds.
National Strategy for Homeland Security/May 2010	The document establishing homeland security goals and strategy for the federal executive branch, agencies and non-federal agencies
Secretary of Defense Policy Memorandum, Policy implementation to establish commander, USJFCOM (cdrUSJFCOM), as the primary Joint Force Provider (JFP) /25 Jun 04	The SecDef policy memorandum that designates CDRUSJFCOM as the primary joint force provider
Homeland security presidential directive (HSPD)-5, management of domestic incidents /28 Feb 03	The directive establishing a single national incident management system (NIMS)
Homeland security presidential directive (HSPD)-8 national preparedness /17 Dec 03	Establishes policies to prevent and respond to terrorist acts, disasters and emergencies

National Incident Management System (NIMS) /December 2008	System that provides a consistent, nationwide approach for federal, state, local, and tribal governments; the private sector; and NGOs to work effectively and efficiently together to prepare for, respond to, and recover from domestic incidents regardless of size, cause, or complexity
DoD directive 5525.5 /15 Jan 86	Establishes standards/limitations for DoD Title 10 forces in support of civilian law enforcement
Joint Publication 3-0 Joint Operations /22 Mar 10	JCS guidance for conducting joint and multinational activities across the range of military operations
Joint Publication 3-08 Interagency, Intergovernmental Organization, and Nongovernmental Organization Coordination During Joint Operations /17 Mar 06	JCS doctrine for coordination between the combatant commands of the department of defense and agencies of the U.S. government, nongovernmental and private voluntary organizations during unified actions and joint operations
Joint Publication 3-61 Public Affairs /25 Aug 10	JCS doctrine for us military support to the media in conjunction with military operations
DoD Reimbursable Rates: comptroller.defense.gov/rates	The DoD reimbursable rates electronic address
Deputy SecDef memo for reporting immediate response /25 Apr 05	The Deputy Secretary of Defense memo directing timely reporting of immediate response
CJCS Standing EXORD DTG: 141745zAUG09 Defense Support of Civil Authorities	The CJCS standing DSCA EXORD for defense support of civil authorities
Defense Transportation Reg 4500.9R /YMD:20050601	The DoD transportation regulation parts i through vi
CJCSI 3121.01b /YMD:20050613	The standing rules of engagement/standing rules for the use of force for us forces

Appendix D – Joint METOC Web-Based Resources

The below links were compiled by CENTCOM and provided at the 2009 Senior METOC Officer conference. Links to non-DoD sites do not imply CENTCOM SMO endorsement as approved METOC data sources, not does their inclusion in the handbook indicate they are approved. They are provided as starting reference point for JMOs or SMOs. The links are hyperlinks and should function for users of the electronic version of this handbook, assuming a user is connected to the appropriate network. The links were active as of March 2009, but are not guaranteed to remain functional. A more dynamic list is expected to be placed on the planned SMO collaboration SIPR portal site.

Useful Websites - NIPR

Climate
Pacific ENSO update http://www.prh.noaa.gov/peac/update.php
Hawaii Drought Monitor http://www.drought.unl.edu/dm/DM_state.htm?HI
Intergovernmental Panel on Climate Change http://www.ipcc.ch/

Commercial Weather Services
Tropical Storm Risk http://www.tropicalstormrisk.com
Weather Underground http://www.wunderground.com
Yahoo (weather news) http://weather.yahoo.com/
Surf News Network http://www.surfnewsnetwork.com/
Storm Pulse http://www.stormpulse.com

Earthquake
Earthquakes http://earthquake.usgs.gov/eqcenter/recenteqsww/Quakes/quakes_big.php
Euro Med Seismologic Center http://www.emsc-csem.org/index.php?page=home
Seismic Monitor http://www.iris.edu/seismon/

Fire outlooks
http://www.spc.noaa.gov/products/fire_wx/overview.html

Global Drought Monitor
http://drought.mssl.ucl.ac.uk/drought.html?map=%2Fwww%2Fdrought%2Fweb_pages%2Fdrought.map&program=%2Fcgi-bin%2Fmapserv&root=%2Fwww%2Fdrought2%2F&map_web_imagepath=%2Ftmp%2F&map_web_imageurl=%2Ftmp%2F&map_web_template=%2Fdrought.html

