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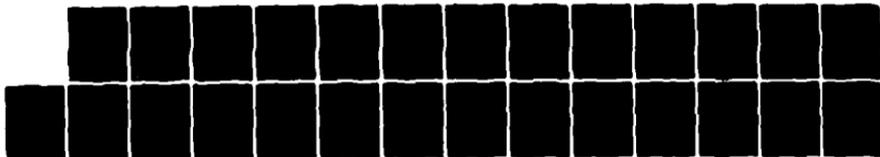
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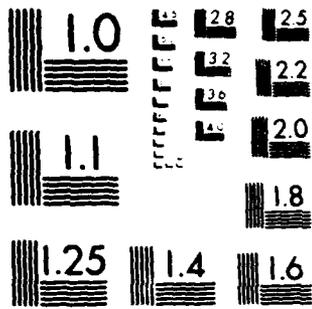
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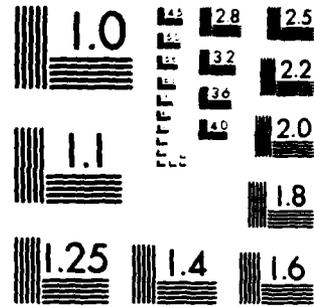
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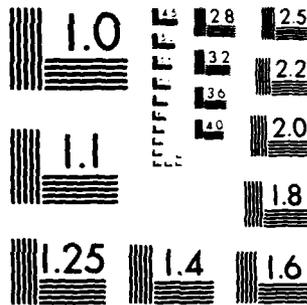
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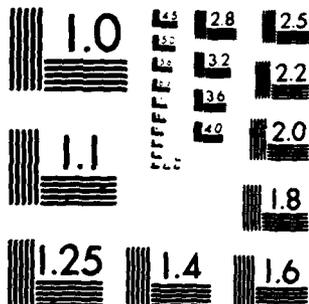
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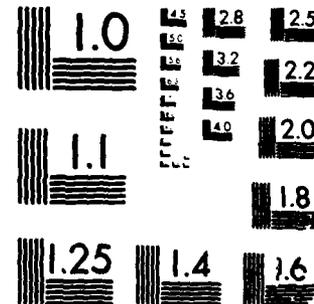
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SPACE: A SANCTUARY, THE HIGH GROUND, OR A MILITARY MISSION?

Joseph E. Justin, Major, USAF

April 1982

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SPACE: A SANCTUARY, THE HIGH GROUND, OR A MILITARY MISSION?*

Joseph E. Justin, Major, U.S. Air Force^{**}

Debates in the public press and by military analysts concerning both the U.S. space program and increased military spending have brought public attention to a critical question: What should be the U.S. strategy for the military use of space in the 1980s? Should space be a demilitarized sanctuary, a place for enhancement of our terrestrial military forces, or a new military mission in its own right? These three schools of thought will be used as a framework for discussing the merits of the following issues:

- o The Soviet space threat;
- o The doctrinal view of the U.S. military role in space;
- o The Shuttle, manned space flight, and expendable launchers;
- o The development of space survivability and warfare programs;
- o The diplomatic and arms control negotiations for space; and
- o The development of military space organizations.¹

Each school of thought has some valid points, which could be combined to develop a consistent military strategy for the use of space and the protection of our national security in the 1980s.

* This paper was prepared for presentation at the International Security Dimensions of Space Conference at The Fletcher School of Law and Diplomacy, Tufts University, Medford, Massachusetts, April 27-29, 1982.

** The views and opinions expressed are those of the author and should not be construed to reflect any endorsement or confirmation by the Department of Defense, the Department of the Air Force or any other agency of the Federal Government.

MILITARY SCHOOLS OF THOUGHT AND SPACE ISSUES

SPACE AS A DEMILITARIZED SANCTUARY

Two of the three schools of opinion approve of the military in space, but disagree on how to use it. The third is fundamentally opposed to any military weapons in space (see Table 1). The school that calls for space for peaceful purposes only (called here the "Sanctuary Group") believes space should not be used as a military instrument of policy.² Instead we should pursue peaceful objectives and mutual efforts with other countries. To them, the United States should at a minimum honor its present international agreements on the free use of space, the right of self-defense, and a prohibition on the means of mass destruction, particularly the 1967 Treaty on the Principles Governing the Activities of States in the Exploration and Use of Outer Space.³ Furthermore, we should be actively involved in the resolution of such issues as claims of orbital sovereignty, rights of remote sensing and open dissemination, allocation of radio frequencies, nuclear power sources in space, and the use of the moon.

