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Missile Survey: Ballistic and Cruise Missiles of Foreign Countries

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Missile Survey: Ballistic and Cruise Missiles of Foreign Countries

Summary

This report provides a current inventory of ballistic and cruise missiles throughout the world and discusses implications for U.S. national security policy. (Note: the Defense Threat Reduction Agency's Weapons of Mass Destruction Terms Reference Handbook defines a **ballistic missile** as " a missile that is guided during powered flight and unguided during free flight when the trajectory that it follows is subject only to the external influences of gravity and atmospheric drag" and a **cruise missile** as "a long-range, low-flying guided missile that can be launched from air, sea, and land.") Ballistic and cruise missile development and proliferation continue to pose a threat to United States national security interests both at home and abroad. While approximately 16 countries currently produce ballistic missiles, they have been widely proliferated to many countries - some of whom are viewed as potential adversaries of the United States. Nineteen countries produce cruise missiles which are also widely proliferated and many analysts consider cruise missile proliferation to be of more concern than that of ballistic missile proliferation, primarily due to their low threshold of use, availability and affordability, and accuracy. This report will be updated annually.

With the fall of Iraq, many analysts see North Korean and Iranian missile and WMD programs as the primary "rogue nation" long-range ballistic missile threat to U.S. national security. Russia and China continue to be the only two countries that could conceivably attack the United States with intercontinental ballistic missiles armed with nuclear weapons but improved relationships with both countries have done a great deal to diminish this threat over the past decades. India's and Pakistan's ongoing missile development programs is viewed by many analysts as highly aggressive and even provocative, but is generally viewed on a regional context as opposed to a direct threat to the United States. The renewal of dialogue between these two countries in an attempt to settle their disputes by diplomatic means may also help in slowing missile proliferation as well as preventing their potential use in this region.

The implications of ballistic and cruise missile proliferation to the United States has necessitated both nonproliferation and counterproliferation approaches in trying to stem the development and deployment and export of missiles. Past Administrations have been characterized as nonproliferation-oriented by some analysts while the current Bush Administration is viewed by some as having abandoned nonproliferation for a more action-oriented counterproliferation approach towards missiles. Other experts have suggested that the United States must somehow find the right balance between missile nonproliferation and counterproliferation policies if meaningful, long-term progress is to be made. While some believe that missile proliferation can be "rolled back"by some combination of these approaches, others note that both ballistic and cruise missiles have become such an integral part of many countries' national security frameworks that it is highly unlikely that countries will abandon their programs in deference to U.S. and Western pressure.

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Introduction

Foreign ballistic and cruise missiles pose a potential threat to the national security interests of the United States. While weapons of mass destruction (WMD) can be delivered by a variety of means including aircraft, artillery, and asymmetric means, it is missile-delivered WMDs that garner the most domestic and international political attention. Countries with a WMD missile capability have the potential to influence the actions of other countries in their regions or even countries on another continent and, in some cases, destroy population centers and national infrastructure. At the present time, the United States is within range of the ballistic missiles of Russia, China, and perhaps North Korea, as well as France and the United Kingdom. Several other countries have missiles within range of U.S. overseas facilities and interests. A number of countries are attempting to either procure or develop longer-range ballistic missiles to accurately deliver WMDs over great distances and many fear that one day such an attack may be launched against the United States by a regional power or rogue state where stringent political and military controls over these weapons are not exercised.

Estimates of the missile threat to the United States continue to be controversial for a number of reasons. One reason is that many missile programs have moved underground in some countries and can also be hidden in a country's civilian space or aerospace industry, making it much harder for intelligence organizations to track development. Also, as countries increasingly share intelligence about missile proliferation, different estimates about range, operational capability, and possible payloads lead to conflicting views.[1] There is also some controversy still surrounding the 1995 National Intelligence Estimate and 1998's Report of the Commission to Assess the Ballistic Missile Threat to the United States (P.L. 104-201) also known as the Rumsfeld Commission Report. Even in 2003 and 2004, the Rumsfeld Commission Report continues to be the open source benchmark for missile proliferation, despite numerous developments in missile programs world-wide. While there is still some disagreement about the extent of the missile threat, the Bush Administration's unwavering commitment to ballistic missile defense, withdrawal from the Anti Ballistic Missile (ABM) Treaty, and the December 2002 Presidential

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[1] An example of this is Iran's Shahab-3 missile. U.S. intelligence believes that the range is about 800 miles, qualifying it as a medium range ballistic missile (MRBM) while the head of the Israeli Mossad reportedly told the NATO North Alliance Council in June of 2002 that the Shahab-3's range was closer to 1,860 miles qualifying it as an intermediate range ballistic missile (IRBM).

Directive to begin fielding the initial set of ballistic missile defense capabilities continues to overshadow many of the contentious issues related to the missile threat.

Recent estimates released by the U.S. Intelligence Community vary little from those issued in the late 1990s. Iran is still assessed as being capable of developing an intercontinental ballistic missile (ICBM)[2] capable of reaching the United States by 2015[3] although in the 1995 National Intelligence Estimate (NIE) most intelligence agencies believed that this could happen before 2015. The NIE also cites North Korea as posing an ICBM threat to the United States before 2015. Likewise, North Korea's ballistic missile development time lines may need to be re-evaluated as new missile programs have been made public. While not posing a direct threat to the United States, the proliferation of shorter range ballistic missiles and cruise missiles has resulted in heightened regional tensions in the Middle East, between India and Pakistan, and between China and Taiwan.

Missile Production and Development Facilities

One significant trend is the increasing number of missile production and development facilities. Sixteen countries are known to produce ballistic missiles: the United States, France, Russia, China, North Korea, South Korea, Taiwan, India, Pakistan, Iran, Iraq, Israel, Egypt, Syria, Ukraine, and Argentina. Several other countries, including Germany, Japan, Great Britain, South Africa, Brazil, and Argentina, could produce ballistic missiles but have chosen not to. When a country has a missile production facility, its ability to produce large quantities of missiles is limited only by its ability to obtain certain critical materials and components. When a country acquires a large number of missiles and launchers, it may be able to launch sustained attacks and to overwhelm existing and planned missile defense systems. Production and research facilities also enable these regional powers to enhance the range, accuracy, destructiveness, and penetration aids of their missiles. Another important factor is that countries with an indigenous missile production capability also avoid export control restrictions when trying to import missiles and missile technology from outside sources. Finally, once a country produces missiles it can consider exporting them as well as the production technology to still more countries for financial, political, or ideological rewards. North Korea has been exporting

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[2] Ballistic missiles are classified by their range as follows:
SRBM = Short-range ballistic missile, 70-1,000 km (43-620 mi.)
MRBM = Medium-range ballistic missile, 1,000-3,000 km (620-1,860 mi.)
IRBM = Intermediate-range ballistic missile, 3,000-5,500 km (1,860-3,410 mi.)
ICBM = Intercontinental ballistic missile, 5,500 km + (3,410 mi. +)
Cruise missile abbreviations:
ALCM = Air-launched cruise missile.
ASM = Anti-ship missile.
CM = Cruise missile (generic).
LACM = Land attack cruise missile.
SLCM = Submarine-launched cruise missile.

[3] "Ballistic and Cruise Missile Threat," *National Air Intelligence Center*, September 2000, p. 15.

missiles and missile production facilities for a number of years, and there is concern that more countries will enter the missile market as suppliers. Russian and Chinese organizations have been primary sources of missile technology and, in the past, Western firms also have transferred missile technology.

Nuclear, Biological, and Chemical Warheads[4]

The primary cause for concern with missile proliferation is that missile systems can provide countries an effective vehicle for delivering nuclear, chemical, or biological weapons over long distances. The most worrisome trend is the growing number of countries with both long-range missile programs and WMD programs. India and Pakistan have tested MRBMs and nuclear explosive devices. North Korea, Iran, and Israel are suspected to have nuclear, chemical, and biological weapons programs as well as a variety of short and medium range missiles.

Over the last several years, nuclear weapons programs have declined in number. South Africa reportedly dismantled the nuclear weapons and missiles that it had developed. Argentina, Brazil, South Korea, and Taiwan also abandoned earlier nuclear weapon programs. Belarus, Kazakhstan, and Ukraine transferred to Russia the nuclear weapons they inherited from the Soviet Union. Recent revelations about the possibility of North Korea's development of nuclear weapons and Iran's revitalized nuclear program could reverse this favorable trend.

Several other countries that have missiles also have chemical weapons, and a few have chemical warheads for their missiles. It has been reported that during the 1991 Gulf War, Iraq had missile warheads filled with a variety of nerve agents and others with botulinum toxin and anthrax. China, Egypt, India, Iran, Israel, Libya, North Korea, Pakistan, Russia, Saudi Arabia, Serbia, South Korea, Syria, Taiwan, and Vietnam, all have missiles and reportedly have chemical weapons. Several countries reportedly have biological weapons programs, including China, Egypt, Iran, Iraq, Israel, Libya, North Korea, Pakistan, and Russia.[5]

Ballistic missiles armed with conventional high-explosive warheads proved to be important weapons of terror when used against cities in the Iran-Iraq war and the 1991 Gulf War. The development of advanced conventional warheads, such as cluster bombs and fuel-air explosives, and enhanced missile reliability and accuracy will increase the military effectiveness of missiles armed with conventional warheads. The United States has demonstrated the military effectiveness of cruise missiles in several conflicts and a new generation of stealthy, more capable cruise missiles is presently in development in a number of countries.[6]

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[4] See also CRS Report RL30699, *Nuclear, Biological, and Chemical Weapons and Missiles: Status and Trends*.

[5] See also CRS Report 98-103, *Nuclear, Biological, and Chemical Weapons and Ballistic Missiles: The State of Proliferation.* (This report is archived - contact Andrew Feickert, CRS to obtain a copy).

[6] "Ballistic and Cruise Missile Threat", p. 23.

The Demand for Missiles and WMD

As missiles and missile production technology have become widely available, the demand for longer-range missiles and nuclear, biological, and chemical warheads increased. Because of their relatively low cost, ability to penetrate defenses, strike deep into an enemy's homeland, and to deliver nuclear or biological weapons that could threaten the survival of an enemy country, missiles have become a delivery system of choice and a symbol of national might.

The technological and military prowess of the United States was demonstrated for the world during the 1991 Gulf War and again more recently in Afghanistan and Operation Iraqi Freedom (OIF). As a result, adversarial countries and non-state groups may be more likely to avoid direct conventional military confrontation with the U.S. Many potential adversaries continue to develop missiles and WMD as means to counter U.S. military strength in their region and to intimidate or deter their neighbors. At the same time, several allies and neutral countries are also building missiles and developing WMD to promote their perceived national security interests. Non-state groups, as well as a few national governments, tend to employ paramilitary terrorists to attack U.S. installations and citizens. There is increasing concern that small, hostile countries and terrorist groups will employ nuclear, biological, or chemical weapons against U.S. citizens abroad or at home.