Global Flooded Lands
http://www.dartmouth.edu/~floods/Modis.html

Global Hazards/Extremes
http://www.ncdc.noaa.gov/sotc/hazards/

Hurricanes

National Hurricane Center http://www.nhc.noaa.gov/
Historical Hurricane Tracks http://maps.csc.noaa.gov/hurricanes/viewer.html
NHC Archive http://www.nhc.noaa.gov/pastall.shtml
Central Pacific Hurricane Center http://www.prh.noaa.gov/hnl/cphc
Tropical Storm Risk http://tsr.mssl.ucl.ac.uk/
Joint Typhoon Warning Center https://metocph.nmci.navy.mil/jtwc.php
NRL Monterey Tropical Cyclone http://www.nrlmry.navy.mil/tc_pages/tc_home.html
Tropical Storm Risk http://tsr.mssl.ucl.ac.uk/
https://navy.ncdc.noaa.gov/ (escape out of the CAC and click authorized user) under Products>Tropical Climatology

International Weather Services (* denotes site has a useful Climo/long term fcst section)

ECMWF (England) http://www.ecmwf.int/
* Australia Bureau of Meteorology http://www.bom.gov.au/
* Singapore Weather Service http://app.nea.gov.sg/cms/htdocs/mss2.asp
* Japan Weather Service http://www.jma.go.jp/jma/indexe.html
Vietnam Weather Service http://www.nchmf.gov.vn/
* Taiwan Weather Bureau http://www.cwb.gov.tw/V5e/index.htm
Solomon Islands http://pi-gcos.org/solomon/default.htm
RSMC/TCP http://www.wmo.ch/web/www/tcp/Advisories-RSMCs.html
Philippines Weather Service http://www.pagasa.dost.gov.ph/
* India (hydro-meteorological section = rainfall maps)
http://www.imd.ernet.in/doc/organization.htm
Papua New Guinea national disaster center http://www.pngndc.gov.pg/index.htm
La Reunion RSMC http://www.meteo.fr/temps/domtom/La_Reunion/#
Fiji (RSMC) http://www.met.gov.fj/index.php
China WMO http://www.worldweather.org/001/m001.htm
Hong Kong/with rest of China http://www.hko.gov.hk
Korea http://web.kma.go.kr/eng/index.jsp
Worldwide Weather & Climate Events http://www.ncdc.noaa.gov/oa/reports/weather-events.html
World Meteorological Organization weather and climate http://worldweather.wmo.int/asia.htm
Worldwide national MET services http://www.dwd.de/de/wir/Interessantes/Links/Links.htm
Natural Hazards Site http://www.intute.ac.uk/sciences/hazards/Storms-Case.html
International Research Outlooks
http://iri.columbia.edu/climate/forecast/net_asmt/2006/index.html

Landslide Potential

http://trmm.gsfc.nasa.gov/publications_dir/potential_landslide.html

Map and reference tools

World Airfield Data http://worldaerodata.com/
http://www.airnav.com/airports/
http://www.baseops.net/
Lat-Lon Distance Calculator http://jan.ucc.nau.edu/~cvm/latlongdist.html

Lat Lon Distance Calculator 2 http://www.wcrl.ars.usda.gov/cec/java/lat-long.htm
Cross Wind Calculator http://www.csgnetwork.com/avxwindfactor.html
World City Populations http://world-gazetteer.com/
World Atlas http://www.worldatlas.com/aatlas/world.htm
Antarctica map and background info http://lima.usgs.gov/
Country background and stats http://www.infoplease.com/countries.html
Civilian ship tracker http://www.sailwx.info/

