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PROMPT GLOBAL STRIKES THROUGH SPACE:

WHAT MILITARY VALUE?

by

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Preface

This paper merely scratches the surface on the topic of prompt global strikes through space, but my chief purpose is simply to contribute to the debate about the potential benefits and problems associated with such a concept. My first intent is to make the reader aware of the subtle but weighty influence that mindsets and institutional preferences have on decisions affecting future military strategy and force structure. Next, I attempt to show some potentially valuable options that prompt precision strikes through space can offer in a major crisis that are not currently possible with either our current military or the military of 2010 if the global strikes through space capability is not fielded by then. Finally, I wanted to leave the reader with the thought that the Air Force must think carefully about, and act boldly with, the space half of the aerospace mission.

The experience of creating this paper has been excruciatingly educational, and for that there is lots of blame to go around. I want to thank my advisors, Dr. Grant Hammond and Col. Ted Hailes, USAF (Ret.), for their enthusiastic and stimulating instruction, and especially Col. Hailes' mentorship as I struggled with formulating an organized think piece from a jumble of loose ideas and serendipitous readings. I am grateful as well to my fellow Air War College "Strategy and Technology" classmates who offered sobering critiques of my ideas and occasionally provided leads on sources. I am materially indebted to the Air Force Research Laboratory for outstanding support in sponsoring my trips to Air Force Space Command and United States Space Command at

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Abstract

The Air Force and U.S. Space Command have long-range plans to demonstrate the technologies necessary to execute prompt global strikes with precision conventional weapons through space launched from the U.S. homeland to any point on the globe in 90 minutes or less. While the Space Operations Vehicle concept is the postulated delivery vehicle early in the 2010 decade, long-range conventional ballistic missiles could provide an initial capability as early as 2005. In light of the potentially aggressive use of weapons of mass destruction by rogue adversaries in future wars, this paper explores the potential benefits and drawbacks of a capability to conduct prompt global strikes through space with conventional ballistic missiles and the Space Operations Vehicle. Political and military factors involved in the strategic decision to acquire, deploy, and employ such a capability are also examined, with emphasis on the Air Force's role.

Chapter 1

Mindsets in the Strategic Arena

> *Military policy is not the result of deductions from a clear statement of national objective. It is the product of competition of purposes within individuals and groups and among individuals and groups. It is the result of politics, not logic.*
>
> —Samuel P. Huntington
> *The Common Defense*

In the examination of any subject, it is wise to first assess the nature of the arena in which that subject contends. This is especially true for controversial or extraordinary topics since the force of even impeccable logic is not normally sufficiently convincing in decisions of policy. As Samuel Huntington observed, more politics than logic plays in the arena of national defense policy.

Military Masks and Mindsets

In his book *The Masks of War*, Carl Builder argues that the U.S. military services—Army, Navy, and Air Force—have their own institutional cultures and styles that define not only who they are but also strongly determine their preferences.

> Despite the logical framework of defense planning, there is considerable evidence that the qualities of the U.S. military forces are determined more by cultural and institutional preferences for certain kinds of military forces than by the 'threat'…It is people, not threats, who argue for and against the acquisition and maintenance of specific military forces.[1]

These mindsets predispose the services senior military leaders to view warfighting issues from differing perspectives which, while good for presenting a variety of approaches and avoiding "group think," have had negative effects when new ideas challenge institutional thinking.

An obvious historical example is the continued maintenance of horse mounted cavalry in the armies of many countries, including the U.S. Army, long after it became obsolescent.[2] Another is the Navy's reluctance to accept its first steam vessel, the *Wampanoag*, in 1868 even after test results were superlative. Steam powered ships were, at the time, just too contrary to the Naval officers' sail-bound mindset.[3] Although the Air Force is the youngest service, it was born with one of the strongest mindsets of all—independent application of air power. The Army Air Force struggled to be free of its parent with the zeal of a teenager longing for a self-identity and independence from home. Strategic bombardment, in one form or another, has been the dominant theme for the Air Force since its inception.[4] But, more subtly, Air Force culture has been strongly influenced by "the Icarus Syndrome"—its love of *airplanes* more than *airpower*.[5]

The Air Force and Ballistic Missile Development

At the close of World War II, the Army Air Forces saw jet airplanes as the next immediate step in the evolution of airpower. Other airpower tools had emerged from World War II in the form of the German V-1 cruise missile and V-2 ballistic missile.[6] In 1945, the Army Air Forces Commander, General H. H. Arnold, offered future concepts which forecast the need "to be ready with a weapon of the general type of the German V-2 rocket, having greatly improved range and precision, and launched from great distances" when improved antiaircraft defenses make strikes with manned aircraft

"impracticable."[7] In fact, General Arnold's vision was particularly apolitical and focused on the practical military potential of ballistic missiles as revealed by the following:

> "I see a manless Air Force," he told von Karman: "I see no excuse for men in fighter planes to shoot down bombers. When you lose a bomber, it is a loss of seven thousand to forty thousand man-hours, but this crazy thing [V-2] they shoot over there takes only a thousand man-hours."[8]

But the Air Force viewed missiles as a distant future technology subordinate to manned jet aircraft. So much so, in fact, that during the late 1940s and early 1950s the Air Force dragged its feet in developing the new technology while the Army and Navy immediately began exploring the weapons' potential.[9] However, the Air Force strongly resisted encroachment upon its roles and missions.

> Throughout this period the Air Force agreed that ballistic missiles were of potentially great importance—that they were the weapons of the future. Further, the Air Force consistently claimed that it was the obvious choice to develop and employ the weapons and that it was conducting so thorough a research and development program that no parallel efforts by the other services were necessary. After each debate and resultant "treaty," the Air Force, having gained the long-range ballistic responsibility, proceeded generally to ignore the weapon until the next challenge to its control.[10]

This curious contradiction of Air Force insistence upon owning ballistic missile development and yet showing little enthusiasm for it was finally resolved by an outside source—the President of the United States. What the Air Force would not do on its own was mandated by civilian authority and validated by the Commander in Chief.[11] Why was that necessary? "The ballistic rocket was at least implicitly a competitor to the manned bomber. The bomber was (and indeed still is) the central focus of identification within the Air Force. To conceive of a new weapon that might someday perform its primary task much more efficiently would require great restructuring of beliefs."[12] And these beliefs were concentrated on manned aircraft to the exclusion—intentional or

inadvertent—of other means toward the same end. The Icarus Syndrome had blinded the Air Force to the potential of ballistic missiles—and the expansion of airpower—in favor of a manned aircraft-only view.[13]

Today's Air Force Mindsets

Is today's Air Force subject to the same "syndrome"? Or can we see objectively beyond our cultural inheritance? Although it is common for current military policy makers to believe they are entirely objective and logical, and may be true for certain individuals at certain times, it is highly improbable simply by our very human nature. The following are a few illustrations of what can be viewed as evidence that the Icarus Syndrome still affects the Air Force, and will likely continue to do so for the foreseeable future. The point of these illustrations is not to challenge the concepts themselves, but simply to show that even current Air Force projects and thinking reveal the institutional preference for manned aircraft—a perpetuation of the Icarus Syndrome—in the face of other potential approaches.

Unmanned Combat Air Vehicles (UCAV). The Defense Advanced Research Projects Agency (DARPA) and the Air Force have funded an advanced technology demonstration (ATD) of an unmanned combat air vehicle with the specific mission of performing high-risk missions like suppression of enemy air defenses (SEAD).[14] The UCAV will have great advantages over manned aircraft. It will be designed for reduced maintenance since there will be no need to fly sorties simply to maintain pilot proficiency.[15] There is also no need for a cockpit, ejection seat, or other life support functions, and with no need to worry about g-induced pilot loss of consciousness, the vehicle can be designed for much greater range, maneuverability, and g-forces than a

pilot could stand.[16] And naturally, there is the advantage of not having to risk a pilot on a high-risk mission. The UCAV seems a logical, even obvious next step for air power capability. If the demonstration proves the concept operationally worthwhile the UCAV could enter the USAF inventory in the next decade.[17]

But step back and look again at the UCAV concept. It is an airplane without a pilot on board—but it is still an airplane. Although it is expected to cost significantly less to operate and support than current manned fighters, the concept of operations (CONOPS) will be similar to manned fighter/attack aircraft in deployment and employment, except the airborne command and control issues will be critical. From a holistic viewpoint, this seemingly futuristic airpower concept is a potentially significant improvement in affordability but without a significant improvement in capability. Viewed in that light, the UCAV is an evolutionary projection of the *status quo* onto aerospace power's future.

Long Range Airpower. In 1997 the congressionally directed Independent Bomber Force Review Commission, headed by Brent Scowcroft, published a scathing report on the Department of Defense's (DOD) strategic decisions affecting the future heavy bomber force. The commission argues forcefully that the B-2 is a revolutionary weapon system, and that the limited acquisition of only 21 B-2s was not in the best interest of national defense. What is most interesting is the commission's explanation as to why the DOD chose not to purchase more B-2s.

> If additional B-2 bombers could make such a revolutionary contribution, why does the Pentagon oppose them? Basic principles of bureaucratic politics go far in explaining the Pentagon's position. We believe there is such strong opposition to the B-2 precisely because it is so revolutionary—because supporting the B-2 would imply far reaching changes in core organizational interests, such as manpower, budget, roles, missions, and autonomy.[18]

The report goes on to detail its reasons. Among them is the belief that "fighter generals" dominate the Air Force and, although well meaning, have chosen to emphasize fighter procurement over bombers.

> At a time when the Air Force budget has been in decline for more than a decade and so many fighters are on the verge of retirement, accepting the B-2 revolution might in their minds mean cutting fighter procurement programs. It might also mean accepting an entirely new approach to warfare in which the fighter sometimes might not even be relevant, let along the dominant air instrument. Thus the number of fighter aircraft, fighter squadrons and wings—ultimately fighter pilots—could be substantially reduced.[19]

The commission's assessment of the B-2's performance potential was somewhat prescient considering it's sterling performance during Operation Allied Force where it flew less than 1 percent of the total sorties but dropped 11 percent of the bomb load in the conflict, and all those precision guided bombs.[20] However, the chief Air Force procurement battles nowadays are over the F-22 fighter, not more B-2 bombers.[21]

A 1998 congressionally chartered Panel to Review Long Range Airpower disagreed with the Scowcroft Commission's recommendation to reopen the production line to build more B-2 bombers in favor of upgraded systems and weapons for the B-2, B-1B, and B-52.[22] However, in the panel's judgment these improvements would cover the nation's needs only for the following 15 years. The panel criticized the Air Force for having no plan at all beyond that timeframe addressing long-range airpower. Therefore, Congress directed the Air Force to prepare a long-term bomber force structure plan by March 1999. The Air Force complied, but this new Bomber Roadmap is interesting for what it does not contain. The Air Force maintained that, with regular advanced technology upgrades, the current fleet of B-2, B-1B, and B-52 bombers can meet operational needs at an affordable cost through the year 2037.[23] But on the subject of a new replacement bomber the Air

Force remained unmoved. Reasoning that 2037 is when a new bomber would need to be fielded, the Air Force believes it does not need to start the acquisition cycle until 2013.[24] F. Whitten Peters, at that time the Acting Secretary of the Air Force, went on to announce that Air Combat Command (ACC) was contracting studies for a Future Strike Aircraft that will be this next generation long range bomber.[25] These paper studies, due to be completed in early 2000, are intended to promote "out of the box" thinking. In particular, the Air Force is interested in hypersonic (Mach 5) bomber concepts although other subsonic proposals will be included in the studies.[26] And there is nothing to prevent contractors from proposing any number of options for this Future Strike Aircraft, including unmanned vehicles.[27]

Representative Duncan Hunter (R-Calif.) was impatient and dissatisfied with the roadmap, as was Donald B. Rice, former Secretary of the Air Force and a member of the panel, and General Michael B. Loh, the retired former commander of ACC.[28] The net result is that Congress has once again directed the Air Force to do more. Believing that a new bomber will be needed much sooner than 2037, the House Appropriations Committee and the House Armed Services Committee have directed the Air Force to produce a Next Generation Bomber Study evaluating alternative options for a new bomber in the 2015 time frame vice ACC's desired 2037.[29]

The lack of enthusiasm for a new long-range bomber from the service that once was the ardent champion of strategic bombing is indeed curious. Add to that the fact that Congress has twice, over the past 2 years, had to demand that the Air Force rework its long range bomber plans. It is hard not to conclude that the airmen creating the future of America's airpower seem single-minded to the point of stubbornness.