Any stigma associated with the possession or use of missiles was severely reduced by the Iran-Iraq War, the Afghan War, the Gulf War, Chinese intimidation of Taiwan, Russian use in its Chechen conflicts, and by U.S. use of Tomahawk missiles in Iraq, Bosnia, Afghanistan, and Sudan. In regional wars, missile attacks and artillery fire on civilian population centers have become a standard form of combat, as the use of standoff weapons (usually cruise missiles or air-to-surface guided weapons) against hostile military units, intelligence centers, terrorist camps, and WMD facilities has become a commonly-accepted U.S. military practice.

The Bush Administration's emphasis on missile defense has resulted in a dramatic acceleration of that program to the point where some observers project a limited capability to defend the United States against a limited ballistic missile attack may soon be deployed. In December 2002, President Bush announced that the United States would build a limited missile defense system by 2004 primarily designed to defend the U.S. against a very limited ballistic missile attack by North Korea or China. Additional sites would also be constructed to defend the U.S. against missile attacks from the Mideast and Europe. A number of reportedly successful sea and land based tests along with the limited deployment of PAC-3 Patriot missiles has also served to strengthen U.S. theater missile defense capabilities. Israel has also tested and deployed its Arrow missile defense system (co-developed with the U.S.). These developments pose new challenges for proliferators and potential adversaries.

Status of Missile Proliferation

About three dozen countries have been publicly identified as having ballistic missiles, and half of those countries are in Asia and the Middle East. About 30 of

these countries have, or are developing, ballistic missiles that can deliver a 500-kilogram warhead 300 kilometers or further.[7] Of the non-European countries, fourteen have produced ballistic missiles (Argentina, China, Egypt, India, Iran, Iraq, Israel, North Korea, Pakistan, South Korea, Syria, Taiwan, Ukraine, and South Africa which no longer produces missiles). In addition to these regional powers, which are often discussed as missile proliferators, several Western and Eastern European countries and republics of the former Soviet Union have missiles.

International pressures and domestic policy decisions have eliminated certain missile programs in Argentina, Brazil, Egypt, South Africa, Poland, Hungary, and former Soviet Republics. While the long-standing Missile Technology Control Regime (MTCR) is credited with slowing missile proliferation, it is not known what effect the International Code of Conduct Against Ballistic Missile Proliferation (ICOC) will have on proliferators.[8]

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[7] Countries that adhere to the Missile Technology Control Regime agree to restrict transfers of missiles that can deliver a 500 kg warhead 300 kilometers, and related technology, components, and material. A relatively crude, early generation nuclear warhead is estimated to weigh about 500 kg. Countries other than the United States that are currently reported to have missiles that meet the MTCR thresholds are: Afghanistan, Algeria, Armenia, Belarus, Bulgaria, China, Egypt, France, Iran, Iraq, Israel, Libya, North Korea, Pakistan, Romania, Russia, Saudi Arabia, Slovakia, Syria, Ukraine, United Arab Emirates, United Kingdom, Vietnam, and Yemen. Additionally, India, South Korea, and Taiwan are in the advanced stages of developing indigenous missiles with a range of 300 km or more.

[8] See also CRS Report RL31848, *Missile Technology Control Regime (MTCR) and International Code of Conduct Against Ballistic Missile Proliferation (ICOC): Background and Issues for Congress.*

Table 1. Missiles by Categories of Range

Range	Country
Intercontinental and/or Submarine-Launched Ballistic Missiles (>5,500 km)	China, France, Russia, United Kingdom, United States, North Korea (Taepo Dong 2 or Taepo Dong ICBM)
Intermediate-Range Ballistic Missiles (3,000 - 5,500 km)	India, Iran, possibly North Korea
Medium-Range Ballistic Missiles (1,000 - 3,000 km)	Israel ,North Korea, Saudi Arabia, China, India ,Pakistan, Iran
Short-Range Ballistic Missiles (70 - 1,000 km)	Afghanistan, Algeria, Argentina, Armenia, Belarus, Bulgaria, China, Czech Republic, Egypt, Greece, India, Iran, Iraq, Israel, Kazakhstan, Libya, Netherlands, North Korea, Pakistan, Romania, Russia, Serbia, Slovakia, South Korea, Syria, Taiwan, Turkey, Turkmenistan, Ukraine, United Arab Emirates, Vietnam, and Yemen.

See the Missile Inventory Appendix at the end of this report for a listing of each missile program by country.

Russia

Russia has the most significant ballistic missile inventory of all countries of concern. Russia currently has approximately 700 ICBMs capable of delivering over 3,000 nuclear warheads of various yields.[9] Russia also maintains a number of ballistic missile-capable submarines equipped with approximately 200 launchers that could deliver up to 900 nuclear warheads.[10] Despite these seemingly significant numbers, the Russian Strategic Nuclear Forces have been in critical decline over the past decade due to a variety of internal and external factors.

Because of slower than anticipated development and also in response to the United States withdrawal from the Anti-Ballistic Missile (ABM)Treaty, the Russian government has slowed the production of its new SS-27 ICBM (one nuclear warhead – compliant with the Strategic Arms Reductions Treaty (START) II and Strategic Offensive Reduction Treaty[11] (SORT)) and will instead retain a significant number of its older SS-18 and SS-24 ICBMs (each capable of carrying 10 multiple

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[9] "Foreign Missile Developments and the Ballistic Missile Threat Through 2015", Unclassified Summary of a National Intelligence Estimate, Central Intelligence Agency, June 13, 2002, p. 10.

[10] Ibid.

[11] See also CRS Report RL31448, *Nuclear Arms Control: The Strategic Offensive Reductions Treaty.*

independent re-entry vehicles (MIRVs)) that were destined to be destroyed under START II ceilings. Russia will retain 154 liquid-fueled SS-18 Satan heavy ICBMs and 36 SS-24 Scalpel ICBMs that were supposed to be eliminated by 2007 under the provisions of START II.[12] Russia's SS-27 Topol-M ICBM was first deployed in 1997 and Russia had deployed 23 SS-27s in silos as of the end of 2000.[13] Although designed to carry one warhead, experts believe, that with modifications, the SS-27 could carry anywhere from 3 to 6 nuclear warheads. Russia claims to have developed missile defense countermeasures for the SS-27 allowing the SS-27 to penetrate any known missile defense. Such countermeasures could include global positioning technology and independent warhead maneuvering capability. It is important to note that independent sources have not substantiated Russian claims on the SS-27's penetration capabilities. Over the next few years, the Defense Intelligence Agency believes that Russia will focus its limited resources on the SS-27 program, the SS-26 short range ballistic missile (SRBM), and the submarine-launched SSN-23 and Bulava-30 ballistic missiles.[14]

According to the Russian press, the Russian government planned to eliminate an additional 18 SS-18 missiles and their silos by the end of 2003.[15] Russia reportedly purchased 30 SS-19 missiles from the Ukraine in July 2003.[16] According to Russian President Putin, the SS-19s were to be put on duty so that hundreds of Soviet-era ICBMs, that had exceeded their service lives, could be retired.[17] The SS-19s, which had been in storage, could remain in service until the 2030s -- a move which could give the Russian defense industry, "breathing space" to develop a new missile.[18] According to Colonel-General Nikolai Solovtsov, chief of Russia's Strategic Missile Forces, Russia would require 10 to 15 years to build a next-generation land-based ICBM.[19]

China

China's current ICBM force consists largely of liquid propellant, single warhead, silo-based missiles. Approximately 20 of these missiles are CSS-4 missiles that could reach targets within the United States and approximately 12 CSS-3 ICBMs

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[12] "Russia to Retain MIRVs Beyond Start II Deadline," *Jane's Defence Weekly*, August, 28, 2002.

[13] "Russia: TOPOL-M ICBM Overview," *Center for Nonproliferation Studies*, January 2001.

[14] Bill Gertz and Rowan Scarborough "Inside the Ring," *Washington Times*, November 15, 2002, p.11.

[15] "Missiles Destroyed", *Moscow Times,* August 1, 2003.

[16] Ibid.

[17] Simon Saradzhyan, "Putin Beefs Up ICBM Capability", *Moscow Times* October 3, 2003.

[18] Ibid.

[19] Vladimir Isachenkov, "Russia Will Build a New Ballistic Missile in 10-15 Years", *Associated Press Worldstream,* October 22, 2003.

that are most likely intended to deter Russia and India.[20] China also has a number of medium range JL-1 submarine launched ballistic missiles (SLBMs). While some analysts claim that China has only recently embarked on a modernization program, other experts suggest that this effort has been underway for almost two decades focusing on increasing missile mobility, incorporating solid fuel designs, improving missile accuracy, producing lighter warheads, and upgrading the missile command, control, communications, and intelligence (C3I) system.[21] The U.S. Intelligence Community projects that, by 2015, most of China's land-based ICBMs will be mobile.[22]

China is continuing the development of its solid fueled DF-31 and DF-31 A ICBMs for both silo, mobile, and submarine deployment. The DF-31 reportedly is highly accurate and would have sufficient range to hit Alaska and Hawaii but not the continental United States.[23] Some analysts believe that likely targets for the DF-31 would be Russian and U.S. military bases and facilities in Asia and that the missiles will likely be operationally deployed sometime in 2004 or 2005.[24] The DF-31A, with extended range and lighter payload, would likely be targeted against the United States, and could be operationally deployed between 2006 and 2010.[25] China has also tested CSS-5 medium range ballistic missiles (MRBMs) with dummy warheads or what the Pentagon calls "penetration aids" designed to defeat missile defense systems. China reportedly successfully test-fired a CSS-5 with multiple warheads in December 2002.[26] Some analysts suggest that China may use its 50 or so CSS-5s to further intimidate Taiwan because of its ability to carry larger payloads and to penetrate missile defenses.[27]

According to U.S. military officials, China has deployed about 450 shorter-range missiles across from Taiwan and that number is expected to grow to 600 by 2005.[28] According to officials, China is adding 75 new missiles a year to the region, a number higher than the 1998 Rumsfeld Commission Report estimates that only 50 missiles a year would be added.[29] These missiles, primarily consisting of CSS-6 and CSS-7 SRBMs, are also reported to be more accurate than earlier versions because

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[20] "Foreign Missile Developments and the Ballistic Missile Threat Through 2015," p. 11.

[21] Robert S. Norris and Hans M. Kristensen, "Chinese Nuclear Forces, 2033; NRDC Nuclear Notebook", *Bulletin of Atomic Scientists,* November 1, 2003, p. 1.

[22] "Foreign Missile Developments and the Ballistic Missile Threat Through 2015,"p. 11.

[23] Robert S. Norris and Hans M. Kristensen, p. 1.

[24] Ibid.

[25] Ibid.