Military METOC
Navy METOC Public-facing Portal: http://www.usno.navy.mil/NOOC/nmfc-n
Naval Oceanography Portal: https://nepoc.oceanography.navy.mil/catalog/index.html
AFWA https://weather.afwa.af.mil/
SMO Portal https://us.jfcom.mil/sites/J3-4/J33/JDC/METOC/JMB/default.aspx
JTF HD Staff Weather page http://www1.apan-info.net/Default.aspx?tabid=1514

Natural disaster
Disaster Watch http://home.att.net/~thehessians/disasterwatch.html
UN Relief Web http://www.reliefweb.int/rw/dbc.nsf/doc103?OpenForm&rc=3#show
Center of Excellence for Disaster Management http://coe-dmha.org/
USAID Disaster Assistance
http://www.usaid.gov/our_work/humanitarian_assistance/disaster_assistance/
Historical disaster statistics http://www.em-dat.net/
CDC worldwide weather events
http://www.ncdc.noaa.gov/oa/climate/research/hazards/index.php
International Disaster Database http://www.em-dat.net/

NOAA/National Weather Service meteorological sites
Local http://www.crh.noaa.gov/forecasts/HIZ010.php?warncounty=HIC003&city=Aiea
Hawaii rainfall summary http://www.prh.noaa.gov/data/HFO/RRAHFO
Hawaii IR Satellite http://www.prh.noaa.gov/hnl/satellite/Hawaii_IR_loop.gif
Hawaii Vis Satellite http://www.prh.noaa.gov/hnl/satellite/State_VIS_loop.gif
Hawaii satellite interpretation message http://www.prh.noaa.gov/data/HFO/SIMHI
Hawaii state composite radar http://radar.weather.gov/Conus/hawaii_loop.php
Long Range models http://www.nco.ncep.noaa.gov/pmb/nwprod/analysis/
East Pac LR models http://www.nco.ncep.noaa.gov/pmb/nwprod/analysis/index_epac.shtml
Soundings http://weather.uwyo.edu/upperair/naconf.html
NWS National/ International Obs http://weather.noaa.gov/
MODIS Rapid Response Server http://rapidfire.sci.gsfc.nasa.gov
Marshall Islands NWS site http://www.prh.noaa.gov/majuro/
Seas Surface Temp Alaska http://www.osdpd.noaa.gov/PSB/EPS/SST/contour.html
Antarctica http://amrc.ssec.wisc.edu/realtime.html
US Center for Ocean, Land and Atmosphere Studies http://wxmaps.org/pix.html
National Snow and Ice Data Center http://nsidc.org/
Heavy Precipitation http://www.ncdc.noaa.gov/oa/climate/severeweather/rainfall.html
Precipitation & temperature maps
http://www.cpc.ncep.noaa.gov/products/analysis_monitoring/regional_monitoring/

Storm events (US) http://www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwevent~storms

Oceanography
Ocean Surface Winds (QuickSCAT) http://manati.orbit.nesdis.noaa.gov/quikscat/
National Data Buoy Center http://www.ndbc.noaa.gov/
NOAA Tides On-line http://tidesonline.nos.noaa.gov/
NOAA Tides and Currents http://tidesandcurrents.noaa.gov/
Hawaii Pacific University Oceanic Institute http://www.oceanicinstitute.org/nav.php
Hawaii Ocean Time Series http://hahana.soest.hawaii.edu/hot/
UK commercial tides http://easytide.ukho.gov.uk/EasyTide/EasyTide/index.aspx
International Bathymetric Chart of the Southern Ocean http://www.ibcso.org/
SeaWIFs, MODIS AQUA http://oceancolor.gsfc.nasa.gov/
Sea heights (commercial site) http://www.aviso.oceanobs.com/
Pacific Islands Ocean data http://ilikai.soest.hawaii.edu/HILO/
Asia – Pacific Data Center http://apdrc.soest.hawaii.edu/

Snow Cover
http://climate.rutgers.edu/snowcover/index.php
http://www.ssd.noaa.gov/PS/SNOW/
http://www.ssd.noaa.gov/VAAC/