Expeditionary Aerospace Force Mindset. The Air Force has recently committed itself wholeheartedly to the Expeditionary Aerospace Force (EAF) concept.[30] This concept is a significant change from the Cold War posture of forward basing much of our forces in countries overseas. Reductions in forward basing as well as cuts in overall force size in the past ten years have combined to make the EAF concept a necessity. The Air Force has now postured itself as chiefly an EAF and is striving to achieve the goal of being able to deploy to any region on the globe and perform combat operations within 48 hours after the execute order.[31]

The EAF is the "Air Force effort to organize, train and equip to create a mindset and cultural state that embraces the unique characteristics of aerospace power (range, speed, flexibility, precision) in all we say and do." [32] To make this work, the Air Force sees the necessity for "cultural changes" which it intends to address by fostering an "expeditionary warrior mindset."[33] On the opening page of the new Air Force Manual 10-100 is "An Introduction to Airmen" than contains the following:

> The Expeditionary Air Force (EAF) defines our structure, culture, and operations. We need to be a light, lean, and lethal fighting machine, prepared to make and keep the peace. Built in this concept is a mindset that we are ready to go anywhere, anytime to carry out our mission. This manual is how we'll do it.[34]

Therefore, every airman is indoctrinated to expect the Air Force will respond to global crises by quickly moving its aircraft, support equipment, and personnel to a theater and from there conduct air operations to accomplish the objectives. The intent is to transform the Cold War forward-based mindset into a 21st century expeditionary mindset so airmen's expectations match reality. But does this new mindset have a darker side?

The 40-year era of the Cold War ingrained its own mindset into the U.S. military from which it still struggles to disencumber itself 10 years later. It is human nature that

once any mindset is established it has a tendency to become entrenched. While championing a new mindset is a good way to break with the old, the Air Force must be careful to keep its self-reflection fresh and not fall into the trap of zealously trading one inveterate mindset for another. An overly passionate commitment to and indoctrination in a particular way of thinking can inadvertently become a liability when, a generation from now, the world has changed again. With the implementation of the EAF concept, the Air Force is truly becoming organized, trained, and equipped for moving large numbers of aircraft, personnel, and equipment to a distant fight in the enemy's neighborhood. But this mental predilection can also mean any idea that does not fit the EAF mindset will likely have a difficult time taking root. For example, what about the idea of striking an enemy across the globe directly from the contiguous U.S. (CONUS)?

The B-2 has soundly demonstrated that capability in operation Allied Force, although it is unlikely ever to do so separate from forward deployed support from other combat aircraft and assets.[35] But even if the B-2 could "go it alone," with only 21 B-2 aircraft in the entire fleet, the pace operations from CONUS to a far-flung region would be quite limited. And as already described, the Air Force is in no great hurry to shift priorities to invest in more long-range bombers. But what about other non-aircraft based global strike possibilities? The U.S. already has intercontinental and sea launched ballistic missiles (SLBM) capable of striking any point on the globe, so the technology is in hand for delivering conventional weapons with these long range missiles.[36] Also, future reusable space launch vehicles could do the same, and do so flying a sub-orbital profile originating from and terminating on U.S. soil.[37] How do these ideas fit into the

Air Force EAF mindset? Will this mindset blind the Air Force to ideas for enhancing the contribution of airpower to America's national defense strategy in nontraditional ways?

The Paradox of Self-Reinvention

The future is always uncertain. For the military services, the difficulty with the future is not in deciding what to do next and how to do it. Ask any senior military officer what the U.S. should do about future national defense and you are likely to get a fairly definitive answer. The real difficulty for the military institution is to maintain sufficient awareness of its own mindsets to avoid making strategic errors in vision, doctrine, and force structure.

> There seems to be a largely unconscious drift in doctrine and force structure as the services seek missions that will preserve their institutional integrity, while staying in tune with the dominant doctrinal future—systematic war. Competition of this sort might be healthy, but it also runs the risk of leading to a force structure driven by efforts to preserve service autonomy.[38]

The more likely "strategic errors" are missed opportunities rather than simple mistakes. That is why it is of paramount importance to understand and make allowances for the services' masks and syndromes, and the plethora of other mindsets that play in the strategic arena where individuals and groups wear logical masks over political faces. Honest self-reflection on current airpower mindsets should cause the Air Force to question whether its strategic momentum is in the best direction for America's national defense needs. This amounts to continuous self-examination and self-reinvention, which is extremely difficult to do but critically important to avoid the "syndrome" trap.

Thesis, Scope, and Methodology

This paper examines the military value of global strikes through space using long-range ballistic missiles and reusable launch vehicles with precision guided conventional payloads in the decade of 2010. Its sole purpose is to advance the debate over military application of force through space. The first two areas of concern, explored in chapter 2, are the nature of the military threat of 2010 and how the U.S. military is posturing itself to respond to armed conflict in that decade. Chapter 3 examines the concept of global strike from the U.S. homeland by weighing the pros and cons of using ballistic missiles and the future Space Operations Vehicle to promptly deliver conventional payloads. The final chapter summarizes and reflects on the arguments, and concludes with comments on the strategic decisions the Air Force and the nation face with regard to global strikes through space.

Notes

[1] Carl H. Builder, *The Masks of War: American Military Styles in Strategy and Analysis* (Baltimore: John Hopkins University Press, 1989), 6.

[2] Randy Steffen, *The Horse Soldier: 1776-1943, Volume IV* (Norman, Oklahoma: University of Oklahoma Press, 1979), 130-132. "The use of machine guns in World War I proved a positive and lasting deterrent." But when the U.S. Army began converting cavalry regiments from horses to motor vehicles in 1931—14 years after the end of World War I—there was vehement objection by some members of the cavalry who believed "the horse would never be replaced by armored vehicles." Even after the cavalry office was closed in 1942, as late as November 1944 the War Department was discussing the possibility of using horse-cavalry units in the final stages of the war against Japan.

[3] Edmund Beard, *Developing the ICBM: A Study in Bureaucratic Politics* (New York: Columbia University Press, 1976), 234.

[4] The phrase "in one form or another" means to include both the classic definition of strategic bombardment as applied in World War II and the current theories of parallel warfare. For a description of parallel warfare theory, see the essay by Col John A. Warden III, "Air Theory for the Twenty-first Century," in *Battlefield of the Future*, ed. Barry R. Schneider and Lawrence E. Grinter. (Maxwell AFB, Alabama: Air University Press, September 1998), 103-124.

Notes

[5] Carl H. Builder, *The Icarus Syndrome* (New Brunswick: Transaction Publishers, 1994), 32.

[6] It is interesting to note that the V-1 "buzz bomb" was preceded by 25 years the Kettering "Bug" of WWI—an American pilotless plane with 300 pounds of explosives in 1917. See General H. H. Arnold, *Global Mission* (New York: Hutchinson & Co., 1951), 64-66. Also worth noting is a conflict between the German Army and the Luftwaffe over the V-1 and V-2. After the Battle of Britain when it appeared that the Army's V-2 might be relied upon exclusively, the Luftwaffe pushed the development and fielding of the pulse jet V-1—an airplane bomb rather than a rocket. This German interservice rivalry may have contributed to the delay in perfecting these weapons, which, in the judgment of General Eisenhower, could have made the invasion of France impossible. See Beard, 220-221.

[7] Walter Millis, *The War Reports,* (Philidelphia: J. B. Lippincott Company, 1947) 462-463.

[8] Michael S. Sherry, *The Rise of American Air Power: The Creation of Armageddon*, (New Haven: Yale University Press, 1987) 187.

[9] Beard, 218-219 and Builder, *The Icarus Syndrome*, 32-33.

[10] Beard, 223.

[11] Trevor Gardner became the Assistant Secretary of the Air Force for Research and Development under Harold E. Talbot in the Eisenhower administration. Shortly after taking office Gardner became convinced that the Air Force was underestimating the significance of ballistic missiles and sought a means to speed up development. He set up the Strategic Missile Evaluation Committee to do just that. In February 1954, the committee recommended that the U.S. must intensify its missile development program due to the expectation that the Soviet Union was likely doing the same for its thermonuclear weapons. Gardner seized upon the results and pressed the Air Force into establishing the Western Development Division, as special organization to rush the ballistic missiles to successful completion. Within a year the Eisenhower administration assigned the program the highest national priority. See Bernard C. Nalty, *Winged Shield, Winged Sword: A History of the United States Air Force*, (Washington, D.C.: Air Force History and Museums Program, United States Air Force, 1997), 83-85.

[12] Beard, 237-238.

[13] Note this interesting comment regarding the professional military education and the Icarus Syndrome: "But the most striking instance of the Icarus Syndrome is the Air Force's long delay in putting major resources into missiles. One may well ask whether the resistance of so may people to the acceptance of space weapons as a logical extension of the Air Force sphere of operations is yet another manifestation of the lack of rigor in the service's professional education system." From Dr. I.B. Holley, Jr., "Reflections on the Search for Airpower Theory," *The Paths of Heaven: The Evolution of Airpower Theory*, ed. by Col Phillip S. Meilinger, USAF (Maxwell AFB, Alabama: Air University Press, September 1997), 598.

[14] DARPA/USAF Fact Sheet, "Unmanned Combat Air Vehicle Advanced Technology Demonstration," July 1999, 1.

Notes

[15] Estimated savings in operation and support costs from the reduction in consumables, maintenance, and personnel with the UCAV are in the range of 50-80% of a current tactical fighter squadron. DARPA/USAF Fact Sheet, 2.

[16] G-forces are the acceleration forces when an aircraft turns rapidly, similar to the forces experienced in a centrifuge. Current high performance aircraft are designed for up to nine gs, or nine times the acceleration of Earth's gravity. Aircraft turning performance is currently limited by the pilot's ability to maintain vision and consciousness under such g-forces. Without a pilot to worry about, vehicles could be engineered to withstand many times the number of g-forces of today's high performance aircraft.

[17] The ATD is currently funded through Phase II, the Detail Design, Fabrication, and Flight Test which will run into FY02. If the UCAV continues with follow-on phases it could enter the inventory around 2010. DARPA/USAF Fact Sheet, 4.

[18] House Military Procurement Subcommittee of the Committee on National Security, *Final Report of the Independent Bomber Force Review Commission*, prepared by Hon Brent Scowcroft et al., July 23, 1997, Committee Print, 13.