[26] John Hill, "China Modernizes Missile Force", *Jane's Intelligence Review,* March 2003, p. 3.

[27] Ibid.

[28] Bill Gertz and Rowan Scarborough, "Inside the Ring: China's Missile Buildup", *Washington Times,* May 16, 2003, p. 11.

[29] Ibid.

they use U.S. Global Positioning System (GPS) satellites to get midcourse guidance correction data.[30]

Reportedly, the Pentagon's 2003 annual report to Congress on China's military postulates that China could have 30 ICBMs capable of hitting the United States by 2005 and as many as 60 by 2010.[31] China is continuing an active testing program and recently test-fired CSS-7 and DF-15 missiles at the Shuangchenzi test facility in northern China.[32]

China is assessed to be technically capable of producing multiple reentry vehicles (MRVs) as well as multiple independently targetable reentry vehicles (MIRVs) for their longer-range missiles but has chosen not to do so.[33] The CIA reportedly estimated that it would take China only a few years to develop MRVs or MIRVs but widespread development for China's ICBMs and SLBMs would "encounter significant technical obstacles and would be costly."[34]

North Korea[35]

North Korea's ballistic missile program continues to trouble both the United States and its allies from a variety of perspectives. Despite international pressure and trade sanctions, North Korea is continuing to both increase, diversify, and improve its missile fleet. In conjunction, North Korea publically declared itself a nuclear power in 2003 and many analysts believe that its nuclear program is focused on developing nuclear warheads for both short, medium, and longer-range ballistic missiles. North Korea has allegedly exported ballistic missiles and associated technologies to a number of countries and some analysts suggest that these transfers have advanced the recipient's missile programs by many years. Finally, North Korea has conducted a number of cruise missile test firings during negotiations which many analysts feel were intended to influence the United States and countries in the region.

North Korea's arsenal consists primarily of shorter-range Scuds, and a number of longer range No Dong and Taepo Dong missiles. North Korea is believed to have approximately 700 Scud C (Hwasong 6) SRBMs with a 500 km range and some analysts believe that a considerable portion of North Korea's estimated 250 tons of chemical and biological agents would be delivered by these missiles. [36] North

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[30] Ibid.

[31] Ron Laurenzo and Nathan Hodge, "Chinese Build-Up Targets U.S. Forces in Taiwan Straits" *Defense Week,* August 4, 2003, p. 1.

[32] Bill Gertz and Rowan Scarborough, "Inside the Ring: DF-15 Launch", *Washington Times,* August 15, 2003, p. 5.

[33] Robert S. Norris and Hans M. Kristensen, p. 2.

[34] Ibid.

[35] For additional information see CRS Report RS21473, *North Korean Ballistic Missile Threat to the United States*, October 1, 2003.

[36] Yihong Chang and James Folely, "Pyongyang Goes for Broke", *Jane's Intelligence* (continued...)

Korea's Scud-Cs have sufficient range to strike targets throughout South Korea. North Korea's estimated 100, 1,300 km range, No Dong missiles enable North Korea to strike U.S. military bases in Japan with both conventional and WMD warheads.[37] North Korea launched a version of its Taepo Dong missile in August 1998 over the Japanese islands, allegedly to put a satellite into orbit. Since this launch there has been speculation that other Taepo Dong versions were under development.

Prior to September 9, 2003 -- the 55th anniversary of the founding of the Democratic People's Republic of Korea – U.S. and international press speculated that North Korea might display a new, longer-range version of the Taepo Dong missile, as well as an unnamed intermediate range missile, during military parades held in Pyongyang. U.S. government officials referred to the allegedly longer-range version of the Taepo Dong as "Taepo Dong X".[38] A Bush Administration official reportedly stated that the Taepo Dong X would have sufficient range to strike Hawaii, Alaska, California, or "most of the West Coast."[39] In another press report, another Administration official estimated the Taepo Dong X's range at 9,400 miles (15,040 kms) which, in theory, would enable the Taepo Dong X to strike virtually anywhere in the United States.[40]

According to unidentified U.S. intelligence officials, the Taepo Dong X is believed to be based on the former Soviet Navy SS-N-6 submarine launched ballistic missile that North Korea may have possibly obtained from Russia between 1992 and 1998.[41] According to this official, the Intelligence Community has "had hints of this for several years" but only within the last year were they able to confirm the Taepo Dong X's existence and its use of SS-N-6 technology to improve its range and accuracy. Officials stated that there was no indication that the Russian government had sanctioned missile sales to the North Korean government in "at least five years." An unnamed congressional source reportedly noted that the Russian Pacific Fleet, which deployed the SS-N-6, was "desperately disorganized and underfunded" during the period between 1992 and 1998, suggesting that North Korea might have obtained SS-N-6 technology from the Russian Navy or the missile's designer, the Makeyev Design Bureau, without the knowledge or approval of the Russian government.

The South Korean press reported on September 8, 2003 that South Korean intelligence officials had identified what they believed were 10 new intermediate

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[36] (...continued)
Review, March 1, 2003, p. 8.

[37] Ibid.

[38] Bill Gertz," North Korea to Display New Missiles," *Washington Times*, September 9, 2003.

[39] Ibid.

[40] George Gedda, "Official Says North Korean Missile Could Target the U.S.," *Associated Press Newswires*, September 11, 2003.

[41] Information in this paragraph is from Sonny Efron, "N. Korea Working on Missile Accuracy," *Los Angeles Times*, September 12, 2003.

range ballistic missiles and five launch pads at North Korea's Mirim Aerodrome.[42] South Korean officials also suggested that this new missile had been under development since the early 1990s and could have a maximum range of 3,600 kms.[43] According to the report, Japanese, South Korean, and U.S. intelligence officials inferred from the shape of the missile that the new North Korean missiles were based on the Soviet-designed SS-N-6.[44] According to one U.S. press report, unnamed U.S. officials confirmed the accuracy of South Korean press reports and further elaborated by stating that the unnamed intermediate range ballistic missile was road mobile[45], making these missiles more difficult to locate and destroy. With the capability to accommodate a reentry vehicle weighing approximately 1,500 lbs (680 kgs)[46] a North Korean missile derived from the SS-N-6 could conceivably accommodate a heavier and less sophisticated nuclear weapon--the type which many experts believe North Korea is capable of producing.

While there appears to be some disagreement in the ranges for the SS-N-6 and the possible North Korean SS-N-6 variant (3,000 to 3,600 kilometers, depending on the source) a missile with a 2,500 kilometer range would enable North Korea to strike U.S. military forces in Japan and Okinawa and with a 3,500 kilometer range to strike Guam, a U.S. territory with a substantial U.S. military presence.[47] If this is the case, such a missile would represent a significant increase in North Korea's ability to deliver a nuclear weapon at extended ranges.

There is widespread speculation that North Korea has developed smaller nuclear warheads. Japanese and U.S. press[48] reported that the U.S. Central Intelligence Agency (CIA) had informed the Japanese and South Korean governments that North Korea is developing the technology to manufacture nuclear warheads small enough fit on North Korea's No Dong intermediate range missiles. According to the reports, the CIA based the assessment on satellite imagery of the Youngdoktong test facility which allegedly revealed test equipment associated with conventional explosives used in plutonium-based weapons. While some analysts cited this as proof of warhead developmental progress, other analysts pointed out that in light of claims of Iraq's WMDs, that there was "skepticism about the quality of American intelligence."[49] The Japanese report alleges that U.S. experts believe that North Korean missile warheads have been downsized to approximately 2,000 pounds,

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[42] "North Said to Deploy Longer Range Missiles," *Joong Ang Daily*, September 9, 2003.

[43] Ibid.

[44] Ibid.

[45] "North Korea to Display New Missiles," p. 1.

[46] "R-27/SS-N-6 SERB," *Federation of American Scientists*, July 13, 2000, p. 1.

[47] North Korea's Long-Range Missiles, Joseph S. Bermudez, p. 5.

[48] Yutaka Ishiguro, Ikuko Higuchi, and Junichi Toyoura, "North Korea's Nuclear Threat Growing, Analysts Say", *The Daily Yomiuri*, Tokyo, June 21, 2003 and David E. Sanger, "C.I.A. Said to Find North Korean Nuclear Advances", *The New York Times*, July 1, 2003.

[49] Sanger, p. 3.

which would allow them to be employed with No Dong missiles.[50] According to Jane's Strategic Weapons Systems, the No Dong has a 1,200 kg (2,646 lb) payload capacity[51] so a nuclear device of this weight could possibly be accommodated by the No Dong. Even if North Korea does have a workable nuclear warhead of this size, other critical functions such as a survivable reentry vehicle, an improved guidance system, and weapon safing, arming, fuzing, and firing systems[52] would need to be achieved before the North Korean government could have confidence that the No Dong could successfully deliver a nuclear weapon.

Some experts contend that North Korea's ballistic missile proliferation activities are equally as disconcerting as their evolving ballistic missile program and their alleged advances in developing nuclear warheads for those missiles. According to reports, North Korea sold $60 million worth of Scud missiles and missile components to Iraq, Iran, Syria, and Yemen in 2002 and analysts, citing increased cooperation with Iran, expect 2003 revenues to meet or exceed 2002 revenues.[53] Pakistan allegedly purchased a number of fully assembled and functional No Dong missiles from North Korea in 2002, which were reportedly transferred in American-made Pakistani Air Force C-130 transports.[54] A Japanese newspaper, Sankei Shimbun, noted for its aggressive stance on North Korea, reported that North Korea was discussing exporting Taepo Dong 2 missiles to Iran as well as jointly developing nuclear warheads with Tehran.[55] North Korea has also reportedly been accused of facilitating Libyan procurement of Iranian Shahab-3 missiles, allegedly because of North Korea's extensive involvement in Iran's ballistic missile program.[56] These and other activities have earned North Korea the title of "world's major exporter of missile technology" as well as " the number one exporter of theater ballistic missiles"[57] and with it, a considerable amount of analysis and discussion on how to put a stop to North Korean missile proliferation.

Despite North Korea's extension of it's self-imposed 1999 Ballistic Missile Test Flight Moratorium through 2003, North Korea has conducted a number of "test flights" of short range cruise missiles not covered under the moratorium which some

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[50] Yutaka Ishiguro, Ikuko Higuchi, and Junichi Toyoura, p. 1.

[51] "No Dong 1 and 2", *Jane's Strategic Weapons Systems: Issue 39,* July 2003, p. 120.

[52] The safing system ensures that the weapon does not detonate prematurely. The arming system readies the weapon for detonation. The fuzing system determines where in the flight the weapon will detonate. The firing system actually delivers the electrical signal to the weapon detonator.

[53] "North Korea has Delivered 400 Ballistic Missiles to the Mideast", *World Tribune.com,* October 27, 2003.

[54] Nicholas Kralev, "Pakistan Purchases N. Korean Missiles", *Washington Times,* March 31, 2003, p. 1.