Space Weather
NOAA Space Weather tutorial http://www.sec.noaa.gov/info/Satellites.html
Solar/Geomag Event Summary http://www.sec.noaa.gov/ftpmenu/forecasts/SGAS.html
NOAA Today's Space Weather http://www.sec.noaa.gov/today.html
Space Weather http://www.sel.noaa.gov/solcoord/solcoord.html

Tornadoes
https://www.afccc.af.mil/products/maps/Historic tornado tracks

Tsunami
Pacific Tsunami Warning Center http://www.prh.noaa.gov/ptwc/
West Coast and Alaska Tsunami Warning Center
http://wcatwc.arh.noaa.gov/events/eventmap.php
Univ of WA Tsunami http://www.ess.washington.edu/tsunami/index.html

Volcano
Volcano News http://www.volcanolive.com/volcanolive.html
Volcano Discovery http://www.volcanodiscovery.com/volcano-tours/erupting_volcanoes.html
Volcano Alerts http://www.intlvrc.org/alerts.htm
Philippines Volcanology Institute http://www.phivolcs.dost.gov.ph/
Tokyo Volcanic Ash Advisory Center http://ds.data.jma.go.jp/svd/vaac/data/index.htm
Volcano Webs in Japan http://hakone.eri.u-tokyo.ac.jp/vrc/links/links.html
Alaska Volcano Observatory http://www.avo.alaska.edu/
Indonesia Volcanos http://portal.vsi.esdm.go.id/joomla/
Weekly Global Vulcanism Report http://www.volcano.si.edu/

NOAA Volcanic Ash http://www.ssd.noaa.gov/VAAC/
Michigan Tech Univ Volcano http://www.geo.mtu.edu/volcanoes/

METOC websites - SIPR

Joint AF & Army Weather Information Network (JAAWIN) (links to all AF OWSs)
http://safwin.offutt.af.smil.mil/index.html

28 OWS (CENTAF Region) http://28ows.shaw.af.smil.mil/

21 OWS (USAFE Region) http://ows.usafe.af.smil.mil/

Naval Oceanography Portal: (links to all USN directorates/production centers)
http://nop.oceanography.navy.smil.mil/Content/

FNMOC http://portal.fnmoc.navy.smil.mil/metoc/

14 WS (aka AF Combat Climatology Center) http://siprweb2.asheville.af.smil.mil/SCIS/

CENTCOM SMO
http://www.rel.cie.centcom.smil.mil/sites/organization/directorate/ccj3/o/ow/default.aspx

MNF-I / MNC-I OIF JMO http://www.corps.res.s-iraq.centcom.smil.mil/sites/special/swo/default.aspx

CJTF-101 OEF JMO http://www.afghan.centcom.smil.mil/cj2/swo/default.aspx

NORTHCOM/NORAD SMO
https://operations.noradnorthcom.smil.mil/sites/BattleStaff/DSCA/metoc/default.aspx

CCMD METOC links (on NORTHCOM page)
https://operations.noradnorthcom.mil/sites/battlestaff/DSCA/metoc/2tab/METOC%20Contacts.aspx

NSA Worldwide SIGINT Weather http://www.nsa.smil.mil/weather/

GLOSSARY

PART I – Abbreviations and Acronyms

AAR	after action report
ACC	Air Combat Command
ACC	air component commander
ACE	aviation combat element (USMC)
ACR	armored cavalry regiment
ADDU	additional duty
AEF	air and space expeditionary force
AEW	air expeditionary wing
AFCCC	Air Force Combat Climatology Center
AFFOR	Air Force forces
AFI	Air Force instruction
AFMAN	Air Force manual
AFMSS	Air Force Mission Support System
AFRES	Air Force Reserve
AFSC	Air Force specialty code
AFSOC	Air Force Special Operations Command
AFSPC	Air Force Space Command
AFW	Air Force Weather
AFWA	Air Force Weather Agency
AG	Aerographer (USN)
AMC	Air Mobility Command
ANG	Air National Guard
AOA	amphibious objective area
AOC	air operations center
AOR	area of responsibility
AR	air refueling
AR	Army regulation
AREPS	Advanced Refractive Effects Prediction System
ARFOR	Army forces
ARTYMET	artillery meteorology
ATO	air tasking order
ATS	air traffic service
AUTODIN	Automatic Digital Network
AVN	aviation
AWN	Automated Weather Network
BBS	bulletin board system
BDE	brigade
BN	battalion
bps	bits per second
BT	bathythermograph
BTXT	bathythermograph data extract
C2	command and control