[19] Ibid., 14.

[20] John A. Tirpak, "With Stealth in the Balkans," *Air Force Magazine* 82, no. 10 (October 1999), 23-24.

[21] Robert S. Dudney, "F-22 Survives a Stealth Attack," *Air Force Magazine* 82, no. 11 (November 1999), 11.

[22] John T. Corell, "Long Range Blind Spot," *Air Force Magazine* 81, no. 6, (June 1998), 3.

[23] John A. Tirpak, "The Bomber Roadmap," *Air Force Magazine* 82, no.6, (June 1999), 31. The article points out that 2037 is "beyond the B-52's 80th birthday."

[24] Ibid.

[25] Ibid., 33.

[26] Steve Douglass, "B-3 and Beyond," *Popular Science* 256, no. 2 (February 2000), 48-49.

[27] Lt Col David W. McFaddin, ACC/XRMA, interviewed by author, 10 December 1999.

[28] Tirpak, "The Bomber Roadmap," 34-35.

[29] McFaddin.

[30] "Expeditionary Aerospace Force: Commanders 'Informing the Force' Detail Concept Paper," (HQ USAF/XOPE, EAF Implementation Division, 1 October 1999), n.p.; on-line, Internet, 21 March 2000, available from http://www.af.mil/eaf/update_Oct99.pdf

[31] It is worth noting that the 48-hour goal is only if the operating airbase has significant infrastructure, host nation vehicles support, and prepositioned munitions. If the airbase is "bare base" (only a runway, fuel, and water) then the time from "execution order" to "bombs on target" would take 144 hours—almost a week. See Lionel A. Galway, et. al, "A Global Infrastructure to Support EAF," *Air Force Journal of Logisitics* 23, no. 2 (Summer 1999), 4.

Notes

[32] Department of the Air Force, *Air Force Handbook for the 106th Congress*, (Washington, D.C.: Assistant Secretary of the Air Force, 1999), 26; on-line, Internet, 30 March 2000, available from http://www.doctrine.af.mil/library/misc/afhandbook.pdf.

[33] "Expeditionary Aerospace Force: Commanders 'Informing the Force' Detail Concept Paper," n.p.

[34] Air Force Manual (AFM) 10-100, *Airman's Manual*, 1 August 1999.

[35] David A. Fulghum, "Lesson Learned May be Flawed," *Aviation Week and Space Technology* 150, no. 24 (June 14, 1999), 64. Stealth aircraft are not invulnerable, as the shoot down of the F-117 by Serbian air defenses proved. The same applies to all stealth aircraft; they are hardly visible to radar, but certainly not invisible, hence the need for electronic warfare support. Also, from Anthony H. Cordesman, "The Lessons and Non-Lessons of the Air And Missile Campaign in Kosovo," unpublished manuscript (Washington, D.C.: Center for Strategic and International Studies, revised September 29, 1999), 180: "The B-2s were normally supported by jamming aircraft and other support aircraft, and did not rely purely on their stealth capabilities."

[36] Naturally, the exclusive association of ICBMs with nuclear weapons makes the idea of employing a conventional ICBM problematic, but not necessarily impossible. See chapter three.

[37] See chapter 3.

[38]Ian Roxborough and Dana Eyre, "Which Way to the Future?" *Joint Force Quarterly*, no. 22 (Summer 1999), 33.

Chapter 2

The Future Threat and U.S. Response Posture

> *As the new millennium approaches, the United States faces a heightened prospect that regional aggressors, third-rate armies, terrorist cells, and even religious cults will wield disproportionate power by using—or even threatening to use—nuclear, biological, or chemical weapons against our troops in the field and our people at home.*
>
> —William Cohen, Secretary of Defense
> *Proliferation: Threat and Response, November 1997*

Potential Threats In 2010

There are many opinions on the nature of international challenges to U.S. national interests in the 2010-decade. It is useful to use Jeffrey R. Barnett's breakout of U.S. competitors into two main categories: peer competitors and niche competitors.

> A peer competitor is defined as a state (or alliance) capable of fielding multiple types and large numbers of both emerging and present weapons, then developing an innovative concept of operations (CONOPS) to realize the full potential of this mix. In most ways, a peer's military capabilities will roughly equal those of the United States. The peer's goal will be to control a vital interest of the United States, on either a global or regional basis, then defeat the U.S. military response.[1]

Examples of peer competitors this century include the Soviet Union, Nazi Germany, and Imperial Japan. War with a peer could evolve to a level of military action well beyond what the U.S. considers a major regional conflict (MRC).[2] Currently the U.S. has no peer competitor, but this may not be the case in 2010 and beyond.

> A niche competitor is defined as a state (or alliance) that combines limited numbers of emerging weapons with a robust inventory of current weapons, then develops an innovative concept of operations to best employ this mix. The niche's overall military forces will be inferior to those of the United States. Its goal will be to effectively challenge U.S. interests in its region by making the U.S. military response sufficiently costly to either deter initial involvement or dissuade further involvement on the part of the U.S.[3]

Examples of possible niche competitors include Iraq and North Korea. The U.S. has obviously been heavily involved for a long time in deterring and coercing these two countries with military might and other means.

Defining only these two sets of U.S. competitors does not cover the universe of threats to U.S. interests. The specter of terrorism with weapons of mass destruction (WMD) is also of great concern. The term "NBC (nuclear, biological, chemical) Arming Sponsor of Terrorism and Intervention" (NASTI) aptly describes the potential WMD threat of both niche competitors, as defined above, and sub-state actors which fall short of being a niche competitor.[4] It is also possible for a peer competitor to also be a NASTI. However, those countries that fit the NASTI profile today—Iraq, North Korea, Iran, Syria, Libya, Cuba—are not peer competitors, nor are they likely to be in the future. But the fact that they harbor hostile intent toward the U.S. means they are indeed likely to remain threatening adversaries for many years to come.

For the purposes of this paper, the focus is on the so called "rogue state," defined here as an aggressive niche competitor armed with some combination of NBC weapons, a credible means of delivery, and the will to use them. A rogue state threatens U.S. interests precisely because weapons of mass destruction are a powerful way to have an asymmetrically significant impact on the U.S. in all aspects of political and military matters.

The Future Impact of Weapons of Mass Destruction

The proliferation of WMD has replaced the Cold War "balance of terror" as the pervasive concern of the civilized world.[5] The U.S. National Security Strategy recognizes that our dominance in conventional military operations means our adversaries are likely to use asymmetric means, including WMD, to achieve their objectives.[6] The U.S. is striving to deal with the future WMD threat whether from a purely terrorist action, as part of a regional crisis, or a direct strike against the U.S. homeland.[7] For the U.S. military, dealing with regional crises is the most challenging in that it is a global mission requiring worldwide expeditionary operations to project power as required to help resolve any and all threats to U.S. national interests.

The number of rogue states that possess nuclear, chemical, and/or biological weapons will, in all likelihood, continue to grow and the means for accurate delivery of WMD will only continue to expand. At this time, the four notorious rogue states of Iraq, North Korea, Iran, and Libya are high on the list of current WMD threats.[8] Many of these same countries are pursuing ever more capable means for delivering WMD. There is good reason to believe North Korea, Pakistan, and Iran have been collaborating since 1992 on ballistic missile development, working on improvements in missile design for ever-increasing ranges.[9] Ballistic missiles are not the only worry. There is much consternation over the potential for cruise missiles of a simple, cheap, and relatively stealthy design to be produced in great numbers and adapted to deliver WMD.[10] Furthermore, the relatively easy availability of GPS technology and modern guidance systems makes it possible for any country to create a "poor man's" precision guided weapon that can threaten naval as well as land-based forces and operations.[11] In the

hands of a niche competitor, these "weapons of precise destruction" greatly magnify the military means to accomplish objectives, whether by threat or actual use.[12]

In all likelihood the known rogue states will maintain belligerent attitudes toward the U.S. for many years to come. The inevitable conclusion is that at some time in the future the U.S. will likely face a determined aggressor armed with WMD, the means to deliver them accurately, and the will to use an asymmetric strategy to accomplish its objectives by threats and/or actual use of these weapons.[13]

If we postulate a future circumstance in which a rogue state decides to use force to achieve a regional objective contrary to U.S. national interests, how is the U.S. likely to respond?

U.S. Crisis Response Posture

Desert Shield demonstrated how the U.S. was postured to respond to Iraq's sudden aggression against Kuwait. Fortunately for the coalition, Saddam Hussein did not interfere with the buildup of forces or the mustering of coalition will during Desert Shield. During Desert Storm the world watched as the coalition systematically pummeled Iraq and routed its forces from Kuwait. One of the most important lessons other countries learned was, when taking action that could bring a U.S. military response do not allow it to occur unchecked.[14]

One of the lessons learned by the U.S. was the need to be able to respond to an aggression quickly enough to avoid a *fait accompli*, which is exactly what Iraq handed the world in August 1990.[15] The tremendous political and military effort it took to undo Iraq's aggressive act is something the U.S. would prefer not to have to repeat, if at all possible.[16] Air Force doctrine now emphasizes that very point: "Delay in decisively and

quickly halting an enemy may force a difficult and costly campaign to recover lost territory."[17] *Joint Vision 2010* clearly depicts the U.S. military's vision for how it intends respond to future crises.[18] The Navy and Marines will continue to provide worldwide forward presence within days of potential crisis regions. The Air Force will have its EAF posture to rapidly deploy to a region of crisis in a matter of hours. And the Army will pare down its fighting organizations to make them more easily deployable and sustainable, although it will continue to depend upon airlift and sealift to get to the fight. The common denominator among the military services is that *all* of them are expeditionary forces—they will deploy to and operate from within the enemy's neighborhood. And therein lies the vulnerability.

Asymmetric Strategies vs. Expeditionary Forces

The December 1997 National Defense Panel report, entitled *Transforming Defense: National Security in the 21st Century*, summarized all the challenges to the military for the 2010-2020 time frame.[19] Concerning threats to forward presence and forward deployment, the panel stated:

> Even if we retain the necessary bases and port infrastructure to support forward deployed forces, they will be vulnerable to strikes that could reduce or neutralize their utility. Precision strikes, weapons of mass destruction, and cruise and ballistic missiles all present threats to our forward presence, particularly as stand-off ranges increase. So, too, do they threaten access to strategic geographic areas.[20]

Later, the report focuses on the threat from weapons of mass destruction:

> Due to their availability, relative affordability, and easy use, weapons of mass destruction allow conventionally weak states and nonstate actors to counter and possibly thwart our overwhelming conventional superiority… Their use, or threat of use, could deter allies from granting the United States forward operating areas and degrade or impede the ability of our forces and allies to effectively complete the mission at hand.[21]

Perhaps the National Defense University's *Strategic Assessment 1999* summarizes future enemy asymmetric approaches best:

> Emerging trends suggest that analysis should examine cases in which well-prepared enemy forces do everything possible to complicate operations for U.S. forces. Such situations may arise with growing frequency in the future. These situations include enemy efforts to deny U.S. deployments to a crisis region, manipulating the political climate, making use of difficult terrain and weather, and aggressively employing conventional forces and weapons of mass destruction. Essentially, such efforts constitute a "countermanding" strategy aimed at negating U.S. operations.[22]

It is therefore clear that the U.S. military's ability to operate from locations in or near an enemy wielding WMD could very likely be in jeopardy in the decade of 2010. How does the U.S. plan to deal with the expectation that its adversaries will eventually, and perhaps inevitably, use WMD to counter its military might?