[55] "Report: N. Korea-Iran Missile Deal", *CNN.com,* August 7, 2003.

[56] Jason Fuchs, "Libya, Iran, DPRK Discuss New Strategic Missile Procurement", *Defense & Foreign Affairs Daily,* September 4, 2003.

[57] Geoff S. Fein, "Ballistic, Cruise Missile Proliferation Worries U.S.: Missile Defense, *National Defense,* October 1, 2003.

analysts claim are merely routine test or training flights while other analysts characterized them as politically-motivated and provocative. While some military analysts note that North Korea routinely conducts its missile tests between March and November, others contend that the 2003 series of had both political and military implications.[58] North Korea's February 24, 2003 test of an antiquated HY-2 "Seersucker" anti-ship cruise missile occurred the evening before the inauguration of South Korea President Roh Moo-Hyun; the March 10 test, also involving a short range anti-ship cruise missile, happened approximately one week after North Korean jets confronted a U.S. RC-135 reconnaissance aircraft, and an April 1 test flight occurred shortly after Japan launched its first spy satellite.[59] In October, North Korea may have test fired up to three cruise missiles in a one week period when talks about resolving the U.S.-North Korean nuclear weapons program were at an impasse.[60] North Korea has also repeatedly suggested that they may not renew their Ballistic Missile Test Flight Moratorium which expired December 31, 2003. Some experts contend that North Korea's apparent willingness to conduct missile test flights for short range missiles and threats to resume the testing of ballistic missiles demonstrates the latent value that North Korean missiles possess in terms of political and military leverage.

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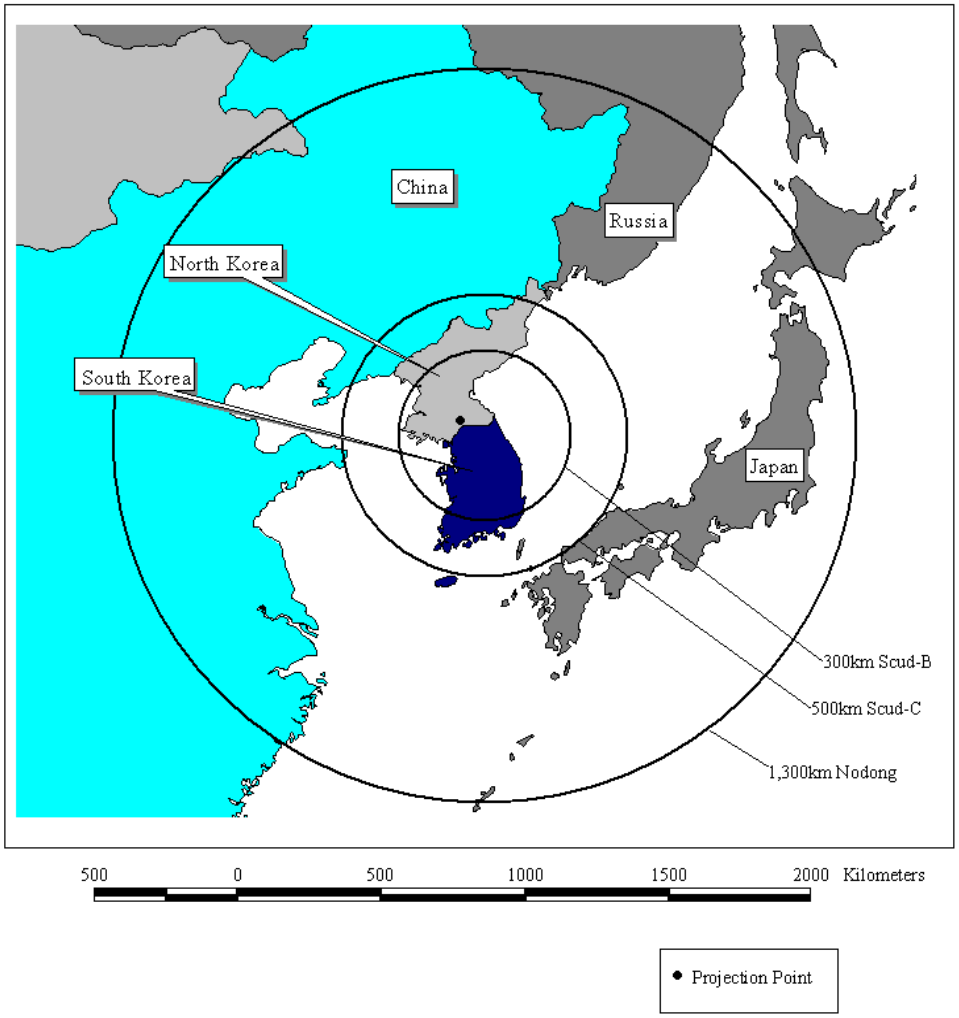
[58] Dennis M. Gromley, "North Korean Cruise Missile Tests – and Iraqi Cruise Missile Attacks - Raise Troubling Questions for Missile Defenses", *Monterey Institute of International Studies,* Monterey, California, April 8, 2003, p. 1.

[59] Ibid.

[60] Natalie Obiko Pearson, "Japan Says North Korea May Have Test-Fired a Third Missile in a Week", *Associated Press Worldstream,* October 25, 2003, p. 1.

Figure 1.

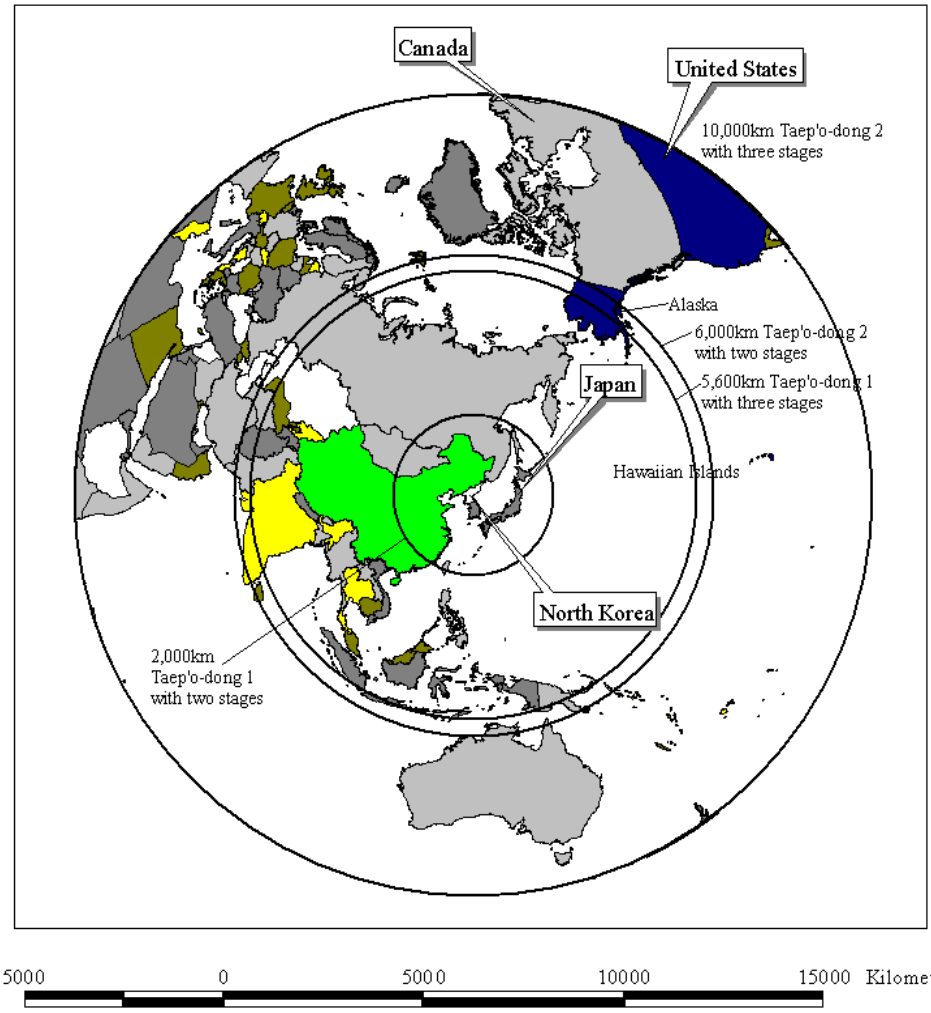
North Korean Short and Medium Range Missile Capabilities
(Launched from areas near the demilitarized zone)



Library of Congress, Geography and Map Division
October 1999

Figure 2.

Potential North Korean Long-Range Missile Capabilities



Library of Congress, Geography and Map Division
October 1999

Iran [61]

During the Iran-Iraq War of 1980 to 1988, Iran acquired Soviet-made Scud-B missiles from Libya and reverse-engineered Scuds from North Korea. After the war, Iran bought additional missiles and production technology for the Scud-B and C from North Korea and reportedly helped fund the development of the Nodong missile and possibly longer range missiles. Iran also received a variety of materials and technology from several Russian companies and institutes.[62] Iran is believed to have imported as many as 200 CSS-8 missiles from China in late 1989 and 30 to 50 CSS-7 missiles in 1995.[63] China has reportedly also given Iran technical assistance in developing and testing missiles. Iran is thought to have between 50 to 300 Scud-B missiles and at least 50 and possibly as many as 450 Scud-C missiles.[64]

The Zelzal missile series uses solid-fuel rockets based on technology reportedly obtained from China, Russia, and Germany. Iran produces the Zelzal-1 (range 100-150 km) and the Zelzal-2 (range 350-400 km) and is developing the Zelzal-3 (range 1,000-1,500 km).[65] The Mushak series consists of shorter-range missiles that also use solid-fuel motors. There was some speculation that North Korea might have received Iranian assistance with the solid-fuel third stage used in its attempted satellite launch on August 31, 1998. Iran has been the recipient of missile technology from several sources but is increasingly gaining the ability to serve as a supplier of missiles and missile technology.

In cooperation with North Korea, Russia, and China, Iran produced and flight tested the Shahab-3 on July 22, 1998. In the test it traveled about 100 seconds before malfunctioning. This liquid-fuel, single stage, 1300 km (800 mile), mobile missile with a 800 -1 ,200 kg warhead is said to be nearly identical to the Nodong and some analysts believe that it could reach Israel and most of Turkey and Saudi Arabia. Iran reportedly conducted its eighth and final test of the Shahab-3 in early July 2003.[66] This test was also the first test in which the Shahab-3 flew to its maximum estimated range of 1,300 km.[67] In a ceremony on July 20, 2003, the Shahab-3 missile was

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[61] For additional information see CRS Report RS21548, *Iran's Ballistic Missile Capabilities*

[62] For further discussion of the Iranian program and Russian assistance see, CRS Report 98-299F, *Russian Missile Technology and Nuclear Reactor Transfers to Iran.*

[63] "Ballistic Missiles National Briefing: Iran," *Center for Defense and International Security Studies,* Lancaster, United Kingdom, May 28, 2003, p. 3.