To the Sanctuary Group, two main areas of concern are antisatellite negotiations and the 1972 Anti-Ballistic Missile (ABM) treaty regarding limitations on ABM systems and noninterference with technical means of verification. They point out that the Soviets have indicated an interest in cooperation.⁴ Further, they argue that the Soviet threat lies in the distant future and can be minimized by encouraging better cooperation and restraints.

Table 1

MILITARY SPACE SCHOOLS OF THOUGHT AND ISSUES

ISSUES	SCHOOLS OF THOUGHT		
	Space as a Sanctuary	Space as the High Ground	Space as a Mission
Threat	Space Race	Soviet Space Threat to Terrestrial Forces	Soviet Space Threat
Military Role	Space Demilitarization	Force Enhancement	Space War Fighting and Winning
Shuttle	Civilian Shuttle	Shuttle and Expendable Launchers	Military Shuttle and Man & Woman in Space
Resources	Freeze on ASAT Systems and Space Weapons	Satellite Autonomy and Survivability	Space Weapons
Arms Control	ASAT Negotiations	Existing Agreements	Existing Agreements
Organization	Open Civilian - Closed Military	Compartmentalized	Space Command

The Sanctuary Group maintains that the threat in space may be less from the Soviets than from the danger of an arms race. According to the Sanctuary Group, the Soviet Union is currently technologically inferior to the United States. It may be better to negotiate to limit the technology

race now--before it is too late. In particular, a laser race in space may be to our disadvantage. Professor Kosta Tsipis of the Massachusetts Institute of Technology, a noted critic of laser weapons, states that although laser weapons seem promising, these systems have major drawbacks. Technically, laser weapons may not be effective because of accuracy, energy, or reliability problems.⁵ Further, he contends that the systems have inherently high vulnerability, making them liable to easy defeat in a first strike by antisatellites or enemy laser systems. According to the Sanctuary Group, the United States should unilaterally freeze any plans for deployment and space testing of its ASAT system, any possible geosynchronous (high orbit) ASAT system, and any possible space-based directed energy system, and the United States should reopen negotiations with the Soviets to freeze their systems and to dismantle their present ASAT system.⁶ The Sanctuary Group believes it may be better to outlaw these systems now rather than to spend all that money and still end up being less secure.

To this group, space should be only for exploration and the advancement of mankind. They believe the Shuttle is an important program and should not be used for military weapons, and if space systems truly are essential for national security, they should be separate from the civilian programs. Further, the United States should find less costly and more rational means of providing for our security.

SPACE AS THE HIGH GROUND OF THE AEROSPACE MEDIUM

Contrary to the opinion that the military has no role in space, the group called here the "High Ground" Group believes space should to be used

for the enhancement of our terrestrial forces. To them, space is essential to our national security.

This High Ground Group maintains that General Thomas D. White, the Chief of Staff of the Air Force from 1957 to 1961, was right when he stated that air and space are inseparable parts of aerospace.⁷ To them, there is no distinct or natural operational limit between air and space. According to General Alton D. Slay (USAF, Ret.), former Commander of Air Force Systems Command, "It is a place--an environment, an arena of considerable operational mission import, but certainly not a 'mission', per se, any more than the atmosphere, or the ocean, or the land is a mission."⁸ In other words, space's real military mission is here on earth.

The U.S. use of space to enhance our military terrestrial forces has now become essential to our national security, according to this group. We have already made large investments and have undertaken many force enhancement functions. We have already spent about \$100 billion and current spending is about evenly divided between civilian and military programs. In the 1980 fiscal year the requested total space budget was up 12 percent to \$7.9 billion.⁹ Our two most vital military roles in space are warning and surveillance. Space photo reconnaissance systems have been particularly useful to our security.¹⁰ Space systems also provide over 70 percent of the overseas communications of the U.S. military and enhance the utility of these forces. During the 1975 Mayaguez incident, for example, space systems aided in President Ford's direct communication with the commander of the landing party and in the relocation of the helicopters' inflight refueling area, necessitated by bad weather in the original location as revealed by weather satellites.¹¹