Deterring Future Use of WMD

Deterring potential adversaries from military aggression is one of the first responsibilities of the Department of Defense, and there is much to consider about the credibility and efficacy of deterring a WMD capable rogue state.

The Unique Power of Nuclear Weapons. Among the three types of WMD it is important to distinguish nuclear weapons from chemical and biological weapons. While the use of and effects from all three are horrific, nuclear weapons have the distinguished history of having held global civilization at risk during most of the Cold War. It is somewhat remarkable that in the 55 years since the two atomic bombs were used in World War II, nuclear weapons have come to be seen as illegitimate instruments of policy.[23] This attitude did not develop immediately, but over years of continued nuclear development, testing, deployment, and political Cold War posturing. The world observed

the nuclear arms race and came to realize with ever-increasing fearfulness how utterly devastating nuclear war would be. Generations of political, military, and academic thinkers now have this doomsday mentality so inextricably linked with nuclear weapons that the ramifications of "first use" of such weapons could be politically fatal to the initiator. So, it is not hard to imagine why one of the international community's goals, for which the U.S. has a strong leadership role, is nuclear nonproliferation.[24]

The recognition that nuclear weapons decreasing utility is a compliment to strategic arms reduction and nuclear nonproliferation efforts.[25] As a consequence, however, the political power associated with nuclear weapons has become as great as, and perhaps greater than, their destructive power. Mere possession and a means for delivery constitute distinguished notoriety on the world scene as being a "nuclear power." This is part of what lures rogue states to acquire nuclear weapons. Altogether, the implied threat of possessing nuclear weapons, a demonstrated means of delivery, and the political will to use them add up to serious political leverage for a rogue state intent upon pursue its goals by all means.[26]

Assuming that by the year 2010 even more rogue states could have nuclear weapons, deterring their use may be easier than deterring the threat of their use. The overwhelming U.S. nuclear strike capability should deter any rogue from initiating a nuclear attack.[27] But what is most likely is that the world community would react with such abhorrence that the retaliatory response would be overwhelmingly bad for the aggressor. However, if a rogue merely threatened the use of nuclear weapons to either achieve its political aims or limit U.S. response option, the U.S. would have to carefully judge the credibility of the threat and act accordingly.[28] This possibility could have a crippling effect on how

the U.S. responds to a crisis in which nuclear weapons might be used against its friends, allies, and/or deployed forces.[29] Here, again, is additional motivation for rogue states to acquire nuclear weapons.

The "Poor Man's Nuke": Chemical and Biological Weapons. Despite the frightening specter of nuclear weapons in rogue hands, there is also great consternation among political and military strategists over the potential impact of chemical and biological (CB) weapons. Referred to as "the poor man's nuclear weapons," these weapons are perhaps more attractive than nuclear capability because they are more easily acquired and much less expensive.[30] Likewise, deterring CB weapons use by a rogue state differs from nuclear deterrence. Some analysts of the Gulf War conclude that Iraq was deterred from using its substantial CB weapons against coalition troops because of a veiled threat from the U.S. on possible retaliation with nuclear weapons.[31] Since that time, the U.S. policy for deterring CB use is still based predominantly on the threat of overwhelming retaliation and potentially a "WMD response in kind" using nuclear weapons.[32] However, such an approach could force the U.S. into a situation with significant negative consequences no matter what its course of action.[33] For example, if an aggressor uses CB weapons against a regional ally of the U.S., should the U.S. respond with limited nuclear strikes? If the U.S. did use nuclear weapons in response to CB attacks, it could cause a storm of world protest and condemnation.[34] But if the U.S. chooses not to use nuclear weapons after making threats, vague or otherwise, its credibility would certainly suffer.[35] Also, any use of nuclear weapons by the U.S. makes it less of an unthinkable weapon for anyone else to use, including the enemy that possesses them.[36] This clash of purposes makes use of nuclear weapons as a deterrent of

or counter to CB weapons extremely problematic, which is exactly the type of weakness a rogue regional aggressor could exploit.

Theater Missile Defense and WMD Deterrence. The Department of Defense's Ballistic Missile Defense Organization (BMDO) is pursuing the development and deployment of a Theater Air and Missile Defense (TAMD) "family of systems" to defend against ballistic and cruise missile attacks.[37] This concept integrates five missile mobile defense systems—Patriot, Navy Area Defense, Theater High Altitude Air Defense (THAAD), Navy Theater Wide Defense, and the Airborne Laser (ABL)—into a system of systems with interoperable and fused command and control centers and sensors. Current acquisition plans call for all elements of this family of systems to be operational by 2010 except for the ABL.[38] Of course, as technology proliferates adversaries will likely obtain stealthy cruise missiles so that no defense, no matter how robust, can guarantee invulnerability from missile attack.[39] But the TAMD of the next decade could effectively negate a rogue state's ballistic missile capability and contribute to deterring it from initiating a war.[40] Furthermore, if such a system were permanently established within allied countries to cover all avenues of missile attacks from a rogue state, that region could be protected from revenge or terror strikes, as well.[41] However, deploying TAMD into foreign regions is a serious matter to all countries for which a missile arsenal is an important part of their national defense. For example, China is greatly disturbed by the U.S.-Japan agreement to jointly research theater missile defense (TMD) after North Korea's August 1998 launch of a rocket across Japanese territory.[42] Certainly lesser states are likewise concerned about the neutering of their missile forces. Especially

disconcerting is the possibility that a rogue state may view as inevitable the permanent deployment of TAMD in its region and scheme to make use of its missiles before then.

When Deterrence Fails: Three Hypothetical Cases

In the year 2010, how might an aggressive niche competitor that has studied U.S. military vision, strategy, and doctrine employ WMD in pursuit of its regional objectives that threatens U.S. interests in the year 2010? For the purposes of this paper, there are three cases worth considering:

1. Surprise WMD attack with little or no warning.
2. WMD attack after responding U.S. military forces have built up in the region.
3. WMD defensive attack to prevent strategic defeat from U.S. led counterattack.

Although the U.S. strives to achieve the vision of a "transparent world" where intelligence capabilities are so robust that strategic surprise is impossible, a determined adversary will find a way to deflate such arrogance.[43] The U.S. should endeavor to minimize strategic surprise but it can never afford to believe it has been eliminated. Even if U.S. intelligence reports indications of military activity, that does not guarantee that such knowledge will prevent surprise—witness Iraq's invasion of Kuwait in 1990. And if the U.S. does decide to react to warning signs by ordering forces to the region, the aggressor's plans may include that possibility and compensate by accelerating the invasion timetable to preserve the initiative.

Case 1: WMD Use before U.S. Forces Deploy. Assume a rogue leader plans an invasion of a neighboring country to secure a limited objective, and that this objective impinges on U.S. national interests sufficiently to cause an immediate military response. Furthermore, assume that the adversary estimates that, with a massive and well-coordinated assault, he can achieve the objective in less than a week if there is no outside

interference. Knowing that the EAF response time is at best 48 hours, and only days for a carrier task force, the invasion plan calls for the very early use of chemical and biological weapons against key regional airfields and seaports to delay the deployment of U.S. forces.[44] This bold plan also includes threatening to use chemical and biological weapons against targets vital to neighboring states to deter them from providing support to U.S. forces with over-flight permission or the use of other bases and ports.[45] Such "strategic WMD surprise" seizes the initiative by using CB weapons right away, robbing the U.S. of a chance to deter their first use. This bold WMD strategy also has the especially significant advantage of striking key ports and airfields before there are large concentrations of military forces, since large numbers of U.S. casualties would certainly precipitate a strong retaliatory response. In fact, the aggressor's strategy would initially be to avoid any kind of mass casualties with these CB attacks to minimize world outrage. The enemy's strategic intent is only to delay the entry of opposing forces long enough to complete his military campaign without outside interference. Warnings that periodic follow-on CB attacks on these ports and airfields will continue to keep them sufficiently "dirty" would perpetuate the "delaying effect," as well as reduce the likelihood of mass casualties since unprotected personnel would have evacuated those areas.[46]

Finally, the aggressor's strategy is complete by issuing a threat to use nuclear weapons if the anyone interferes with the invasion. This would invoke a climate of terror to further complicate and delay any initial response until after the objective is secured, and then continue to hold the region hostage to deter a coherent response later.[47] The enemy's nuclear capability also helps close a "loophole" in his strategy. If the enemy's airspace is directly accessible from international waters, Navy and Air Force aircraft and

missiles could strike enemy targets with no need for over-flight permission from neighboring countries. However, this audacious aggressor plans to stun the opposition by deliberately detonating a nuclear weapon at altitude over open water in a menacing gesture towards naval forces. This would demonstrate nuclear capability and resolve without striking an actual target or causing significant casualties, again to avoid a vengeful cry for immediate retaliation.[48] The specter of an open-air nuclear detonation could be chilling enough to have the desired effect, confounding opposing decision-makers and thus delaying an effective response in time to stop the invasion.

The entire region, including naval operating areas, would be under imminent threat of chemical, biological, and nuclear attack. The decision to place U.S. forces within reach of enemy WMD after the enemy demonstrated a willingness and capability to use them would be arduous. Again, that is all an enemy needs to do at the outset—shock the U.S. and confound its decision-making process long enough to achieve the invasion's objective. After the objective is secured, the aggressor can cease all attacks but maintain a menacing posture against military intervention while maneuvering politically to consolidate gains and convince the world to accept the new status quo. Of course the plan would include a final phase—prepare to endure economic and political sanctions over the long term. Such a hypothetical case is certainly extreme but not unimaginable.

How will the U.S. respond? First, there is the problem of preventing a *fait accompli*, which is one of the principle motivators for a quick reaction military response.[49] In this case, with the threefold effects of repeated CB contamination of key airfields and seaports, regional neighbors threatened with WMD if they assist the U.S., and political decision-makers reeling from the shock, there would be little the U.S. could do in time to

halt the invading forces short of their objectives. Then begins the long, hard work of righting the wrong, but unlike in Desert Storm the early use of WMD would add enormous complications. Such circumstances would make eventual entry into the region and military operations for a counterattack an ominous challenge.

Case 2: WMD Use after U.S. Forces Deploy. In the second hypothetical case, the aggressor conducts the invasion but only threatens the use of WMD against its neighbors. This permits the U.S. to issue its severe warning about an overwhelming response if WMD are used at all. In this climate of escalation dominance, U.S. forces would likely deploy to the region and begin combat operations only a few days after the start of the invasion. Only after forces arrive in the region does the aggressor initiate a salvo of CB attacks on coalition staging airfields and seaports in hopes of causing sufficient casualties to weaken America's will. Unlike the first case where CB attacks occurred before forces deployed, in this case large numbers of U.S. and coalition troops could be exposed to the chemical and biological attacks. Operational elements of the TAMD would make enemy ballistic and cruise missile attacks much less effective, but some "leakers" would likely get through. The U.S. would then need to respond "overwhelmingly" in accordance with whatever tiered escalation it had planned. The adversary's additional nuclear threat, stated or implied, would perhaps seem more credible once he had broached the CB threshold in spite of U.S. warnings. But, TAMD deployed to the region would lessen enemy chances for successfully delivering a nuclear weapon, and with the U.S. escalating its action in response to the CB attacks, a nuclear attack would seem to be a suicidal act.