[64] "Iran Missile Overview", *Global Security.org*, http://www.globalsecurity.org/wmd/world/iran/missile-overview.htm, April 15, 2003. pp. 1-2.

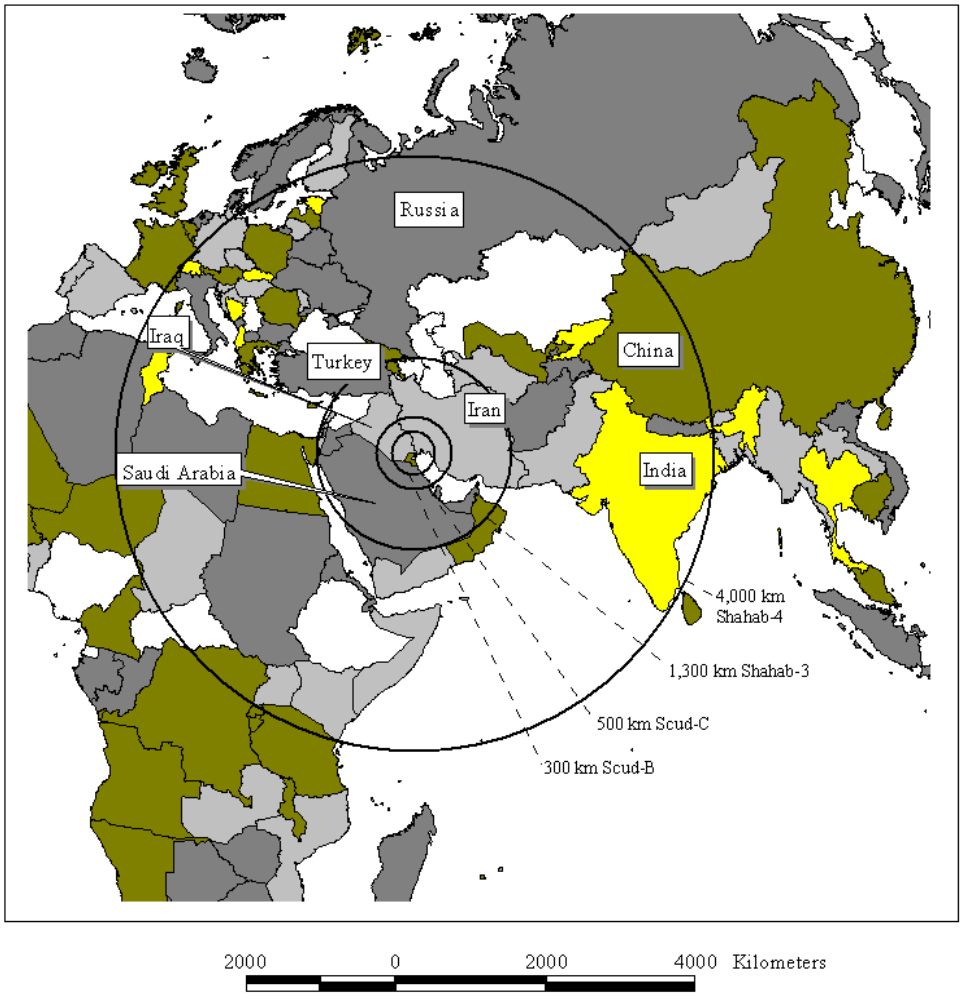
[65] *Iran Brief,* Sept. 9, 1996, pp. 1-2, abstract in Center for Nonproliferation Studies database, Monterey Institute.

[66] Alon Ben-David, "Iran Successfully Tests Shahab 3" *Jane's Defence Weekly*, July 9, 2003, p. 1.

[67] Ibid.

officially handed over to Iran's Revolutionary Guards and analysts speculated that an undetermined number of Shahab-3's have already been deployed operationally.[68] Both the United States and Israel have expressed concern about the Shahab-3's announced deployment with an Israeli official reportedly stating "the combination of the Shahab-3 and the nuclear weapon would be a very serious threat to the stability of the region."[69]

Ranges of Iran's Missiles



Library of Congress, Geography and Map Division
January 2000

[68] Najmeh Bozorgmehr, "Iran's Ballistic Missile Goes into Service", *London Financial Times*, July 21, 2003, p. 8.

[69] Nazila Fathi, "Iran Confirms Test of Missile That is Able to Hit Israel" *New York Times*, July 8, 2003.

Iran was also reportedly developing the Shahab-4, a ballistic missile with a range of 2,000 km (1,240 miles) believed to be based on the Soviet SS-4, liquid-fuel MRBM, that was ordered destroyed under the Intermediate Nuclear Forces (INF) Treaty.[70] Also under development was a 5,000 km Shahab-5 that could possibly reach many parts of Europe.[71] On November 6, 2003, the Iranian government announced that it would abandon the development of the Shahab-4.[72] This announcement, coming less than a month after Iran agreed to suspend uranium enrichment operations and open its nuclear program to International Atomic Energy Agency (IAEA) inspections, is seen by some analysts as a way of addressing the international community's alarm concerning Iranian proliferation activities. While the explicitly stated cessation of the Shahab-4 program and the implicit abandonment of other longer-range missile programs (Shahab-5 and 6) may be considered to be significant achievements by some experts, other experts contend that the Shahab-4 was at best a "paper missile" not ready for production and that Iran will continue to develop these missiles in secret or start up production again in the future when the situation is more conducive.[73]

Iran has several anti-ship cruise missiles and produces some — including the C-802 — with technology acquired from China. These weapons give Iran a significant capability to attack ships in the Persian Gulf and might be used to develop a land attack cruise missile.

Iraq[74]

Prior to the commencement of U.S.-led Operation Iraqi Freedom (OIF) on March 19, 2003, U.S. and British intelligence claimed that Iraq had upwards of 20 Al Hussein missiles in violation of U.N. Security Council resolutions as well as numerous shorter-range Al Samoud and Ababil-100 missiles permitted under the resolutions. During the course of the war, at least 17 Al Samoud and Ababil-100 missiles and Frog-7 rockets were fired at Coalition forces.[75] Additionally, one Iraqi cruise missile was known to have successfully eluded missile defenses and struck a target in Kuwait City.[76] There were no confirmed reports of Al Hussein launches during the war. To date, efforts by U.S. military and other U.S. government organizations to locate Al Hussein or Scud missiles have not been successful.

Although efforts to locate proscribed missiles have not yielded any physical evidence, the CIA-led Iraq Survey Group (ISG) has allegedly uncovered a significant

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[70] *Jane's Defence Weekly*, February 17, 1999, p. 5.

[71] Alon Ben-David, p. 1.

[72] Karl Vick, "Iran Says It Will Abandon Development of Longer-Range Missile" *Washington Post*, November 7, 2003, p. A26.

[73] Ibid.

[74] See also CRS Report RS21376, *Iraq: Weapons of Mass Destruction (WMD) Capable Missiles and Unmanned Aerial Vehicles (UAVS).*

[75] Hans Greimel, "Thorough Assessment in Store for Patriot", *Army Times*, April 23, 2003.

[76] Ibid.

amount of information on Iraq's missile program. According to an unclassified interim progress report given to Congress by Dr. David Kay, the ISG's chief, Iraq was involved in a number of missile related activities in contravention of UN Security Council resolutions.[77] Allegations of these missile-related activities from the report include the following:

- "Continuing covert capability to manufacture fuel propellant useful only for prohibited Scud variant missiles, a capability that was maintained at least until the end of 2001 and that cooperating Iraqi scientists have said they were told to conceal from the UN."
- "Plans and advanced design work for new long-range missiles with ranges up to at least 1000 km - well beyond the 150 km range limit imposed by the UN. Missiles of a 1000 km range would have allowed Iraq to threaten targets through out the Middle East, including Ankara, Cairo, and Abu Dhabi."
- "Clandestine attempts between late-1999 and 2002 to obtain from North Korea technology related to 1,300 km range ballistic missiles --probably the No Dong -- 300 km range anti-ship cruise missiles, and other prohibited military equipment."[78]

According to David Kay's statement, Saddam Hussein ordered the development of missiles with a range of at least 400 km up to 1000 km in early 2000. These missiles include both liquid and solid propellant designs and some analysts report that these projects were only in the "planning stage."[79] Another highlight of the report concerns Iraqi attempts to acquire No Dong missiles from North Korea. According to a report, the ISG found "written evidence of a contractual negotiation" between North Korea and Iraq for the purchase of 1,300 km-range No Dong missiles.[80] Iraqi documents indicate that Baghdad made a $10 million down payment in late 2002 for a single No Dong missile but North Korea failed to deliver the missile "because they were being watched too closely by the Bush Administration" and also apparently did not refund Iraq its $10 million.[81] The Kay report also contained evidence of two Iraqi cruise missile programs. According to one report, Iraq was attempting to upgrade the range of its HY-2 missile from 100 km to 150 - 180 km in one program while another program attempted to convert the HY-2 into a 1,000 km-range land-attack cruise

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[77] Statement by David Kay on the Interim Progress Report on the Activities of the Iraq Survey Group (ISG) Before the House Permanent Select Committee on Intelligence, The House Committee on Appropriations, Subcommittee on Defense, and the Senate Select Committee on Intelligence, October 2, 2003. http://www.cia.gov/cia/public_affairs /speeches/2003/david_kay_10022003.html

[78] Ibid.

[79] Bob Drogin, "Friendly Fire - What David Kay Really Found", *New Republic*, Ocyober 27, 2003, p. 23.

[80] Fredrick Kempe and David S. Cloud, "Baghdad Records Show Hussein Sought Missiles, Other Aid Abroad", *Wall Street Journal,* November 3, 2003, p. 1.

[81] Ibid.

missile.[82] Ten of the 150 -- 180 km modified missiles were delivered to the Iraqi military and two were fired -- with one reportedly being shot down and one landing in Kuwait.

Despite U.S. inability to find proscribed Al Hussein or Scud missiles, some experts claim that the ISG's interim findings validate assertions that Iraq was actively pursuing advanced missile capabilities in clear violation of UN Security Council resolutions. While documentary evidence may, in fact, support this position, Iraq's ballistic and cruise missile capabilities may no longer be of concern to the United States and its allies. It is not clear how Iraq's military will be reconstituted and rearmed under the auspices of the United States and its coalition partners, but it is possible that Iraq will be denied missiles of any range and configuration, thereby eliminating this capability from further consideration.