C2PC	command and control personal computer
C4I	command, control, communications, computers and intelligence
CAP	crisis action planning
CAT	crisis action team
CBRNE	chemical, biological, radiological, nuclear and high-yield explosives
CCDR	combatant commander
CCMD	combatant command
CE	command element (USMC)
CJCSI	Chairman of the Joint Chiefs of Staff instruction
CJCSM	Chairman of the Joint Chiefs of Staff manual
CJTF	commander, joint task force
CMS	communications subsystem (usmc tmq-44a)
CNMOC	Commander, Naval METOC Command
COA	course of action
COAMPS	Coupled Ocean-Atmosphere Mesoscale Prediction System
COCOM	combatant command (command authority)
COE	common operating environment
COMSEC	communications security
CONOPS	concept of operations
CONPLAN	concept plan
CONUS	continental United States
COP	common operational picture
CVN	nuclear aircraft carrier
CWT	combat weather team
DII	defense information infrastructure
DISA	Defense Information Systems Agency
DISN	Defense Information System Network
DIV	division
DMS	defense message system
DMSP	Defense Meteorological Satellite Program
DOD	Department of Defense
DSCR	Defense Supply Center Richmond
DSN	Defense Switched Network
EAC	echelon above corps (Army)
EAD	earliest arrival date
EHF	extra high frequency
EO	electro-optical
EOD	explosive ordinance disposal
FALOP	forward area limited observation program
FAX	facsimile
FLENUMMETOCCEN	Fleet Numerical METOC Center
FM	field manual
FM	frequency modulation
FMF	Fleet Marine Force
FNMOC	Fleet Numerical METOC Center
FOB	forward operating base

FORSCOM	United States Army Forces Command
FTP	file transfer protocol
GBS	Global Broadcast System
GCCS	Global Command and Control System
GCCS-A	GCCS-Army
GCCS-M	GCCS-Maritime
GCE	ground combat element
GIS	geospatial information services
GOES	geostationary operational environmental satellite
GPS	Global Positioning System
HF	high frequency
HFRB	high frequency radio broadcast
HMMWV	high mobility motorized wheeled vehicle
HQ	headquarters
IA	individual augmentee
IERS	International Earth Rotation Service
IMETS	Integrated Meteorological System
IMOSS	interim mobile oceanographic support system
INMARSAT	international maritime satellite
ISR	intelligence, surveillance, and reconnaissance
IWEDA	Integrated Weather Effects Decision Aid
JAAWIN	Jjoint Air Force-Army Weather Information Network
JAOC	joint air operations center
JCS	Joint Chiefs of Staff
JFACC	joint force air component commander
JFLCC	joint force land component commander
JFMCC	joint force maritime component commander
JFSOCC	joint force special operations component commander
JMCIS	Joint Maritime Command Information System
JMCOMS	joint maritime communications system
JMD	joint manning document
JMO	joint METOC officer
JMV	joint METOC viewer
JOA	joint operations area
JOAF	joint operations area forecast
JOPES	Joint Operation Planning and Execution System
JP	joint publication
JPEC	joint planning and execution community
JSCP	Joint Strategic Capabilities Plan
JSOTF	joint special operations task force
JTCB	joint targeting coordination board
JTMD	joint table of mobilization and distribution
JWICS	Joint Worldwide Intelligence Communications System
LAN	local area network
LCC	land component commander
LDO	limited duty officer