Unfortunately, the Soviet Union is challenging the U.S. use of space and our force enhancement functions. Each year the Soviet Union launches at least 75 missions, the United States only 15 to 20. At least 70 percent of Soviet missions are purely military.¹² Also, the Soviet Union is threatening to deny free passage in space, lately with tests of their killer satellite system, although reportedly this system may be used only against low orbit satellites.¹³ Further, lasers and directed energy weapons may become threatening despite their possible major drawbacks.¹⁴

Space's harsh environment and our need for a 10,000 mile long "screwdriver" to repair satellites can be minimized by technology and the Shuttle. The High Ground Group argues that the Shuttle should be supported in terms of the military need for low-cost transportation into space. The Department of Defense has put over a billion dollars into the Shuttle development and has budgeted another two billion to complete it.¹⁵ Further, the Air Force has budgeted over a billion dollars a year for Shuttle operational support during the mid-1980s. Although the Shuttle is the first step, the "DC-3" of the space age, the Shuttle program and schedule must be balanced against the advantages of expendable launchers and our overall military space needs. This group believes the need for low-cost transportation is the key to this balance. They argue that we need increased launch capabilities for larger satellites, spares, proliferation of systems, decoys, and highly maneuverable systems. For these requirements, expendable space systems have many advantages and should be maintained along with the Shuttle.

Concerning the role of military personnel in space and a permanent presence in space, this group argues that we should carefully consider what

benefit these programs would provide to the United States. According to General Slay, "To put military people in space just because it's something we can do is not my idea of a judicious expenditure of our scarce resources."¹⁶ In other words, military personnel should be used in space only if their presence enhances system effectiveness.

This group believes that space systems should be based upon the need for enhancement of terrestrial forces. The Global Positioning System, for example, is justified because it accurately provides velocity and position information. Terrestrial forces can use this capability to drop bombs accurately, fire weapons, or command the battle. Other important programs are the Defense Satellite Communication System (DSCS III), the Air Force Satellite Communication (AFSATCOM) system, the Defense Meteorological Satellite Program (DMSP), the programmed deployment of mobile ground terminals for our early warning satellites, the Integrated Operational Nuclear Detonation Detection System (IONDS) deployment with the Global Positioning System, and the MILSTAR program, which will provide global two-way military communications on a survivable basis.¹⁷ To this group, such futuristic systems as directed energy systems should be very carefully reviewed. If these "Star Wars" systems prove feasible, they may be of interest, but can we afford them? And how will they help our combat troops? To this group, priority should be given to programs for improved satellite autonomy and survivability.

There should also be a sound reason for negotiations of any new arms control agreements for space. What would we gain and how would it help our overall security? Would any agreement have the required credibility, deterrence, or capability to ensure that one side would not try to gain a

unilateral advantage? According to this group, satellites that terrestrial forces can use as a threat should not be placed in sanctuary. In summary, the military arguments concerning these issues should be carefully considered.

This group argues that we should be wary of a military command for space.¹⁸ To them, an unnecessary or a premature organization could be counterproductive and might foster unneeded futuristic systems. They believe that the recent government actions are more than sufficient to coordinate and integrate our space operations. Some of these actions have been

- o The establishment of an Air Force Space Division (a major part of the former Space and Missile Systems Organization--SAMSO) and the naming of a Deputy Commander for Space Operations;
- o The establishment of a Manned Space Flight Support Group at Johnson Spaceflight Center to provide support to NASA and train Air Force personnel in Shuttle operations;
- o The establishment of a Defense Space Operations Committee, chaired by the Secretary of the Air Force, to coordinate Department of Defense space operations;
- o The formation of a Directorate for Space Operations within the Headquarters of the Air Force;
- o The naming of Major General James A. Abrahamson, U.S. Air Force, as the Associate Administrator for NASA responsible for the Shuttle;
- o The formation of a course in space operations at the Air Force Institute of Technology for training Air Force personnel;

- o The re-establishment of the North American Aerospace Defense Command to a four-star command;
- o The planned construction of an Air Force Consolidated Space Operations Center in Colorado Springs for control of Air Force space and launch operations; and
- o The construction of Space Transportation System facilities at Vandenberg AFB.¹⁹

According to the High Ground Group, we should be wary of further steps toward coordinating and integrating our space activities. They believe the structure of a Space Command should evolve through need, as did the Air Corps. If a Space Command is to be, it should be created only when it is clearly needed.