India[83]

India has an extensive missile and space program. In addition to antitank, surface-to-air, and air-to-air missiles, it produces SRBMs and is developing MRBMs and IRBMs. India's test of nuclear devices in 1998, its possibly arming some missiles with nuclear warheads, and its long-running conflict with Pakistan regarding Kashmir make its missile force a cause of concern. The Prithvi series of liquid fuel theater missiles includes a 150 km and a 250 km model that are in production and a 350 km model in development. The Danush is reportedly a naval version of the Prithvi with a range of 250 km. The Agni I reportedly has a 700 - 750 km range and is both rail and road-mobile.[84] The Agni II, also rail and road-mobile, is said to have a range of at least 1,500 km, much more than necessary to reach all of Pakistan.[85] India has long refused to sign the Nuclear Non-Proliferation Treaty as a non-weapon state, has not signed the Comprehensive Test Ban Treaty, and is not a partner of the Missile Technology Control Regime or other multilateral export control mechanisms. While India claims it needs these strategic weapons to deter China, many analysts believe that they are a destabilizing factor in South Asia. India also obtained the lease of a Russian submarine capable of carrying nuclear-capable cruise missiles with a 300 km range in December 2002.[86] This capability will not only further destabilize the region but will also greatly enhance the survivability of India's nuclear weapons by providing them with a triad -- a land, air, and sea-based nuclear weapons delivery capability.

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[82] Kay Report, p. 9.

[83] See also CRS Report RL32115, *Missile Proliferation and the Strategic Balance in South Asia.*, October 17, 2003.

[84] Rose Gordon, "India Conducts Four Missile Tests", *Arms Control Today*, March 2003.

[85] Ibid.

[86] *India to Lease Nuclear Sub*, Moscow Times, December 3, 2002, p.3.

India reportedly tested an Agni I missile on January 9, 2003[87] . In September 2003, the Indian government announced that they would create two additional Prithvi missile groups armed with conventional warheads and an Agni I regiment and an Agni II regiment which could be armed with nuclear warheads.[88] There was also speculation that India was preparing to test their 3,000 km Agni III missile. The Indian government reportedly hinted in October 2003 that they would test the Agni III as early as November 2003[89] but government statements later that month suggested that a test flight would be postponed until 2004 pending the completion of additional testing.[90] India also successfully test-fired its supersonic, 290 km range, Brahmos cruise missile on October 30, 2003 and again on November 9, 2003.[91] India jointly developed the supersonic Brahmos, which can carry a 200 kg payload, with Russia.[92]

Pakistan[93]

While it says it is not in an arms race with India, Pakistan has reacted to India's missile programs with its own and has tested nuclear devices following India's nuclear tests. It has received extensive help from China and North Korea in developing and producing missiles. China also helped Pakistan with the development of nuclear weapons. The Hatf-2 and 3 are solid fuel SRBMs that are probably based on the Chinese M-11 and M-9 respectively. The Ghauri-I and Ghauri-II are reportedly based on (or copies of) North Korea's Nodong or even its Taepo Dong-1 missile. The Shaheen/Ghaznavi series are reportedly solid fuel missiles of uncertain origin. The Pakistani missiles and nuclear weapons are said to constitute a deterrent force against India's numerically-superior conventional forces, but are seen by many as greatly increasing the possibility of nuclear warfare.

Pakistan and India have been characterized by some analysts as having conducted "tit-for-tat" missile tests during 2003. On March 26, the same day India tested a Prithvi missile, Pakistan tested a Hatf-2 missile.[94] On October 3, when some experts suggested that Pakistani-Indian peace talks had stalled, Pakistan tested a

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[87] Rose Gordon.

[88] "Army Takes its Agni and the Nuclear Age", *The Indian Express,* September 24, 2003.

[89] David C. Isby, "India Prepares to Test 3,000 km-Range Agni III", *Jane's Missiles and Rockets,* November 1, 2003.

[90] "Test Put Off for Agni-III, Brahmos Takes Off", *Financial Times,* October 30, 2003.

[91] See "Test Put Off for Agni-III, Brahmos Takes Off" and "India Test Fires Supersonic BrahMos Missile", *Deutsche Presse-Agentur",* November 9, 2003.

[92] "India Test Fires Supersonic Brahmos Missile".

[93] See also CRS Report RL32115, *Missile Proliferation and the Strategic Balance in South Asia.*, October 17, 2003.

[94] "Pakistan Conducts Second Nuclear-Capable Missile Test in a Week", *Agence France Presse",* October 8, 2003.

Hatf-3 and five days later tested a Shaheen- 1 missile.[95] On October 14, Pakistan again tested a Shaheen-1 missile.[96] Despite allegations from India, Pakistan stated that these tests had nothing to do with the stalled peace talks[97] and were conducted in the course of normal missile development.

On November 7, 2003 during a meeting in Seoul with South Korean government officials, Pakistani President, General Pervez Musharraf, reportedly stated that Pakistan had obtained short-range missiles and technology from North Korea but that Pakistan could now make the missiles itself.[98] During the same meeting, he stated that Pakistan had not traded nuclear technology for missiles and that there was currently "no interaction with North Korea whatsoever on any defense related matters."[99] Analysts suggest that this statement may indicate that Pakistan is now capable of producing Ghauri missiles, considered by many experts to be copies of the North Korean No Dong, indigenously and that publically severing ties with North Korea might lessen U.S. pressure regarding Pakistani-North Korean cooperation. Having publically proclaimed the end to this relationship, Pakistan would assume considerable risk if they re-initiated missile-related dealings with North Korea.

Cruise Missiles

Some analysts consider the cruise missile proliferation threat even more of concern than the proliferation of ballistic missiles. Characterized as relatively inexpensive to produce from readily-available aviation technologies, cruise missiles have been called the "poor man's air force" and provide countries that may not have the resources for a ballistic missile program or even a modest air force, the ability to strike targets both at sea and on land from a distance with precision. There are approximately 130 or so cruise missile types distributed between 75 nations.[100] Of the 75 countries with cruise missiles, 19 of them were "producers"and only six of the 19 countries (India, Japan, Taiwan, South Africa, Iran, and Syria) do not currently export their domestically-produced missiles.[101] About 12 of the 19 countries produce land-attack cruise missiles (LACMs) with the remainder producing anti-ship cruise

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[95] Ibid.

[96] "India, Pakistan Move Forward with New Weapons", *Arms Control Today,* November 2003, p. 39.

[97] "Pakistan Tests Missile Able to Hit Sites in India", *New York Times,* October 4, 2003.

[98] "Musharraf Says N Korea Links Over", *BBC News,* November 7, 2003.

[99] Ibid.

[100] Michael E. Dickey, "Chapter 6 - The Worldwide Biocruise Threat", *The War Next Time: Countering Rouge States and Terrorists Armed with Chemical and Biological Weapons"*, United States Air Force Counterproliferation Center - Maxwell Air Force Base, Alabama, November 2003, p. 156.

[101] Ibid.

missiles (ASCMs).[102] Some analysts estimate that over 70 countries have deployed over 75,000 ASCMs.[103] Antiship cruise missiles, which first began operational service in the late 1950s, are seen by many analysts as precursors to longer-range, heavier payload LACMs. According to officials from the U.S. Defense Intelligence Agency (DIA), in the past, ASCMs were the most widely produced cruise missile variant but LACMs are now leading in production based on spending trends in missile research and development.[104] The DIA further estimates that China will have hundreds of LACMs by 2030 and that Iran, Syria, and Libya will have a modest number also by this date.[105]

The United States recently demonstrated the role that cruise missiles continue to play in modern military operations during Operation Iraqi Freedom (OIF). During the first twelve days of the war, which started on March 19, 2003 with a barrage of 40 Tomahawk cruise missiles launched at regime targets in and around Baghdad, about 700 Tomahawks - - representing 25% of all the Tomahawk missiles ever built - - were fired.[106] According to U.S. defense officials, fewer than 10 of these missiles failed to strike their intended targets.[107] Also of note during OIF, Iraq fired five modified HY-2 missiles at U.S. forces - - marking the first time that U.S. ground forces had ever been attacked by enemy cruise missiles.[108]Some analysts believe that the continued reliance and use of cruise missiles by the United States, including the use of armed unmanned aerial vehicles (UAVs) such as the Predator UAV armed with Hellfire missiles, not only emphasizes their utility and attractiveness but at the same time "destigmatizes" their use. While ballistic missile use is often condemned, little is generally said about the use of cruise missiles, which, due to their accuracy and relative abundance, can be every bit as lethal and destructive as a ballistic missile.

The United States is one of the world's leading exporters of cruise missiles, having sold the Harpoon ASCM to some 23 nations and the Tomahawk LACM to

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[102] Dennis Gromley, "UAVs and Cruise Missiles as Possible Terrorist Weapons", *New Challenges in Missile Proliferation, Missile Defense, and Space Security*, Occasional Paper No. 12, Monterey Institute of International Studies Center for Nonproliferation Studies, Monterey, California and University of Southampton Mountbatten Centre for International Studies, Southampton, United Kingdom, July 2003, p. 3.

[103] Ibid.

[104] Robert Wall, "Land Attack Cruise Missiles Seen as Growing Threat", *Aviation Week & Space Technology*, August 25, 2003, p. 38.

[105] Ibid.

[106] Tom Infield, "Tomahawks Used Heavily in War's First 12 Days", *Philadelphia Inquirer*, April 2, 2003.

[107] Tony Capaccio, "Raytheon Tomahawks Miss few Iraqi Targets, Navy Says", *Bloomber.com*, April 12, 2003.

[108] Michael R. Gordon, "A Poor Man's Air Force", *New York Times on the Web*, June 19, 2003, p. 1.

Great Britain.[109] Other countries are actively involved in the export of cruise missiles. The French Apache LACM is one such cruise missile that is on the global export market. The export version of the Apache (called the Black Shahine) is reported to have terrain-following radar for guidance and incorporates stealth technology and a range that exceeds 300 kilometers which violates MTCR restrictions on range. The United Arab Emirates (UAE) have reportedly ordered 250 Black Shahines from France -- a purchase that has generated a great deal of international concern.[110]

The development of sophisticated cruise missiles is not the exclusive domain of the United States or other Western countries. India and Russia teamed up to develop the BrahMos (for the Brahmaputra River in India and the Moscow River in Russia) a 280 kilometer, 200 kilogram cruise missile capable of being launched from ships, submarines, aircraft, and land.[111] Besides its supersonic speed, which will make its interception extremely difficult, the BrahMos incorporates stealth technology and many experts consider the BrahMos a "state-of-the-art"cruise missile.[112] Particularly troubling to the United States is the reported stated intent of Russia and India to export the Brahmos to Third World countries which could provide these countries with an asymmetric advantage[113] over the United States and our allies who could be hard pressed to effectively defend against this missile.[114] The Brahmos has undergone a series of successful tests with the last reported test being in late November 2003 in India.