Whether or not WMD casualties steel U.S. resolve or cause faintness of heart will depend greatly upon the perceived national interests at stake at the time. But in contrast

with the first case, waiting to use WMD until responding U.S. forces were in the region returned the initiative to the U.S. who could threatened a devastating response if the enemy crossed the WMD threshold. Thus, the rogue's WMD attacks would be less of a surprise and risk escalating the U.S. response. In this hypothetical case where the invader only needs one week to seize his objective the result may still be a *fait accompli*, but the responding forces would already be well on the way to reversing that circumstance, thus eventually denying the rogue his prize.

Case 3: WMD Use to Prevent Strategic Defeat. This final hypothetical case is similar to how Desert Shield played until the beginning of Desert Storm. In this case, the adversary yields the operational initiative to the U.S. and coalition forces, awaiting their counterattack, while making threats about using WMD. But U.S. escalation dominance deters the rogue leader from using WMD until threatened with strategic defeat, at which time he orders CB strikes on counterattacking forces, despite the U.S. warnings, in hopes that the shock of CB use will force a reassessment of coalition objectives. U.S. and coalition forces, fully involved in executing the mission, would be slowed but not likely stopped by these attacks. However, the U.S. must then decide how to respond to the enemy's crossing of the CB threshold.

From the U.S. viewpoint, attacking a rogue state that has CB and nuclear weapons but has not yet used them would require unequivocal warning and a credible retaliation threat to deter the adversary from using WMD on attacking U.S. and coalition forces. But there is the troublesome thought that attempting to systematically destroy or disable the adversary's WMD capability as part of the campaign objectives could trigger a "use or lose" reaction.[50] If the adversary perceives the imminent loss of his WMD capability,

and is desperate enough to preserve it, then he might be even more likely to employ WMD. So, as strange as it seems, U.S. and coalition military objectives may need to be revised downward from completely removing the enemy's WMD capability as part of the military campaign. But if the rogue did choose to use CB in an attempt to defend that capability or to prevent strategic defeat, with the rogue state's back against the wall, any U.S. retaliation in response to WMD use would need to be measured. A nuclear strike from the enemy, however, would seem out to the question. If he were to be so bold as to initiate using CB *and* nuclear weapons against counterattacking forces the U.S. response will likely be swift and severe. U.S. and coalition casualties could certainly be significant, but the ire of the American people and the world community would demand retribution for such an act. The adversary would almost certainly have committed strategic suicide.

The only difference between this hypothetical case and Iraq's actions in the Gulf War is that Iraq was successfully deterred from using WMD. However, the outcome seems as inevitable as Desert Storm—U.S. and coalition forces would almost certainly prevail.

Vulnerabilities of the Expeditionary Approach

The three hypothetical illustrations above reveal some shortcomings in the expeditionary forces approach to regional crises. It is highly unlikely that a future rogue state will use the third hypothetical approach—this was essentially Iraq's choice and, as already noted, no aggressor is likely to repeat that mistake. The second hypothetical approach would bloody the nose of U.S. and coalition forces, but is basically a gamble on defeating U.S. and coalition political will, with no confidence of success. The first

hypothetical case seems to have a greater chance for success. An aggressor that acts rapidly and decisively to seize and maintain the strategic and operational initiative to hold responding U.S. forces at bay and its neighboring states hostage would indeed present the world a grave predicament.

There are many facets in analyzing a strategic decision to use WMD that go well beyond the scope of this paper. Certainly, using WMD as part of a military offensive is tantamount to declaring war on the civilized world, and worldwide condemnation would befall such an aggressor. But we live in a dangerous world with national leaders and powerful international actors not nearly so squeamish as some are about using terrible means to achieve their ends. This kind of aggression has been common throughout world history. The fact that the U.S. currently enjoys sole superpower status should not lull us into complacency, thinking that we can handle anything lesser powers throw our way.

Notes

[1] Jeffrey R. Barnett, *Future War* (Maxwell AFB, Alabama: Air University Press, January 1996), xviii.

[2] Ibid., 21.

[3] Ibid., xviii-xix.

[4] Barry R. Schneider, *Future War and Counterproliferation* (Westport, Connecticut: Praeger Publishers, 1999), 3.

[5] The White House, *A National Security Strategy for a New Century* (Washington, D.C.: The White House, December 1999), 2: "Weapons of mass destruction pose the greatest potential threat to global stability and security. Proliferation of advanced weapons and technologies threatens to provide rogue states, terrorists and international crime organizations with the means to inflict terrible damage to the United States, our allies and U.S. citizens and troops abroad."

[6] Ibid., 19.

[7] Ibid., 16.

[8] North Korea is assessed as having "probable possession" of nuclear weapons while Iraq, Iran, and Libya have "clear intent" to obtain them. All four are assessed or suspected to have chemical and biological weapons or programs, or the clear intent to obtain them. See Schneider, 5 and 6.

Notes

[9] Duncan Lennox, "Ballistics Boom," *Jane's Defence Weekly* 32, no. 10 (8 September 1999), 31. For a list of current ballistic missiles among NASTI states, see Schneider, 120.

[10] Schneider, 119-126.

[11] "It is only a matter of time until that type of terminal guidance [GPS and radar] is added to other ballistic missiles to begin to develop a significant capability against major warships as sea. The primary targets will be aircraft carriers, which provide the core U.S. naval strike capability in expeditionary warfare. However, large amphibious ships also will be targeted." From Capt John F. O'Connell, USN (Ret), "The Tactical Ballistic Missile Threat to Naval Expeditionary Forces," *Marine Corps Gazette* 83, no. 9 (September 1999), 60.

[12] David Blair, "How to Defeat the United States: The Operational Military Effects of the Proliferation of Weapons of Precise Destruction," in *Fighting Proliferation: New Concerns for the Nineties*, ed. Henry Sokolski (Maxwell AFB, Alabama: Air University Press, September 1996), 76-77. A related RAND study contains a thorough analysis on the effects of conventional missile attacks on combat air bases. See John Stillion and David T. Orletsky, *Airbase Vulnerability to Conventional Cruise-Missile and Ballistic-Missile Attacks*, (Santa Monica, California: RAND, 1999).

[13]Schneider, 110.

[14] Ibid., 92.

[15] Report of the National Defense Panel, *Transforming Defense: National Security in the 21st Century* (Washington, D.C.: National Defense Panel, December 1997), 11.

[16] Alan D. Zimm, "Deterrence: Basic Theory, Principles, and Implications," *Strategic Review* 25, no. 2 (Spring 1997), 47. "General deterrence also can suffer from the '*fait accompli'* syndrome, where an aggressor executes the act so rapidly that general deterrence forces cannot impact the event; the aggressor then essentially says, 'I have what I want, what are you going to do about it?' The 'what are you going to do about it' can entail a huge, expensive effort." Indeed, consider the expense and effort of Desert Shield/Storm and its 10-year aftermath, which continues with no end in sight.

[17] Air Force Doctrine Document (AFDD) 1, *Air Force Basic Doctrine*, September 1997, 42.

[18] *Joint Vision 2010* (Washington D.C.: Chairman of the Joint Chiefs of Staff, July 1996), 4.

[19] It is worth noting that the membership this National Defense Panel included retired four-star generals from each of the four military services.

[20] *Transforming Defense: National Security in the 21st Century*, 13.

[21] Ibid., 15 and 16.

[22] Hans Binnendijk et al., ed., *Strategic Assessment 1999* (Washington, D.C.: Government Printing Office, 1999), 275.

[23] Capt. Ian Bryan, USAF, "Nuclear Forces in Regional Contingencies," *Strategic Review* 24, no. 3 (Summer 1996), 36.

[24] The Strategic Arms Reduction Talks (START) initiatives are still in the mainstream of U.S. national security strategy, as is the Comprehensive Nuclear Test Ban

Treaty and other nonproliferation initiatives. See *A National Security Strategy for a New Century*, 7-10.

[25] General Charles A. Horner, USAF (Ret.), "Weapons of Mass Destruction and National Security in the Post-Cold War World," in *Pulling Back from the Nuclear Brink: Reducing and Countering Nuclear Threats*, ed. Barry R. Schneider and William L. Dowdy (London: Frank Cass, 1998), 280.

[26] There are lots of debates on any particular rogue state's ability to acquire a nuclear weapon, whether by internal production or external procurement. Such arguments are worthy of consideration, but beyond the scope of this paper. The point here is that there are enough rogue states in the world today with sufficient motivation and means to obtain a nuclear capability to make it virtually inevitable that some of them will do so—and could likely do so by the next decade. For a thorough treatment, see Schneider, Chapters 1 and 2.

[27] Dean Wilkening and Kenneth Watman, *Nuclear Deterrence in a Regional Context*, (Santa Monica, California: RAND, 1995), xii.

[28] Ibid., xi.

[29] If Nazi Germany had the atomic bomb before 1945, the events of World War II and thereafter would certainly have played out very differently. For a thought provoking discussion on a more recent "what if," see Barry R. Posen, "U.S. Security Policy in a Nuclear-Armed World Or: What If Iraq Had Had Nuclear Weapons?" *Security Studies* 6. no. 3 (Spring 1997), 1-31. In that article, Posen is critical of the mindset of the U.S. policy community that refuses to deal realistically with the possibility of a nuclear armed regional adversary, preferring to focus their energies on "happy ending" scenarios when conducting simulations of regional nuclear crises. Concerning a RAND study about one such exercise, he states in a footnote on p. 2 that "the document surfaces a relative paucity of recommendations about how the United States ought to analyze and prepare for the most likely and dangerous contingency—a nuclear-armed regional adversary against whose nuclear forces we will not have reliable offensive and defensive options." The RAND article to which Posen refers is Marc Dean Millot, Roger Molander, Peter A. Wilson, *"The Day After" Study: Nuclear Proliferation in the Post-Cold War World* (Santa Monica: RAND, 1993), vols 1, 2, and 3.

[30] Schneider, 83.

[31] Ibid., 63-64, and 72.

[32] "Thus, if struck by any nation's WMD, interpreted as nuclear, biological, or chemical weapons, the U.S. government reserves the right to reply with its own WMD, in this case, with its nuclear forces." From Schneider, 72. Also, the U.S. has forsaken CB weapons, hence, the only "WMD response in kind" available is, by definition, nuclear. See David R. Franz, ed., *Medical Aspects of Chemical and Biological Warfare* (Washington, D.C.: TMM Publications, 1997), 64 and 75.

[33] See Schneider, 74. Also, Greg Weaver and J. David Glaes, *Inviting Disaster: How Weapons of Mass Destruction Undermine U.S. Strategy for Projecting Military Power* (McLean, Virginia: AMCODA Press, 1997), 54-55.

[34] Schneider, 74.

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[35] Philip L. Ritcheson, "Proliferation and the Challenge to Deterrence," *Strategic Review* 23, no. 2 (Spring 1995), 43.

[36] Hans Kristensen, "Nuclear Futures: Proliferation of Weapons of Mass Destruction and US Nuclear Strategy," *BASIC Publications Research Reports*, March 1998, n.p.; on-line, Internet, 12 October 1999, available from http://www.basicint.org/nfuture2.htm. From the Executive Summary: "Using nuclear weapons to deter states armed with other weapons of mass destruction is counterproductive, undermining the nuclear non-proliferation regime. By using nuclear weapons in this way, the United States is sending a message that nuclear weapons are important for achieving prestige in world affairs and for accomplishing military and political objectives. Pointing nuclear weapons at regional troublemakers will provide them with a justification to acquire nuclear weapons themselves."