SPACE AS A MILITARY MISSION

The group I shall call the Mission Group argues that we should give more attention to space as a mission in its own right.²⁰ According to a noted commentator on our military space program, Colonel Morgan W. Sanborn (USAF, Ret.), just as air operations are uniquely different from land and naval operations, so are space operations uniquely different from air operations. "Space is a mission and not simply another medium only to be used to augment existing military roles and responsibilities."²¹

General Thomas White said, following Sputnik, "Whoever has the capability to control space will likewise possess the capability to exert control [over] the surface of the earth."²² The Mission Group argues that this concept--loosely defined as "space power"--is even more compelling today. According to the Department of Defense's Soviet Military Power,

"The Soviet Union is intensely engaged in a program designed to achieve a dominant role in space."²³ According to Representative Ken Kramer of Colorado, an advocate of a great military role in space, the Soviet threat consists of their ASAT system, the manned orbiting Salyut stations, and their satellite targeting of our naval forces.²⁴ According to the Department of Defense, the Soviets are working on a new booster that is similar in performance to our Apollo Saturn V booster, six to seven times the launch weight capability of our Shuttle, and able to launch a new series of Soviet projects.²⁵ The Mission Group argues that the growing Soviet space threat illustrates the need for better American military space operations. In case of war, space could be the first battlefield.²⁶ They contend that lasers and follow-on particle beam weapon systems, if made survivable, could decrease the utility of long-range nuclear weapons, changing our present concepts of deterrence and arms limitation agreements. Not only would lasers be possible antisatellite weapons, they would be an effective first-line ABM system. Questions concerning the need to abrogate the ABM treaty would have to be resolved. The reported follow-on particle beam system could further improve our capabilities.²⁷ One concept recently proposed by Lieutenant General Daniel O. Graham (USA, Ret.), who is a former director of the Defense Intelligence Agency, consisted of a large number of "space cruisers" armed with antimissile projectiles and a military manned station in space for command and control.²⁸ A later version of these "space cruisers" would use a laser system. The Mission advocates argue that we should give more attention to such systems and to the long term problem of how to fight and win a war in space.

As for the Shuttle, the Mission Group believes that the issue is people, not hardware. People will determine what can be done, how, and at what cost. According to Colonel Morgan Sanborn, "I predict that manned space systems will provide at least the same quantum jump in military capabilities as did the airplane."²⁹ Although it is difficult to quantify the benefit of military people in space, their presence will demonstrate what military missions can be accomplished.

The Mission Group believes that more attention should be given to the Air Force's coordination and integration of space operations, especially the study of a Space Command.³⁰ According to Sanborn, "The first essential is a reorganization of Air Force command responsibilities to give proper recognition to the potentials of military space."³¹ They also believe we need a revolutionary change in our military structure.

The General Accounting Office has recommended that the Department of Defense establish a focal point for space and the creation of a "Space Master Plan."³² Other services, in particular the Navy, are acutely aware of the military value of space and the need for protection from any Soviet threat from space.³³ For the Shuttle and military space operations, full responsibility comes together only in the Office of the President.³⁴ But the Office of the President is too high in the organizational structure to deal with operational problems that might develop with the military use of the Shuttle.

According to the Mission Group, the formation of the Defense Space Operations Committee and the other changes are all steps in the right direction. But more should be done to actively integrate and coordinate our military space activities. Representative Kramer advocates formation

of a Space Command to integrate the space activities of at least four major Air Force commands and 11 other organizations and even advocates renaming the Air Force the "Aerospace Force."³⁵ Secretary of the Air Force Verne Orr rejected the name change but has initiated himself a study of a Space Command and has voiced his hope that such a command could be operational by 1985.³⁶ To the Mission Group these are welcome changes. In their opinion, if we do not change our structure, we may be neglecting the military potential of space.

UNRESOLVED ISSUES

Each of the three schools of thought has some valid points, but each argument is one-sided. These groups are limited in interdisciplinary exchange of ideas and traditional scholarly standards and have little in common for the discussion and analysis of alternatives. In considering the Soviet threat, we still need to ask: What should be our space strategy? Are the Soviets really threatening free passage in space? Is there a risk that the Soviets will develop such another cataclysmic event as Sputnik? Can space-based systems really be used against long-range weapons? If so, what would be the effect on international stability? Should we be first in the military realm of space? Are there any acceptable alternatives to being first?