Implications

It appears that ballistic missile programs in the aforementioned countries are progressing along various developmental paths prescribed by each country's perceived national security needs. While some countries posses nuclear missile warheads of various yields and a variety of missiles that can reach targets from short to intercontinental ranges, others are still developing nuclear weapons and must still master the scientific and engineering challenges of developing a viable nuclear missile capability. Some analysts believe these countries in the advanced stages of nuclear missile development can be deterred from further progress, either through diplomacy or some form of coercion. Others say that, short of physical destruction of their programs, countries like North Korea and Iran will eventually achieve the capability to deliver nuclear weapons to various ranges with ballistic missiles. Cruise

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[109] Dickey, p. 157.

[110] "Apache", *World Missile Briefing,* Teal Group Corporation, July 2003, p. 7.

[111] "India's Supersonic Cruise Missile", *Frontline,* Volume 18-Issue 13, July 2001, p. 1.

[112] "PJ-10 BrahMos, *GlobalSecurity.org*", July 2003, [http://globalsecurity.org/military/world/india/brahmos.htm], p. 1

[113] An asymmetric advantage in military terms is when a weaker force attacks a stronger force by unconventional means, often striking at a stronger opponent's weak or vulnerable point to create conditions favorable to the weaker force.

[114] "India's Supersonic Cruise Missile", p. 2.

missile programs are far more widespread than ballistic missile programs, largely due to their relative affordability and the dual use nature of their technology. While cruise missiles may not be able to deliver significant payloads over great distances, their stealth and accuracy afford their possessors a potential asymmetric advantage.

In order to address the implications of progressively improving and diversified ballistic and cruise missile threats, the United States has relied on nonproliferation and counterproliferation activities in various combinations and in varied degrees of application. Some analysts contend that past Administrations relied too heavily on nonproliferation activities (which are considerably cheaper than many counterproliferation programs) and blame this imbalance for the current state of missile proliferation. The current Bush Administration is accused by other experts as being too heavily skewed in the direction of counterproliferation, as witnessed by the National Missile Defense Program and the Proliferation Security Initiative, but still other experts note that much of the emphasis on counterproliferation is an inevitable result of the events of September 11, 2001.

U.S. Counter and Nonproliferation Policy[115]

The events of September 11, 2001 have had a profound impact on U.S. counter and nonproliferation policy. The National Security Strategy of the United States of America published in September 2002 calls for "proactive counterproliferation efforts" and "strengthened nonproliferation efforts" against terrorist and hostile states.[116] While missiles are not singled out in the strategy, they are implicitly part of the Administration's definition of WMD. The December 2002 National Strategy to Combat Weapons of Mass Destruction goes into far greater detail on how the threat of WMDs and missiles will be dealt with.[117] This strategy explicitly states that "The United States, our friends and allies, and the broader international community must undertake every effort to prevent states and terrorists from acquiring WMD and missiles." The primary means by which this goal is to be achieved is through counterproliferation and nonproliferation activities. The strategy states that "effective interdiction is a critical part of the U.S. strategy to combat WMD and their delivery means." Another approach is the widely publicized concept of preemption. While preemption has been an underlying assumption in previous national security strategies, it has assumed a prominent role in the current strategy. Some have called for preempting WMD and missile programs in North Korea and Iran, for example, but this may not be a practical or prudent course of action given the range of circumstances in each particular case. The Administration also includes missile defense as a tenet of counterproliferation. In the area of nonproliferation, the strategy calls for the "strengthening of the Missile Technology Control Regime

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[115] See also CRS Report RL31559, *Proliferation Control Regimes: Background and Status.*

[116] *National Security Strategy of the United States of America,* September 2002, p. 14.

[117] *National Strategy to Combat Weapons of Mass Destruction,* December 2002.

(MTCR), including the support for universal adherence to the International Code of Conduct Against Ballistic Missile Proliferation." Also part of this strategy is the implementation of bilateral and multilateral agreements to stop the spread of missile proliferation.

The Proliferation Security Initiative (PSI), announced by President Bush on May 31, 2003, is an international initiative which focuses on the interdiction of WMD and associated delivery systems and technology. Ten nations besides the United States have agreed to take steps to stop the flow of these items including the seizure of shipments as they transit air, land, and sea routes.[118] According to the Administration's Fact Sheet, the PSI principles are "fully consistent with national legal authorities and with relevant international laws and frameworks." The PSI group met in Paris in late 2003 and adopted the principles detailed in the fact sheet. A series of U.S.-sponsored naval interdiction exercises called "Pacific Protector" were conducted in September 2003, involving Australia and Great Britain, as part of the PSI..[119] While the Administration claims that the PSI does not target any particular country, many experts believe that the PSI was developed in response to growing North Korean missile exports and technological assistance to countries of concern.

It remains to be seen if this strategy will be transformed from theory into action. No matter what view is taken, responses to proliferation challenges will have to be individually tailored to meet the particular circumstances of the challenge and the global political costs and benefits of the approach chosen, whether that course is to directly attack a country's WMDs and missiles with military force or enacting sanctions on a proliferating country or business.

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[118] NPI Participants: Australia, Britain, France, Germany, Italy, Japan, the Netherlands, Poland, Portugal, and Spain.

[119] "The Proliferation Security Initiative: Naval Interception Bush-Style," *Center for Defense Information*, August 25, 2003.

Appendix 1. Ballistic and Land Attack Cruise Missile Inventory[120]

(See Footnote 3 on page CRS-2 for abbreviations - blank spaces indicate data unknown)

Designation		Type	Launchers	Missiles	Range (km)	Payload (kg)	Motors	Status
REPUBLICS OF THE FORMER SOVIET UNION								
Armenia	SS-1 Scud	SRBM	8	32	300	1,000	Liquid	
Belarus	SS-1 Scud	SRBM	<50		300	1,000	Liquid	
	SS-21 Scarab	SRBM	<100		120	482	Solid	
	SS-25 Sickle	ICBM	0	0	10,500	1,000	Solid	All moved to Russia
Kazakhstan	SS-1 Scud	SRBM	<50		300	1,000		
	SS-21 Scarab	SRBM	<50		120	482	Solid	
	SS-18 Satan	ICBM	0	0	11,000	8,800	Liquid	All Deactivated
Russia	SS-1, SS-1C Scud Mod 2	SRBM	>250		300+	1,000	Liquid	
	SS-11 Sego	ICBM	0	0	13,000/ 10,600	1,100	Liquid	All Deactivated
	SS-13 Savage	ICBM	0	0	9,400	1,800	Solid	All Deactivated
	SS-17 Spanker	ICBM	0	0	10,000	400	Liquid	All Deactivated

[120] Information from this chart is taken from the Carnegie Endowment for World Peace Missile Chart, [http://www.ceip.org/files/projects/npp/resources/ballisticmissilechart.htm] , March 4, 2004 and Cruise Missiles: Potential Delivery Systems for Weapons of Mass Destruction, U.S. Government Publication, April 2000.

Designation		Type	Launchers	Missiles	Range (km)	Payload (kg)	Motors	Status
	SS-18 Satan	ICBM	186	186	9,000/ 11,000	8,800	Liquid	24 Deactivated
	SS-19 Stiletto	ICBM	170	170	10,000	43,500	Liquid	3 Deactivated
	SS-21 Scarab	SRBM	>200		120	482	Solid	
	SS-24 Scalpel	ICBM	46	46	10,000	40,500	Solid	Modernized w/ one warhead
	SS-25 Sickle	ICBM	360	360	10,500	1,000	Solid	In Service, One Warhead
	SS-27 Topol M	ICBM		~10	10,500		Solid	Modified SS-25, former SS-X-29, In Production
	AS-2 Kipper	ALCM			120	1,000	Turbojet	
	AS-3 Kangaroo	ALCM			650	2,300	Turbojet	
	AS-15 Kent (Kh-65SE/Kh-101)	ALCM	782	782	600/3,000	410/150	Turbofan	Two Versions In Development
	AS-19 Koala	ALCM			4000	875?		Terminated
	Alfa	Supersonic CM			600			In Development
	SS-N-6 Serb	SLBM	16	16	3,000	680	Liquid	All Removed from Subs
	SS-N-8 Sawfly	SLBM	208	208	7,800/ 9,100	3,600	Liquid	All Removed from Subs
	SS-N-17 Snipe	SLBM	0	0	3,900	1,135	Solid	12 Deactivated

Designation		Type	Launchers	Missiles	Range (km)	Payload (kg)	Motors	Status
	SS-N-18 Stingray	SLBM	208	208	6,500/ 8,000	1,315	Liquid	All Removed from Subs
	SS-N-20 Sturgeon	SLBM	120	120	8,300	2,270	Solid	
	SS-N-21 Sampson	SLCM			3,000	150	Turbofan	
	SS-N-23 Skiff	SLBM	112	112	8,300	1,360	Liquid	
	SS-N-24 Scorpion	SLCM			4,000		Turbofan	Canceled
Turkmenistan	SS-1 Scud	SRBM	<50	100+	300	1,000	Liquid	Possible
Ukraine	SS-1 Scud	SRBM	<100	100+	300	1,000	Liquid	
	SS-19 Stiletto	ICBM	0	0	10,000	43,500	Liquid	60 Being Dismantled
	SS-21 Scarab	SRBM	<100		120	482	Solid	
	SS-24 Scalpel	ICBM	0	0	10,000	40,500	Solid	46 Deactivated
	AS-15 Kent	ALCM			600/3,000	410/150	Turbofan	Reported Sent to Russia
EUROPE								
Bulgaria	SS-1 Scud	SRBM	36		300	1,00		
	SS-23 Spider	SRBM		8	500	450	Solid	
Czech Republic	SS-1 Scud	SRBM	0	0	300	1,000		
	SS-21 Scarab	SRBM			70/120	482		
	SS-23 Spider	SRBM	0	0	500	450	Solid	Scrapped
France	SSBS S3D	IRBM	0	0	3,500		Solid	18 Deactivated Sept 1996

Designation		Type	Launchers	Missiles	Range (km)	Payload (kg)	Motors	Status
	S45/S5	IRBM			4,500+			Canceled
	Hades	SRBM	15	500	480			In Storage
	M-20/M-4	SLBM	80	80	3,000/ 5,000		Solid	In Service
	M-45 (variant of M-4)	SLBM			5,000		Solid	Tested 1995
	M-51	SLBM			8,000		Solid	In Development
	Apache/ Apache AI	ALCM			140/ 250-400	520/ 400	Turbojet	Tested 1994, in service by 1997/2001
	SCALP (formerly Super Apache)	CM			500-800	400		In Development
	ASMP	CM			300		Rkt/ Ramjet	In Service
	ASLP	CM			1,300		Rkt/ Ramjet	In Development
	Teseo Mk3	Dual Role			300	145	Turbojet	In Development
Germany	Taurus (KEPD-350)	CM			350	500	Turbojet	In Dev. with Sweden
Greece	ATACMS	SRBM		40	160	1,670	Solid	Sold in 1996
Hungary	SS-1 Scud	SRBM	0	0	300	1,000		Destroyed or Transferred