[37] Ballistic Missile Defense Organization, "The Family of Systems Concept," *BMDO Fact Sheet AQ-99-16*, March 1999, n.p.; on-line, Internet, 23 March 2000, available from http://www.acq.osd.mil/bmdo/bmdolink/pdf/aq9916.pdf.

[38] Ibid. Since TMD is a top national priority there is every reason to believe the current programs will become a reality in the next decade.

[39] Barnett, 96. Also, those without such advanced delivery systems would have to use unconventional means to strike with WMD like surprise special operations forces attacks or classic terrorist actions, which will always be difficult to defend against.

[40] Schneider, 131.

[41] Ibid., 132.

[42] "Although Chinese analysts do recognize the threat to Japan from North Korea, they still believe that development of the U.S.-Japan TMD is also designed to counter China's missile capabilities, which the People's Liberation Army (PLA) and civilian analysts recognize as China's most effective military asset, especially in relations with Taiwan." From Thomas J. Christensen, "China, the U.S.-Japan Alliance, and the Security Dilemma in East Asia," *International Security* 23, no. 4 (Spring 1999), 64.

[43] The United States Commission on National Security, *New World Coming: American Security in the 21st Century* (Washington D.C.: Office of the Secretary of Defense, September 15, 1999), 143. "U.S. intelligence will face more challenging adversaries, and even excellent intelligence will not prevent all surprises." A good example is how India surprised the entire world in 1998 with its unannounced underground nuclear test.

[44] Schneider, 108.

[45] The reader might ask why the rogue would not threaten WMD strikes on neighboring countries in response to *any* military strikes *regardless* of their origin or means of delivery. There are at least two reasons why such an extreme threat would be counterproductive and therefore an unlikely course of action. First, this kind of policy is hostage terrorism in its purest form—threatened violence against innocents to deter a response from another party. Any national leader who invoked this kind of policy would most certainly be demonized and forfeit all possibility of engaging in productive political dialogue after his invasion is completed. Second, with such a "shoot the innocents" policy in effect any number of other actors could, for their own devious purposes, launch

a provoking strike to intentionally cause the rogue to strike a neighboring country with WMD. In fact, it's not unthinkable that a potential but impatient coalition partner could do just that to precipitate world condemnation and massive retaliation against the rogue.

[46] The enemy's choice of agents CB for these attacks would have to match the circumstances. The more virulent and persistent agents would serve best as a deterrent against the deployment of forces. For example, the most powerful nerve agent, VX, can remain active from three days to three weeks. [From Javed Ali and Leslie Rodrigues, *Jane's U.S. Chemical/Biological Defense Guidebook* (Alexandria, Virgina: Jane's Information Group, 1998), 35.] But, in keeping with the enemy desire to minimize world outrage, initial attacks could be with less virulent and perhaps non-lethal CB agents to force the evacuation of those areas. Then, follow-on attacks to lay down more virulent and persistent agents can still avoid mass casualties but greatly increase the risk to and complications for U.S. and coalition deployment actions.

[47] Joseph Kruzel, "American Security Policy in a New World Order," *1993 American Defense Annual*, ed. Joseph Kruzel (New York: Lexington Books, 1993), 4.

[48] The energy of a nuclear detonation in the lower atmosphere manifests itself in light, heat, radiation, and blast, but very limited electromagnetic pulse (EMP) effects. However, such a demonstration would give credence to a follow-on threat to detonate a nuclear weapon high enough in the upper atmosphere, or in space, to cause great EMP effects that could widely cripple communications networks and satellite operations. See Barnett, 79.

[49] *Air Force Strategic Plan Volume 1: The Future Security Environment*, April 1998, 10-11.

[50] Schneider, 159.

Chapter 3

The Concept of Prompt Global Strikes Through Space

> *Should U.S. vital interests be threatened and our civilian leadership decide response through the use of space systems is appropriate, time-critical targets can be struck by delivering conventional precision-guided weapons anywhere in the world within 90 minutes of launch.*
>
> —Long Range Plan: Implementing U.S.SPACECOM Vision for 2020

Joint Vision 2010 emphasizes "power projection" as a key means for America's Armed Forces to deter conflict or fight and win our nation's wars.[1] The concept of global strikes through space offers the potential to project combat power with an unprecedented combination of speed and precision.

For the purposes of this paper, the term "global strike" is defined as "the capability to conduct a precision strike with conventional weapons from U.S. soil to any point on the globe, including the recovery of any reusable launch platform onto U.S. soil."[2] While virtually any aircraft possessing an air refueling and ordnance delivery capability could theoretically be used for global strike, this is feasible only with long range bombers like the B-1, B-2, and B-52. The B-2 demonstrated its global strike prowess during the Kosovo conflict, flying numerous 30-hour round trip missions from Whiteman AFB, Missouri.[3] For the future, the Air Force is exploring concepts for conducting global strikes through space, putting targets at risk anywhere on the globe within 90 minutes of

launch.[4] A world with such weapons would contrast starkly with the "expeditionary only" mindset of today.

Prompt Force Application Through Space

The Air University study *Air Force 2025* published in 1996 envisioned global strike with conventional ballistic missiles and space vehicles.[5] U.S. Space Command (USSPACECOM), with its 1998 publication *Long Range Plan: Implementing USSPACECOM Vision for 2020,* sees the potential global strike capability against fixed, mobile, and moving high-value targets "on-demand." A limited capability could be available in 2005 using conventional ballistic missiles, with a significant increase in capability by 2012 with the introduction of a military Space Operations Vehicle. And by the year 2020, global strike capability could be fully matured and its operational deployment complete.[6]

This section focuses on the potential technical concepts and political issues involved in making global strike a reality, including two potential launch vehicles, the conventional ballistic missile (CBM) and the Space Operations Vehicle (SOV), and the reentry vehicles to bring the munitions into the target area.

Delivery Vehicle Concepts

Conventional Ballistic Missile. Intercontinental ballistic missiles (ICBM) and sea launched ballistic missiles (SLBM) were an early product of the Cold War, designed exclusively for hurling nuclear weapons across oceans and continents. They became two legs of the strategic triad, manned long-range bombers being the third, and remain an important part of U.S. nuclear deterrent capability today.[7] Current ICBM and SLBM

technology is sufficiently accurate and reliable that rearming these vehicles with conventional weapons would be almost a technical triviality.[8] While there are a few published proposals for converting some Air Force ICBMs into operational CBMs, there has been no surge of advocates in the literature.[9] On the Navy side, there is no current work with any land attack weapons system that would transit space.[10] Rather, all current and future Navy efforts for long-range strike are focused on evolution of the Tomahawk cruise missile, advanced theater ballistic missiles, and a new concept for a very long-range gun system.[11]

In its exploration of acquiring a new ICBM to replace the Minuteman III force as it ages out, Air Force Space Command (AFSPACE) is concurrently examining the potential for an entirely new ICBM that could be used in dual roles as a launch vehicle for both nuclear and conventional weapons.[12] USSPACECOM views CBMs as an "intermediate capability to deliver conventional precision weapons transiting space" that "may be a prelude to other concepts of Force Application."[13]

Space Operations Vehicle. In August 1994, President Clinton designated the National Aeronautics and Space Administration (NASA) as the lead agency for advanced technology development and demonstration for the next generation of reusable launch vehicles (RLV), and NASA's experimental vehicle for the RLV program is the X-33 VentureStar.[14] The X-33 is a half-scale version of the expected full sized RLV, and is intended only to demonstrate the vehicle's design and simulate flight characteristics of the full-scale RLV. However, technical problems have caused the X-33 flight test program to slip from the original planned start in June 2000 to some time in 2002.[15]

The Air Force is working with NASA to ensure military requirements for the RLV concept are incorporated so that the military version, the SOV, will be readily adaptable for military missions.[16] As envisioned, the SOV will be unmanned and capable of flying sub-orbital "pop-up" trajectories that allow much greater throw weight than could be placed in orbit.[17] For example, a SOV capable of orbiting 6,000 pounds could throw 40,000 pounds of weapons through space in a sub-orbital profile.[18] The utility of the SOV as a reusable launch vehicle "workhorse" for all kinds of space launch missions seems to make it highly likely that the program will become operational with the military in some form. USSPACECOM foresees the first SOVs to potentially be available for initial operational missions in 2012.[19]

Common Aero Vehicle. The common aero vehicle (CAV) is a new concept in reentry vehicles currently planned for development and testing in the latter half of this decade.[20] The "common" in CAV means it can be used for any number of purposes and payloads, and delivered by any kind of space launch vehicle. The CAV itself is essentially a shell weighing 1,300-2,400 pounds fully loaded. There are two distinct CAV design concepts. The first is an evolutionary design based on current reentry vehicle technology with downrange maneuverability but little or no cross-range maneuverability. This is the lighter-weight design and will be the first to be tested to demonstrate the basic technologies needed for a CAV. The second is a lifting body design that will able to maneuver up to 2,400 nautical miles cross-range and carry a bit larger payloads.[21] Both will be able to deliver virtually any kind of payload to a variety of target types.[22] Some of these payloads and targets include:

- A single Unitary Penetrator for defeating deeply buried targets, using the hypersonic speed of reentry from space as the kill mechanism rather than explosives
- Precision area attack weapons such as the Low Cost Autonomous Attack System[23] (LOCAAS) for attacking ground mobile targets and the Small Smart Bomb[24] (SSB) for attacking fixed targets
- Specialized Agent Defeat weapons for neutralizing biological or chemical weapons
- Insertion of Unmanned Aerial Vehicles for use in reconnaissance and surveillance

But the full intent is for CAVs to be able to deliver through space "most of the same conventional munitions planned for use on the F-22, JSF [Joint Strike Fighter], B-1, and B-2."[25]

There are many technical challenges to making the CAV a reality, including thermal protection during reentry, guidance and control, payload release.[26] The Air Force Research Laboratory's Ballistic Missile Technology Division has planned a series of missile technology demonstrations to test many of these over the next several years.[27] The first CAV program is not considered high risk, and CAVs should be available for deployment in the latter half of this decade.[28] This would make them available for use on CBMs perhaps as early as 2005 as reflected in USSPACECOM's *Long Range Plan*.[29]

Operational Considerations

The operational issues for global strikes through space are different for each type of launch vehicle considered here, CBM or SOV. In whatever manner command and control for these weapons systems would be set up, the very nature of a global strike originating from U.S. soil would certainly require National Command Authority (NCA) consent for a combatant commander to employ them.[30]

Conventional Ballistic Missiles. A CBM launch targeted across the globe will look just like a nuclear ICBM launch. At the very least this could cause great consternation

among countries able to detect the launch, and at worst cause one or more of those countries to increase their nuclear alert posture. The key concern is that nuclear weapons-capable states understand that a CBM mission is not directed at them and is not nuclear.