In considering the Shuttle and expendable launchers, we need to ask: Should we have both the Shuttle and expendable vehicles or just one type of launcher? When should personnel be used in military missions--just for the Shuttle portion, for in-orbit missions, for in-orbit repairs, or for in-orbit command and control? Do manned systems have a credible role in light of ASAT technology?

In developing our systems for the future, what is our priority? Should it be development of better systems for the force enhancement role or should we be doing more on futuristic systems? Will these systems work? Is there a military mission for them? Can we afford them? Are there easier methods of achieving that mission? And how will it help our combat troops?

Concerning any possible arms reduction negotiations, what should be the U.S. position? Should our goal be to demilitarize space, to limit space to just force enhancement missions, or to view it as a full military mission? What should be our position on any ASAT treaty and the ABM treaty? What would we gain by any new initiative? And how would it help our overall security? Should we match the Soviet ASAT capability before we negotiate? How likely is it that the Soviets would dismantle their system?

When, if ever, should a space command be formed? Should it be an Air Force command, a unified command, or a separate service? Is space uniquely different from other environments? Will space warfare be uniquely different from other warfare? Which of the alternatives has the proper centralized control, credibility, and military capability? And, if there is to be a major change in our military organization for space, when should that change occur?

REFLECTIONS ON SPACE STRATEGIES AND INITIATIVES

It is difficult to argue either that space can be free of military considerations or that the United States need not provide for a military role in space. The superpowers do not have any formal space forces, but they do have a serious commitment in space. The Soviets have demonstrated their commitment to programs of historic firsts, and they continue to build a massive record of manned and unmanned launches. Although they have no separate military service for space, they do have a separate Strategic Rocket Force. The military use of space dominates their entire space program. A strong influence in Soviet military doctrine extends their concept of combined forces and operations into space.

Both superpowers can use space for arms verification, warning, enhancement, and command and control of terrestrial weapon systems. In general, space-based systems enhance conventional forces for the superpowers. Further, the superpowers can use space to decrease the usefulness of long-range nuclear weapons. Space systems may even be the first line of defense.

The danger from space should not be neglected. The United States must provide for its security. The issue is not whether, but how, that security should be provided. At least in this aspect space as a sanctuary has limited pragmatic validity.

It is also hard to argue either that space is "just another place" or that the Air Force's justification for its role in space should be based solely upon the term "aerospace." Other services, in particular the Navy, are justifiably concerned about the space threat and the military use of

space. Also, since the days of Sputnik, the integration of the roles and missions of the services has greatly increased. Further, there are differences between space and air operations and even between space and missile operations. Launch services, including Shuttle operations, satellite operations, and command and control services, are all very specialized and distinct. Technology and the Shuttle will not change astrodynamics and celestial mechanics--laws of nature that describe motion in space--any more than the 1930s' technology and the long-range bomber changed the laws of aerodynamics. However, technology and the Shuttle inevitably will change how we will use space. Most people, including the military, tend to think of air and space as being separate. We should avoid basing the Air Force's role in space on the term "aerospace" and justify our role otherwise.

The long-term objective of the military role in space should be more than merely the enhancement of terrestrial forces. Although space is being used for that now, and there is the new possibility of a Soviet threat of denial, are these the purpose of the military in space? Or is that just what technology will now permit? The role of the military is related to warfare--both its deterrence and its resolution. If space may be the first battleground, an enormous advantage may accrue to the side that is able to control space for its own benefit. Fundamental to the military role in space, therefore, is this concept of assured free passage and its use for national objectives. In the future, nations may first actually have to assure access and passage in space before using it to achieve their objectives. To control space and to deny it to the enemy may become major military objectives. The United States must develop the military

capability to assure free passage in space selectively.

The United States needs a balanced military space program. We need a mix of the Shuttle fleet and expendable launchers, manned and unmanned space systems, and survivable systems. We should also develop an operational ASAT capability, initiate a vigorous technology program for space-based missile defenses, and investigate the impact of abrogating the ABM treaty. Highly survivable, autonomous satellite systems and unmanned launchers have many advantages; but to accomplish our missions, we also will require people and a Shuttle. The enhanced capabilities of the Shuttle will provide a revolutionary test of the best missions for people in space. The Shuttle must be balanced against the benefits of other programs. We should also consider new initiatives beyond the Shuttle. We might sponsor a limited number of exchange officers from our Allies to fly as part of the Department of Defense programs on the Shuttle. We also need training programs for our military specialists who are now being recruited for possible military missions on the Shuttle. We need to continue discussions on space-based radars and a permanent presence in space. Clearly we need to develop better thinking about our space-based systems, their missions, and our objectives for the military role in space.