Designation		Type	Launchers	Missiles	Range (km)	Payload (kg)	Motors	Status
Italy	Teseo	Dual Role			300+	160	Turbojet	In Development, Stealth Otomat
Netherlands	ATACMS	SRBM			160	1,670	Solid	Plans buy by 1999
Poland	SS-1 Scud	SRBM	0	0	300	1,000	Liquid	Transferred
Romania	SS-1 Scud	SRBM	13		300	1,000	Liquid	Storage
Serbia	K-15 Krajina (perhaps modified SA-2)	SRBM			150			
Slovakia	SS-1 Scud	SRBM			300	1,000		
	SS-21 Scarab	SRBM	<50		70/120	482		
	SS-23 Spider	SRBM	<50		500			
Spain	Alada	CM			200+	500	Turbojet	Proposed
	Capricornio	MRBM			1300	500	Solid	Postponed in 1994, Reportedly an SLV
Turkey	ATACMS	SRBM		120	160+	1,670	Solid	U.S. sold in 1996; 72 delivered by 1999
United Kingdom	Trident D-5, UGM 133	SLBM	48		12,000	Nuclear	Solid	3 Boats In Service

Designation		Type	Launchers	Missiles	Range (km)	Payload (kg)	Motors	Status
	Tomahawk BGM-109	SLCM			1,600	320	Solid	
	Storm Shadow	CM		500-2,000	250-400	400	Turbojet	In Development
	Pegasus	CM			200+	500	Turbojet	Probably canceled
CHINA								
	CSS-2 (DF-3/3A)	MRBM	40-80	40-80	2,650/ 2,800	2,150	Liquid	In Service
	CSS-3 (DF-4)	ICBM	10-25	10-25	5,500	2,200	Liquid	In Service
	CSS-4 (DF-5/5A)	ICBM	18	20-50	12,000/ 13,000	3,200	Liquid	In Service
	CSS-5 (DF-21)	MRBM	10	25-50	1,800-3,000	600	Solid	In Service
	CSS-N-3 (JL-1)	SLBM	12/ Sub.		1,700	600	Solid	In Service
	CSS-6 (DF-15/M-9)	SRBM			600	500	Solid	In Service
	CSS-7 (DF-11/M-11)	SRBM			300	500	Solid	In Service
	CSS-8 (M-7/8610)	SRBM			150	190	Solid	In Service
	DF-25	MRBM			1,700	2,000	Solid	May be 2 stages of DF-31

Designation		Type	Launchers	Missiles	Range (km)	Payload (kg)	Motors	Status
	DF-31/JL-2	ICBM/ SLBM			8,000-11,840	700	Solid	In Development; Tested 8/99
	DF-41	ICBM			12,000	800	Solid	In Development
	Xiong Ying ?	LACM			1,500-2,000		Turbofan	In Development
REST OF THE WORLD								
Afghanistan(Taliban, Massoud, & Jambesh)	SS-1 Scud-B	SRBM	<50		300	1,000	Liquid	In Service
Algeria	SS-1 Scud-B	SRBM			300	1,000	Liquid	
Argentina	Alacran	SRBM			200	500	Solid	
Brazil	MB/EE-150	SRBM			150	500	Solid	Terminated
	SS-300	SRBM			300	1,000	Solid	Terminated
	SS-600	SRBM			600	500	Solid	Terminated
Congo, Dem. Rep. Of	SS-1 Scud-B	SRBM			300	1,000	Liquid	Possibly Received from Iran
Egypt	SS-1 Scud-B	SRBM	<50	100+	300	1,000	Liquid	In Service
	Scud derivative (Project T)	SRBM			450		Liquid	In Service?
	Scud-C	SRBM			500	700	Liquid	?

Designation		Type	Launchers	Missiles	Range (km)	Payload (kg)	Motors	Status
	Vector (Condor II)	SRBM			800-1,000		Solid	Possibly in Development
India	Prithvi-150	SRBM		75	150	800-1,000	Liquid	In Service
	Prithvi-250	SRBM			250	500-750	Liquid	In Production
	Prithvi-350	SRBM			350	750-1,000	Liquid	In Development
	Dhanush- Naval Prithvi	SLBM			250		Liquid	In Development
	Agni	MRBM			1,400- 2,500	1,000	Solid/ Liquid	In Development/ Tested
	Agni II	IRBM			3,000	1,000		Tested 4/99
	Agni III	IRBM			3,500- 5,000			In Development
	Surya	MRBM-ICBM			2,000-5,000			In Development
	Sagarika	SLCM or SLBM			300	500	Solid	In Development
Iran	CSS-8 (M-7/8610)	SRBM	<50	200	150	190	Solid	In Service
	CSS-6 (M-9)	SRBM			600	500	Solid	Possible
	CSS-7 (M-11) variant	SRBM			300	500		Possible Development
	Mushak-120 (Iran-130, Nazeat)	SRBM			130	500 or 190	Solid	In Service

Designation		Type	Launchers	Missiles	Range (km)	Payload (kg)	Motors	Status
	Mushak-160	SRBM			160	190	Solid	In Service
	Mushak-200	SRBM			200	500	Solid	In Development
	NP-110				170		Solid	In Development with Chinese help
	Shahab-3/Nodong Variant	MRBM			1,300-1,500	750	Liquid	Tested 7/22/98, Similar to Nodong
	Shahab-4	MRBM			2,000-2,500 (or 4,000)	1000		In Development
	Shahab-5	ICBM			10,000			Possibly in Development
	SS-1 Scud-B	SRBM	<50	200+	300	1,000	Liquid	In Service
	Iran 7000 (Scud-C variant)	SRBM	<50	100+	600/ 700	500	Liquid	In Service
	Zelzal (Earthquake) 1	SRBM			100-150		Solid	In Production
	Zelzal 2	SRBM			350-400		Solid	In Production
	Zelzal 3	MRBM			1,000-1,500		Solid	In Development
	Two unnamed programs	ICBM?			5,500/ 10,000	750		In Development, Unconfirmed

Designation		Type	Launchers	Missiles	Range (km)	Payload (kg)	Motors	Status
Iraq	Ababil-100	SRBM			130-140 (or 500)	300	Solid	In Development
	Al-Samoud/ Samed/Sumud	SRBM			150		Liquid	Flight tested; SA-2-type engine
	SAKR 200	SRBM			150	500		In Development
	SS-1 Scud-B	SRBM			300	1000		
	Scud variant/Al Husayn	SRBM			600	500		Some Remain
	Scud variant/Al-Abbas	SRBM			900	300		Discontinued
Israel	Jericho 1 (YA-1)	SRBM		~50	500	750	Solid	In Service
	Jericho 2 (YA-3)	MRBM		~100	1,500	1,000	Solid	In Service
	Jericho 3 (extended range)	MRBM/ IRBM/ ICBM			2,000-4,800-11,500	1,000	Solid/ liquid	In Development
	Popeye Turbo	ASM			350	895	Turbojet	
	Delilah Derivative (Star-1)	ALCM			400	450	Turbojet	In Development
	Modular Stand-Off Vehicle	ALCM			100	675	None	In Development
Korea, North	Scud-B variant	SRBM	12	100+	300	1,000	Liquid	In Service
	Scud-C	SRBM		100+	500	700	Liquid	In Service

Designation		Type	Launchers	Missiles	Range (km)	Payload (kg)	Motors	Status
	Nodong	MRBM			1,000-1300	1,000	Liquid	In Service
	Taepo Dong-1	MRBM			1,500- 2,000	1,000	Liquid	Used with solid fuel third stage in satellite launch attempt 8/31/98
	Taepo Dong-2	IRBM			4,000-6,000		Liquid?	In Development
Korea, South	NHK-1 (Baekgom)	SRBM			180	300	Solid	In Service
	NHK-A (Hyon Mu)	SRBM			180	300		In Service
	NHK Extended Range	SRBM			300			Tested at reduced range
	ATACMS	SRBM		111	160	1,670	Solid	U.S. negotiating in 1997
Libya	SS-1 Scud-B	SRBM	80	240+	300	1,000	Liquid	In Service
	Scud-C	SRBM		100+	500	700	Liquid	Possibly in Development
	Al-Fatah (lttisalt)	MRBM			900		Liquid	In Development
Pakistan	Hatf-1	Rocket			80-100	500	Solid	In Service
	Hatf-2	SRBM			280	500	Solid	In Development
	Hatf-3 (Possibly the Tarmuk, a version of M-9)	SRBM			750-800	500	Solid	Indian press reports M-9-type project

Designation		Type	Launchers	Missiles	Range (km)	Payload (kg)	Motors	Status
	M-11 (CSS-7/DF11)	SRBM		40?	300	500	Solid	Missiles or parts and factory from China. May be basis for Hatf-2
	Ghauri (or Mk III or HATF-V)	MRBM			1,000-1,500	600 or 700	Liquid	In Development with China and North Korea; similar to Nodong; tested 4/6/98
	Ghauri II (or HATF-VI	MRBM			1,500-2,300	700	Liquid	Reportedly Tested 4/99
	Shaheen I (HATF-4)	SRBM			600-700	320	Solid	Tested 4/99
	Shaheen II/ Ghaznavi/ Ghazni	MRBM			2,000-3,000		Solid?	In Development; May be related to NK Taep'o-dong
	Abdali	MRBM			2,500			In Development
Saudi Arabia	CSS-2 (DF-3)	MRBM	30	~50	2,400/ 2,800	2,150	Liquid	Possibly not operational
South Africa	Arniston	MRBM	4+/0?		1,450	1,000	Solid	Suspended

Designation		Type	Launchers	Missiles	Range (km)	Payload (kg)	Motors	Status
	Torgos (Multi-Purpose Standoff Weapon)	LACM			300		Turbojet	In Development
Syria	SS-21	SRBM		36+	70	482	Solid	In Service
	SS-1 Scud-B	SRBM		100s	300	1,000	Liquid	In Service
	Scud-C	SRBM		50+	600	500	Liquid	In Service
Taiwan	Hsiung Feng-3	CM			300			In Development
	Ching Feng (Green Bee)	SRBM			130	400	Liquid	In Service
	Tien Chi (Sky Halberd)	SRBM			300	500		SSM version of Sky Bow II SAM. Tested 2/97
	Tien Ma (Sky Horse)	SRBM			600-1,000	500		In Development
United Arab Emirates	SS-1 Scud-B	SRBM	6		300	1,000		
	Black Shahine (Version of Apache)	ALCM			140-300	520		Bought From Matra Bae Dynamics
Vietnam	SS-1 Scud-B	SRBM	<50		300	1,000	Liquid	In Service
Yemen	SS-21	SRBM	<50	24?	70	482	Solid	In Service
	SS-1 Scud-B	SRBM	<50	18?	300	1,000	Liquid	In Service