AFSPACE is studying a number of mitigating steps to make CBMs operations possible without arousing nuclear fears.[31]

- Geographic separation of CBM sites from nuclear missile sites.
- CBM on-site inspection agreements
- Pre-launch consultations, notification
- CBM radar or infrared signature enhancement

The first item refers to deploying CBM launch sites a great distance away from current nuclear ICBM sites. The AFSPACE proposal is to establish two bases, one on the East Coast and one on the West Coast, far removed from the nuclear missile sites. These sites would also be open to treaty verification inspections to confirm they indeed have only conventional payloads and are separate and distinct from the U.S. strategic nuclear arsenal. However, since current treaty interpretation requires that every CBM launch tube count against the total number of strategic launch silos allowed the U.S. would have to be willing to sacrifice some number of nuclear launch silos to have a CBM launch capability.[32] To limit the reduction of nuclear silos, current thinking has four launch tubes at each of the two sites for a total of eight silos. Pre-launch consultations and notification for these countries could help assuage their fear but risks the loss of surprise with the attack, which could be important depending on the nature of the CBM strike mission. Finally, technical enhancements of the CBM to make it appear very different to surveillance and warning sensors have been proposed.

An actual CONOPS for command and control of CBM missions has not been developed but there have been notional CONOPs for wargaming purposes. Launches from each of the two notional CBM sites could put weapons on target within 6 hours from a cold start, and less than 1 hour if the missiles are generated and ready. Reloading the four tubes for the next salvo could take an estimated 8 hours after launching a Minuteman type missile, yielding a maximum of 12 CBM launches at each of the two sites in a 24-hour period.[33]

Space Operations Vehicles. The Air Force wants the SOV to be capable of launching within 6 hours from a dead start and turn to the next mission in 8 hours or less.[34] While the SOV will be capable of launching payloads bound for orbit, for global strike missions it will fly a sub-orbital "pop-up" profile allowing it to launch from and recover to U.S. soil.[35] If delivering CAVs with 2,400 nautical mile cross-range, the payload trajectory can cover virtually any region of military interest across the globe.[36] In a study of potential SOV combat striking power compared to the B-2, six SOVs sized to deliver 14,000 pounds of ordnance each would be able to strike distant targets from the very first day compared to 10 B-2s executing their first strike on the fourth day.[37] This SOV fleet, with a response time of 6 hours and turn time of 12 hours, would deliver more ordnance on target than could the 10 B-2s until the B-2 fleet's second combat mission on the eighth day.[38]

International and Domestic Political Issues

Weapons and Space. Considering first the political impacts on global strikes through space from outside the military, there are two categories of effects to consider. First are the "hard" political constraints from treaties and agreements with other nations.

Then there are the softer international and domestic political issues related to mindsets that inhibit the likelihood of a global strikes through space getting sufficient political support to become a reality.

The Nuclear Test Ban Treaty (1963), the Outer Space Treaty (1967), and the Treaty on the Limitation of Anti-Ballistic Missile (ABM) Systems (1972) restrict military space activities. But they do not explicitly restrict CBM or SOV operations as envisioned as long as they do not carry WMD, conduct ABM testing, deployment, or operations, or interfere with other countries space intelligence systems used to verify treaty compliance during peacetime.[39] Current National Space Policy guidelines state that "DOD shall maintain the capability to execute the mission areas of space support, force enhancement, space control, and force application," which clearly intends that the military be prepared to conduct warfare in space if and when the time comes.[40] However, the notion of peacetime deployment of weapons in space of any type is not consistent with current U.S. national policy. USSPACECOM, keenly aware of this fact, is still responsible for planning for the possible use of weapons in and through space "should our civilian leadership later decide that the application of force from space is in our national interest."[41] Simply transiting space with a sub-orbital weapon bound for a surface target should be the easiest type of space weapon to debate successfully. However, aiming weapons at satellites, placing weapons in orbit aimed at other things in space, or parking weapons in orbit to be de-orbited onto a surface target later are currently considered taboo. Also, should the U.S. deploy a capability for global strikes through space, it will have to be managed with great diplomatic skill to avoid sparking a "space arms race." U.S. friends and allies should be less nervous about this capability than potential

adversaries, but it is doubtful that any move toward "weaponizing space" would go unchallenged within the international community.

The domestic political issues with the global strikes through space concept may in reality be tougher to deal with than international issues. The first mindset obstacle is simply the idea of striking a distant enemy directly from the CONUS. This hesitancy seems a bit odd since the U.S. did this very thing with B-2s, 15-hours from takeoff to target, against Serbia during the Operation Allied Force. But the idea of making such a strike so direct and immediate (less than 90 minutes from launch) without the need for supporting forces in the region is, indeed, different than a long range manned bombing mission. Perhaps this reluctance is related to a fear that adversaries will aim their asymmetric strategies toward the U.S. homeland in response to a CBM or SOV attack. One obvious enemy method would be to sponsor a well timed act of military sabotage in the CONUS, or perhaps a purely terrorist act on U.S. soil with the threat of more. An adversary might also simply threaten to use WMD against U.S. friends or allies, effectively holding them hostage to prevent U.S. intervention with a global strike, similar to threatening neighboring countries if they assist U.S. and coalition deployment forces.

Regardless of the adversary's attempt to inhibit U.S. global strike response there really is nothing new here except that the U.S. homeland is potentially on the front lines and in the line of fire. And yet analysts already expect U.S. adversaries in the future to strike directly at the U.S. homeland as part of their asymmetric strategy.[42] So, the fear that fielding a global strike weapon system would invite enemy strikes against the U.S. homeland is a moot point—they are likely going to happen anyway. And when they do,

if they do, a global strike capability could be a superb tool in the U.S. arsenal to give an immediate and emphatic response to the perpetrator.

Conventional Ballistic Missiles. In the minds of most people ICBMs are directly and inseparably identified with nuclear weapons. This is an extreme liability for any proponent of using ballistic missiles with conventional payloads since no country wants any risk a CBM launch that could be misinterpreted as a nuclear strike. The AFSPACE "mitigating steps" listed earlier are unlikely to satisfy the majority of U.S. friendly political actors, and would likely never be agreed to by less than friendly countries unless they, too, could deploy a similar capability. But consider a change in roles and imagine that the Russians propose to deploy their own CBM force with all the listed AFSPACE mitigating factors in effect. It is extremely doubtful that the U.S. would agree to such a proposal. Any such agreement between or among sovereign states would necessarily include an elevated risk of misinterpreting a CBM launch as a nuclear strike. The disastrous consequences of such an error make accepting this additional nuclear risk virtually impossible. Hence, any attempt at an agreement to deploy CBMs would likely be vehemently opposed by all nuclear powers.

Space Operations Vehicles. The international and domestic political impacts of the SOV concept are much less severe than for CBMs since the new vehicle carries no "nuclear baggage." Also of great benefit is the fact that the SOV will have been fathered by a civilian agency. Since NASA has recently increased its commitment to its RLV program, the new vehicle is expected to be operational for civilian use by 2010.[43] This non-military impetus virtually guarantees the military SOV will be operational shortly thereafter. And it matters not if the military chooses a different approach than NASA's

final RLV design. The fact that this new class of space launch vehicles was born out of a "manifest destiny" for America's space program means the Air Force can readily adopt it for its own use, as it did with the Space Shuttle, or evolve its own vehicle from that precedent. Also unlike the CBM concept, the sure expectation of an SOV fleet for frequent and routine "normal" military space missions will make the addition of a global strike mission a relatively straightforward matter whenever the political winds finally shift in favor of global strikes through space. And since the triad of ICBMs, SLBMs, and manned bombers will remain the mainstay of U.S. nuclear deterrence for the foreseeable future, there should be no need to add a nuclear capability to the SOV; it, therefore, should be declared a "conventional weapons only" system.[44]

Military Issues

Establishing a Mission Need. The notion of global strikes through space has thus far received less than enthusiastic support within the military. In February 1997, the AFSPACE Directorate for Requirements signed out a draft Mission Needs Statement (MNS) for "Prompt Global Strike." When the draft MNS was coordinated with other military services and Unified Commands, typical among the comments was that forward deployed forces—particularly Navy and Marine—provide sufficient deterrent and combat capability for the expected threats.[45] AFSPACE has kept the issue alive, attempting to answer the critiques with a new draft MNS to be signed out for coordination soon. But even the USSPACECOM Director of Requirements is not convinced that the case for global strikes through space is compelling. The obvious benefits are a fast response time and guaranteed penetration to the target, but without a clearly articulated mission need that makes sense to a Unified CINC the concept will not get the support it needs to

compete with other military requirements.[46] But opportunities are increasing to debate the global strike concept in comparison with current and future force application systems.

Global strikes through space in Wargames. Two Chief of Staff of the Air Force (CSAF) directed wargames have included a global strikes through space capability with CAVs delivered by CBMs and SOVs. Global Engagement IV (GE IV) in October 1999, simulating two major regional conflicts in the year 2010, saw the first use of these weapons in the Global Engagement wargame series. The May 1998 and June 1999 Aerospace Future Capabilities Games (Futures Game), set in the year 2020 against a near-peer competitor, had these and other futuristic weapons simulated for game play.

The 2010 version of the CBM weapon system available for use in GE IV was Minuteman II or III ICBM stages with a single CAV payload. Their deployment followed the CONOPS described above—four launch tubes on the East Coast and four on the West Coast with an 8 hour generation time and 8 hour reload time. The SOV force was limited to a single vehicle capable of carrying three CAVs with generation and reload times of 8 and 6 hours respectively. With such relatively meager resources, global strikes through space were used more as a "silver bullet" against enemy leadership command and control targets with some success.[47] Of particular interest is the post-GE-IV conclusion that the EAF of 2010 could indeed deploy from CONUS and get bombs on target with 48 hours, but that protection of these forces from accurate enemy ballistic and cruise missiles—with and without WMD—caused major problems with sustainment throughout the game.[48]

Also worth noting is the political artificiality involved in the use of CBMs and SOVs. Retired Air Force General Joseph W. Ashy, former Commander of AFSPACE

and USSPACECOM, played the role of theater CINC for one of the cells. He employed CBMs in the game and thought they were very effective, particularly in their ability to swing easily from one theater of operations to another.[49] However, he personally did not believe CBMs would, in reality, ever be politically acceptable. General Ashy used them during the wargame simply because they were available in the simulation and he wanted to allow their use for evaluation purposes. On the contrary, he believed the SOV had a realistic future as a military tool but only after some undetermined length of time when governmental authorities see the inevitability of warfare in and through space and invest appropriately to prepare for it.[50] Retired Air Force General John Shaud, who played the role of the NCA Panel Chief for GE IV, expressed similar reservations about political aspects of global strikes through space. Like General Ashy, General Shaud wanted to make sure all weapons allowed were exercised and therefore never disapproved use of CBMs or the SOV if a CINC requested them.[51] Concerning the use of CBMs and the SOV in GE IV, General Shaud said he "never saw the use of them as compelling." Overall, he characterized the risks of conventional weapons coming from space onto another country as currently "unknown." Still, both generals had the same opinion that as time puts the Cold War further and further behind us it is inevitable that force application in and through space will become a reality.

The results from the Futures Games of 1998 and 1999 can be interpreted as showing how force application through space can contribute more to a hypothetical war in 2020. In contrast with GE IV, CBMs added little to combat capability in the Futures Games because no Blue Force Commander would consider using them at any time during the campaign, especially against a nuclear capable near-peer adversary.[52] However, with a

simulated fleet of 12 SOVs with CAVs, both the 1998 and 1999 Futures Games used global strikes through space often and for multiple mission types. Using various precision weapons, strategic strikes against deep high-value targets, fixed interdiction targets like bridges, and interdiction strikes against mobile armor, vehicles, and aircraft all had a telling effect on the enemy.[53]

> The SOV and CAV provide a powerful weapon for rapid deep strikes into an enemy's homeland. The Red Force commander stated in the hotwash that the combination of these two systems caused him more anxiety in the game than any other weapon in Blue's arsenal.[54]

One particular Blue strategy employed the SOV heavily during the Halt Phase: "Through space attacks alone, the U.S. destroyed 80% of the vehicles in each of the invading armies and 20% of the vehicles in the follow-on forces over the border."[55] This global strikes through space capability was particularly important when considering enemy capabilities to counter U.S. forces in theater even with the protection of 2020 TAMD systems.