LSS	local sensor subsystem (USMC TMQ-44a)
MAGTF	Marine air ground task force
MAJCOM	major command (USAF)
MARFOR	Marine Corps forces
MARFOREUR	Marine Corps Forces, Europe
MAW	Marine aircraft wing
MCS	maneuver control system
MEF	Marine expeditionary force
MET	meteorological
METMF(R)	meteorological mobile facility(replacement)
METOC	meteorological and oceanographic
METWATCH	meteorological watch
MIST	meteorological information standard terminal
MM5	mesoscale model version 5
MOS	Military occupational specialty
MOSS	mobile oceanographic support system
MRS	meteorological radar subsystem (USMC TMQ-44a)
MRS	mini rawinsonde system
MSC	Mission Support Center
MSS	meteorological satellite subsystem (USMC TMQ-44a)
MST	MEF weather support team
MWSG	Marine wing support group
MWSS	Marine wing support squadron
NAF	numbered air force
NAMIS	NATO Automated Meteorological Information System
NATO	North Atlantic Treaty Organization
NAVEUR	Naval forces, Europe
NAVFOR	Naval forces
NAVOCEANO	Naval Oceanographic Office, Stennis Space Center, MS
NBC	nuclear, biological, chemical
NCEP	National Center for Environmental Prediction
NCO	non-commissioned officer
NEC	navy enlisted code
NGB	National Guard Bureau
NIPRNET	Nonsecure Internet Protocol Router Network
NITES	Navy Integrated Tactical Environmental System
NOAA	National Oceanic and Atmospheric Administration
NOGAPS	Naval Operational Global Atmospheric Prediction System
NSWC	Naval Special Warfare Command
N-TFS	New Tactical Forecast System
NTM	national technical means (of verification)
NTP	network time protocol
NWS	National Weather Service
OA	Operations Aerography shipboard METOC division
OPAREA	operations area
OPLAN	operational plan

OPORD	operation order
OPSEC	operations security
OPTASK	operations task
OWS	operational weather squadron
PACAF	Pacific Air Forces
PACFLT	Pacific Fleet
PACOM	Pacific Command
PCS	processing subsystem (USMC TMQ-44a)
PMS	portable meteorological subsystem (USMC TMQ-44a)
PMSV	pilot-to-METRO service
POC	point of contact
POD	point of departure
POE	port of embarkation; port of entry
PSYOPS	psychological operations
QC	quality control
RATT	radio teletype
RFF	request for forces
RSS	remote sensor subsystem (USMC TMQ-44a)
SAR	search and rescue
SATCOM	satellite communications
SECDEF	Secretary of Defense
SHF	super-high frequency
SIPRNET	SECRET Internet Protcol Router Network
SMO	senior meteorological and oceanographic officer
SOC	special operations center / commander
SOCEUR	Special Operations Component, United States European Command
SOCJFCOM	Special Operations Command, Joint Forces Command
SOCPAC	Special Operations Component, United States Pacific Command
SOCSOUTH	Special Operations Command, United States Southern Command
SOF	special operations forces
SOWT	special operations weather team
SPECAT	special category
SSS	shelter subsystem (USMC TMW-44a)
SST	sea surface temperature
SWI	special weather intelligence
SWO	staff weather officer
TACC	tanker airlift control center
TACMET	tactical meteorology
TADIXS	tactical data information exchange system
TAF	terminal aerodrome forecast
TALCE	tactical airlift control element
TAWS	target acquisition weather software
TENCAP	tactical exploitation of national capabilities program
TOPS	thermodynamic ocean prediction system
TPFDD	time-phased force and deployment data
TTF	tanker task force

T-VSAT	Tactical-very small aperature terminal
UAV	unmanned aerial vehicle
UCP	Unified Command Plan
UHF	ultra high frequency
USAFE	United States Air Forces Europe
USAREUR	United States Army Forces, European Command
USASOC	United States Army Special Operations Command
USCENTCOM	United States Central Command
USEUCOM	Unitied States European Command
USGS	United States Geological Survey
USJFCOM	United States Joint Forces Command
USMC	United States Marine Corps
USNAVEUR	United States Naval Forces, Europe
USNO	United States Naval Observatory
USNORTHCOM	United States Northern Command
USPACOM	United States Pacific Command
USSOCOM	United States Special Operations Command
USSOUTHCOM	United States Southern Command
USSTRATCOM	Unitied States Strategic Command
USTRANSCOM	Unitied States Transportation Command
UTC	unit type code
VHF	very high frequency
VSAT	very small aperture terminal
WMO	World Meteorological Organization
WS	weather squadron
WX	weather