A necessary condition for any arms control negotiation for space must be a consensus on U.S. vital interests and our military role in space. We must be willing to negotiate the nonvital interests. Our warning and surveillance systems are vital, and other systems also may be vital. Any negotiations must avoid restrictions that might put these systems at risk. Perhaps the greatest uncertainty concerning the military role in space is the question of arms reduction initiatives. In general, U.S. and Soviet

military space programs are asymmetrical and do not lend themselves easily to common limitations.

The changing nature of the military role in space and Shuttle operations will require better coordination and integration of our military space activities. Shuttle operations may require a dedicated organizational structure to utilize the Shuttle's potential. The present structure for air operations of centralized command and control and decentralized execution may not be suitable for our space systems. Although we are moving toward multi-mission space systems for multi-users, each space system is a special and singular entity. In general, launch services, command and control telemetry, tracking, and satellite operations are interrelated functions, which should be integrated within a proper organizational structure. Further, any possible ASAT system should be included, as should advanced research and development.

A separate vertical structure of centralized command and control and centralized execution of those commands up to the space system or on board the Shuttle may be a better structure than integrating our space operations into our present terrestrial operational structure. A dedicated organization is needed to overcome the compartmentalization of military space projects that has developed over the last decades. This should help correct the layered misperceptions and the inter- and intraservice rivalries concerning responsibility and authority for our military space programs.

Our situation in regard to the effects of overcompartmentalization parallels the entrenched military organization in the 1930s. At that time, lack of proper organization led to the neglect of air power. To correct

the situation, air power advocates concentrated on the unescorted bomber, with the result that the military further neglected strategic thinking about other important elements of air power. With proper organizational support, they might have made better preparations for World War II. The United States cannot afford to repeat that error in developing our priorities and strategies.

If the Soviet threat is real, we must have an organization properly structured to plan and execute the space order of operations and the postattack reconstitution of space systems. If full responsibility for space operations comes together only in the Office of the President or in the Defense Space Operations Committee, then this may be too high an organizational level to deal with the problems that might develop in military Shuttle operations. Our military space activities must be better integrated and coordinated.

By the mid-1980s the United States should have a major change in the military organization for space. The development of a U.S. Air Force Space Command, and even a unified (and someday a separate) U.S. Space Organization, for the first time would create the means to address our space objectives adequately. It would provide a cadre of military space professionals, a center for long-range planning, and an advocate. These will be critical in the fight for the space share of the military budget and in the proper use of space for national security. The mid-1980s are appropriate for a major change in our military organization for space. An Air Force Space Command, and perhaps even a unified U.S. Space Organization, should be in existence for the first Shuttle flight from Vandenberg AFB, for the start of operations of the Consolidated Space

Operations Center in Colorado Springs, and for the start of operations of the Defense Satellite Communication System III, the Global Positioning System, and, possibly, the ASAT system.

In summary, U.S. strategy for the military use of space during the 1980s should address the following points: Space is now a major military consideration and not just another place; therefore, the United States must provide for a military role in space. The long-term objective of the military role in space is more than mere enhancement of terrestrial forces. If we unilaterally assume that the military potential of space is limited to force enhancement, we may be neglecting an important element of our future defense. The United States needs a balanced military space program: a mix of the Shuttle fleet and expendable launchers, manned and unmanned space systems, and survivable systems. We also need to continue to develop an antisatellite deployment capability and a program of research in space-based missile defense. Furthermore, we should have as a goal the negotiation of a meaningful arms reduction agreement for space. However, we first must have a well-conceived domestic consensus on our vital interests in space. Finally, we should have a major change in the military organization for space by the mid-1980s. Shuttle operations will require a dedicated and efficient organization to use the Shuttle's potential fully.

SPACE STRATEGY FOR THE 1980S

Discussions of military space strategy should avoid emotion-laden arguments. The flights of Columbia and the debates on the military uses of space should be opportunities to discuss the real issues that face us in the 1980s. Our criteria for judgment should be in terms of a clear and compelling national interest for our military role in space. We need a strategy that will enhance our national security, use our resources properly, and be consistent with our national interests. We must examine our policy assumptions, objectives, constraints, and choices. Space policy should be viewed as a continuation of national policy, not as a separate military issue.