PART II- Terms and Definitions

atmospheric environment. The envelope of air surrounding the Earth, including its interfaces and interactions with the Earth's solid or liquid surface.

joint meteorological and oceanographic coordination cell. A subset of a joint meteorological and oceanographic coordination organization which is delegated the responsibility of executing the coordination of meteorological and oceanographic support operations in the operational area. Also called JMCC.

joint meteorological and oceanographic coordination organization. A Service meteorological and oceanographic organization which is designated within the operations order as the lead organization responsible for coordinating meteorological and oceanographic operations support in the operational area. Also called JMCO.

joint meteorological and oceanographic officer. Officer designated to provide direct meteorological and oceanographic support to a joint force commander. Also called JMO.

joint operations area forecast. The official baseline meteorological and oceanographic forecast for operational planning and mission execution within the joint operations area. Also called JOAF.

maritime environment. The complex union and interaction between oceans, seas, bays, estuaries, and other major water bodies, with the atmosphere and land seaward of the mean high water mark.

meteorological and oceanographic. A term used to convey all meteorological, oceanographic, and space environmental factors as provided by Services, support agencies, and other sources. These factors include the whole range of atmospheric (weather) and oceanographic phenomena, from the sub-bottom of the earth's oceans up to the space environment (space weather). Also called METOC.

meteorological and oceanographic data. Measurements or observations of meteorological and oceanographic variables.

meteorological and oceanographic environment. The surroundings, which include conditions, resources, and natural phenomena, in and through which the joint force operates. The complete environment extends from the sub-bottom of the Earth's oceans, through maritime, land areas, airspace, ionosphere, and outward into space.

meteorological and oceanographic operations support community. The collective of electronically connected, shore-based meteorological and oceanographic production facilities/centers, theater and/or regional meteorological and oceanographic production activities. Also called MOSC. See also meteorological and oceanographic.

meteorological watch. Monitoring the weather for a route, area, or terminal and advising concerned organizations when hazardous conditions that could affect their operations or pose a hazard to life or property are observed or forecast to occur. Also called METWATCH.

meteorology. The study dealing with the phenomena of the atmosphere including the physics, chemistry, and dynamics extending to the effects of the atmosphere on the Earth's surface and the oceans.

oceanography. The study of the sea, embracing and integrating all knowledge pertaining to the sea and its physical boundaries, the chemistry and physics of seawater, and marine biology. From a military perspective, oceanography includes basic oceanography plus the study of bathymetry, hydrography, geophysics, astrometry and precise time; supported by ocean engineering, operational supercomputing, and operations research.

precise time and time interval. A reference value of time and time interval (frequency). Standards are maintained through traceable measurements referenced to a primary timing or frequency standard. The Department of Defense standard for precise time and time interval is Universal Coordinated Time as maintained by the United States Naval Observatory.

senior meteorological and oceanographic officer. Meteorological and oceanographic officer responsible for assisting the combatant commander and staff in developing and executing operational meteorological and oceanographic service concepts in support of a designated joint force. Also called SMO. See also meteorological and oceanographic.

space environment. The environment corresponding to the space domain, where electromagnetic radiation, charged particles, and electric and magnetic fields are the dominant physical influences, and that encompasses the earth's ionosphere and magnetosphere, interplanetary space, and the solar atmosphere.

space weather. The conditions and phenomena in space and specifically in the near-Earth environment that may affect space assets or space operations. Space weather is influenced by phenomena such as solar flare activity, ionospheric variability, energetic particle events, and geophysical events.

terrestrial environment. The Earth's land area, including its manmade and natural surface and sub-surface features, and its interfaces and interactions with the atmosphere and the oceans.