We should view space as now being a major military consideration requiring a major national commitment. The United States needs a balanced military space program, a goal of negotiating an arms reduction agreement for space, and a major change in our military organization for space. These items should become elements of the U.S. strategy for the military use of space during the 1980s.

NOTES

1. For a further discussion of these issues see Michael M. May, "War or Peace in Space," Discussion Paper No. 93, California Seminar on Arms Control and Foreign Policy, Santa Monica, March 1981.
2. The National Aeronautical and Space Act of 1958 is often quoted although it does have provisions for the right of self-defense and a military role in space. For further discussion see Richard D. Lyons, "Military Planners View the Shuttle as Way to Open Space for Warfare," New York Times, March 29, 1981, p. 1; Frank Asbeck, "The Militarisation of Space," Armament and Disarmament Information Unit, April/May 1980, pp. 1-3; Barry Scheider, "Preventing Star Wars," Bulletin of the Atomic Scientists, October 1981, pp. 13-15; David A. Andelman, "Space Wars," Foreign Policy, No. 44, Fall 1981, pp. 94-106; Donald L. Hafner, "Averting a Brobdingnagian Skeet Shoot: Arms Control Measures for Anti-Satellite Weapons," International Security, Vol. 5, No. 3, Winter 1980/1981, pp. 41-60; and May, "War or Peace in Space."
3. For an excellent discussion on space law see Major General Walter D. Reed, the Judge Advocate General, U.S. Air Force, address to the American Astronautical Society, "A Legal Regime for Space Activities," Supplement to the Air Force Policy Letter for Commanders, No. 1-1979, AFSINC/IIA, Kelly AFB, TX, January 1979; Carl Q. Chrestol, "Growth of Space Law," Astronautics and Aeronautics, December 1981, pp. 111-115; and Raymond L. Garthoff, "Banning the Bomb in Outer Space," International Security, Vol. 5, No. 3, Winter 1980/1981, pp. 25-40.
4. See Anthony Austin, "Brezhnev Hints He Wants Talks on Space Arms Curbs," New York Times, April 18, 1981; and "Colby Calls Shuttle Spur to Arms Talks," Washington Star, April 22, 1981.
5. Kosta Tsipis, "Laser Weapons," Scientific American, Vol. 6, No. 6, December 1981, pp. 51-57.
6. Andelman, "Space Wars."
7. Department of the Air Force, Air Force Manual 11-1, Functions and Basic Doctrine of the U.S. Air Force, Department of the Air Force, Washington, D.C., February 1979, Chap. 7.
8. Alton D. Slay, "Space: The Air Force's Future Initiative," Astronautics and Aeronautics, April 1979.
9. Dr. Frank Press, then director of the Office of Science and Technology, Executive Office of the President, statement before the Committee on Science and Technology, the House of Representatives, 14 February 1979.

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20. For this point of view see Lyons, "Military Planners View..."; Donald W. Cox and Michael Stoiko, Spacepower -- What It Means to You, Philadelphia, 1958; Dandridge Cole, "Response to the 'Panama Hypothesis'," Astronautics and Aeronautics, June 1961; Jacob E. Smart, "Strategic Implications of Space Activities," Strategic Review, Fall 1974; Richard E. Hansen, "Freedom of Passage on the High Seas of Space," Strategic Review, Fall 1977.
21. Morgan W. Sanborn, "National Military Space Doctrine," Air University Review, January/February 1977.
22. Thomas D. White, Speech to the National Press Club, 29 November 1957, as reported by The Wall Street Journal, December 2, 1957, p. 2. It is ironic that General Thomas D. White can be used both by the High Ground and by the Mission Group to argue what the role of the military should be in space.

23. Soviet Military Power, p. 99.
24. Ken Kramer, "The United States Space Challenge: Can It Be Met?" The Wichita Eagle-Beacon, 27 September 1981, p. 3B.
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27. Malcolm Wallop, "Opportunities and Imperatives of Ballistic Missile Defense," Strategic Review, Fall 1979, pp. 13-21; Lyons, "Military Planners View..."; and "An Armada in Space," St. Louis Post-Dispatch, January 11, 1981.
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31. Sanborn, "National Military Space Doctrine."
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36. Famiglietti, "Orr Hopes for Separate Space Command by 85."