> It seems clear that future near-peer and regional competitors could develop an anti-access capability that could inhibit U.S. aerospace forces from operating inside a substantial exclusionary zone…Adversaries employing anti-access capabilities against the U.S. will seek to overwhelm U.S. defenses through the use of massive salvos. While a layered defensive architecture will potentially destroy a major percentage of any such salvo, it is inevitable that some missiles will leak through…Depending on the nature of their armaments, a few leakers (e.g. those with chemical warheads) could wreak tremendous havoc on active air bases…Future massed missile salvos will be a mixture of cruise and ballistic missiles. With smaller heat signatures, nap-of-the-earth flight paths, and smaller radar cross-sections than ballistic missiles, cruise missiles will pose a major challenge to U.S. defenses.[56]

As one might expect, these wargame results emphasized the crucial link between effective precision global strikes through space and very capable Intelligence, Surveillance, and Reconnaissance (ISR). "In sum there is a tight relationship between

SOW [Standoff Warfare] and target-quality, deep look ISR. The decision to do the first implies the need to do the second."[57] Furthermore, without proper command and control for the targeting task, prompt precision global strike simply cannot happen.

Summarizing the results of all three wargames, global strikes through space would appear to have military utility especially later in the 2010 decade when more such systems would be available to warfighters, although CBMs were found to have much less use than SOVs. But beyond military efficacy in computer wargame simulations, the value of global strikes through space should also be analyzed by estimating its potential contribution to U.S. national security strategy for deterring adversaries as well as defeating their aggression.

U.S. Crisis Response Posture with Global Strikes Through Space

This section examines the potential impact of global strikes through space for deterring U.S. adversaries, and for contributing to crisis response in the three hypothetical cases outlined in chapter 2. Again, the time period considered is the world as it may appear in the decade of 2010 with niche competitors able and willing to challenge U.S. national interests in pursuit of their own.

Global Strikes and WMD Deterrence

Air Force doctrine underscores the deterrent capability of combat airpower with a global reach.

> Air and space forces can deter an adversary from taking actions contrary to US or allied interests by providing the capability to project potent military power anywhere on earth in a matter of hours. It is the knowledge that air and space intelligence, surveillance, and reconnaissance systems are closely watching their activities; that long-range bomber and air mobility forces are ready to respond over

> intercontinental ranges with a large variety of capabilities; that land-based fighter and attack aircraft are available to sweep the skies and prevent movement of ground forces, which gives the adversary's leadership reason to pause and reconsider their objectives and plan of action.[58]

While current Air Force doctrine stresses aircraft as the means for global strikes, possessing the ability to strike an aggressor through space directly from the CONUS in 90 minutes or less would add a new dimension to conventional deterrence. Deploying such a system and announcing it publicly would require U.S. adversaries to factor a wholly new capability into their strategic calculus.

Global Strikes Through Space and a Regional Nuclear Threat. As discussed in chapter 2, a regional aggressor with nuclear weapons can potentially threaten neighbors into submission and slow U.S. military response. Having CBMs and SOVs in the military arsenal will not eliminate the magnitude of such threats, but they can force an adversary to weigh carefully the chances for success knowing that any target visible or known to the U.S. could be struck within a few hours of an aggressive act. With each successive encounter, the U.S. demonstrates to the world that its superior technology, organization, and prowess at executing military operations only get better. Extrapolating this trend to 2010, the mere existence of an operational CBM and SOV global strike capability could deter many regional adversaries—but not all—from actions they might otherwise take.

With regard to a nuclear threat, the only unique features of CBMs and SOVs is their capability to strike from beyond the adversary's weapons range, and that weapons falling from space would be virtually unstoppable. This would not necessarily be completely reassuring to neighboring countries that are still within nuclear strike range from an aggressor, so other strategies must be employed to deter the aggressor from carrying out a

nuclear threat, specifically the counter-threat to retaliate in kind. But the ability to strike adversary targets precisely, effectively, and immediately with conventional precision munitions, and without the need for U.S. forces to be within range of the adversary's weapons, would be an undeniably significant advantage.

Global Strike and Chem-Bio Weapons. Global strike from CONUS offers attractive deterrent options against CB weapons. As pointed out in chapter 2, the U.S. policy to respond to CB use by a regional niche competitor with "WMD in kind"—meaning potential retaliation with nuclear weapons—can lack credibility in certain situations. But the ability to strike a CB wielding adversary from CONUS with conventional precision weapons through space provides another means short of a nuclear response without exposing U.S. troops or equipment to the regional threat. This is particularly important when considering the U.S. desire to maintain escalation dominance in a confrontation. Having another rung in the escalation ladder below using nuclear weapons would give the NCA an option for response to CB use that is currently not available. Furthermore, should circumstances call for a preemptive or preventative strike against CB weapons or facilities, global strike capability can hold those targets at immediate risk regardless of their location or the location of U.S. military forces.

However, in the case of pre-hostility CB deterrence, forward-deployed forces will likely be able to hold most targets at risk, assuming there was adequate warning time to prepare. Only in a case where the region of concern is beyond the reach of forward-deployed forces would the global strike weapons be the only way to hold CB targets at risk. But again, if U.S. forces are within striking distance of an adversary, those forces

will almost assuredly be within range of the adversary's weapons in 2010 and beyond, as will the U.S. homeland in some cases.

When Deterrence Fails: Three Hypothetical Cases Revisited

How might a regional aggressor's actions and the U.S. response with a global strikes through space capability differ from that described in chapter 2?

Case 1: WMD Use before U.S. Forces Deploy. In this case, the aggressor's invasion strategy is to use CB at the outset against potential staging and operating bases and ports, and threats of CB and nuclear strikes to intimidate neighbors from assisting the U.S. The intent is to impede the deployment and employment of forces sufficiently for the adversary to achieve the invasion's objectives and present the world with a *fait accompli*. This entire strategy is based upon the U.S. expeditionary force posture wherein any adversary can expect only a few days freedom of action before U.S. forces are in a position to attack. But he could buy some number of additional days if his CB attacks and nuclear threats obstruct deployment of forces.

However, with CBM and SOV assets the enemy would know U.S. counterattacks could begin within hours of the start of an invasion. An adversary may simply increase the size of his invasion force anticipating the loss of some percentage to these strikes, and that may be all that is needed to ensure success. But not knowing the true effectiveness of these U.S. weapons, the adversary's must make a "guess" at attrition rates. Hence, there is a greater gamble for success than if CBMs and SOVs were not available to U.S. forces.

Even assuming all the CBMs, SOVs, and CAVs that could be deployed in 2010 would be, the total weight from global strikes through space alone would probably not be

sufficient to halt a determined invader. Other targets could be chosen to have an asymmetrically greater affect by attacking what the adversary truly holds most dear, which means discerning the chief enemy centers of gravity.[59] And yet it may not be politically possible for the U.S. to condone strikes of certain critical targets no matter how likely their destruction may coerce an enemy. For example, Italy's surrender in 1943 was in part due to the fear that continued allied bombing might destroy Italian archival treasures.[60] In today's world of precision strikes the enemy's archival treasures would most probably be on the prohibited target list.

Perhaps the greatest effect of global strikes through space would be to execute a preemptive attack before the adversary commits to an aggression like invading a neighbor's territory. Or a less provocative move, but with the same "show of force" effect, would be to deliver a reconnaissance UAV through space in a CAV. Of course this assumes sufficient strategic warning to act. But even a token preemptive attack to demonstrate to an adversary his vulnerability could have much greater effect before he has "crossed the line" and committed his forces and his political reputation to an invasion's success. If the demonstration of a through-space attack does not deter the invasion, denying the adversary's objective by halting his invading forces is most likely the only way to stop him.[61] With munitions potentially available in 2010, global strikes through space could definitely start and contribute to the Halt Phase, and certainly send an unequivocal message of U.S. intent.[62]

Case 2: WMD Use after U.S. Forces Deploy. If an aggressor waits until U.S. and coalition forces begin arriving in the region and then uses CB weapons, he has already yielded the initiative. The U.S. would already have warned the adversary about

consequences if WMD were used and would have to make good on that threat, while elements of the TAMD family of systems would already be in the region ready to defend against missile attacks. If the CBM and SOV weapons had not yet been used, they could be one of the means for escalating the U.S. response short of a "WMD in kind" response with nuclear weapons.

In this hypothetical second case, global strikes through space further provides the theater CINC with a measure of targeting flexibility to fill in targeting "gaps" across the spectrum of targets when CB attacks slow theater operations, including targeting the enemy's CB warfare capabilities themselves. Global strikes through space can also be one of the most responsive capabilities available to a CINC. With the potential ability to precisely strike a target anywhere in less than 90 minutes, this may be the quickest response time of any asset in or out of the theater. Depending upon circumstances in the theater at the time, strikes through space may even be the fastest way to attack "pop-up" or especially time-critical targets. To have this global strike capability ready to answer any theater CINC's "call for fire" would bring tremendous flexibility and versatility to combat operations worldwide.

Case 3: WMD Use to Prevent Strategic Defeat. In this third case, as in the second, CB use by the adversary would likely require the U.S. to respond in accordance with its previous warning about the consequences if the enemy used WMD. TAMD will have been established in the theater and prevent much of the combat effect of the enemy's belayed WMD missile attacks. Enemy WMD capability would likely already have suffered attrition from the coalition's counter-offensive campaign. Again, global strike assets could be a part of the U.S. response to CB attacks. In fact, these weapons would

most likely already be integrated into the campaign to support the counter-offensive. Also, as in the second case, global strikes through space gives the CINC great flexibility in filling in targeting "gaps" caused by CB attacks on friendly forces, including counter-fire against enemy CB warfare assets. And, as with the third case from chapter 2, any systematic campaign to eliminate the adversary's WMD capability—especially the nuclear weapons—should carefully weigh the risk of causing the enemy to "use or lose" his WMD.

During the counter-offensive phase, when U.S. and coalition forces press the attack to strategically defeat the aggressor, global strike with CBMs and SOVs would not serve a unique role. Instead they would simply be available for use by the CINC in an "on call" capacity or as an active part of his campaign plan. However, holding them back as a method for escalation dominance in response to some enemy escalation, like CB attacks, should be considered if its efficacy is credible in the situation. Otherwise, all means to bring firepower on the enemy should be used to greatest effect in speeding his defeat.

America's Strategic Paradox

As a democracy, the U.S. engages in military action only to defend its national interests, never for conquest. As a result, the U.S. strives to seize the strategic initiative through peaceful means while perpetually yielding the initiative to adversaries who choose non-peaceful means. This paradox is basic to the very nature of our national culture and belief system. No matter how intently the U.S. studies potential enemies and tries to prepare for any eventuality, when our adversaries act they will surely do so with premeditation and careful calculation of the possible U.S. responses. The retaliatory

cruise missile strikes against Osama Bin Laden's base camps in Afghanistan probably surprised the terrorist and his lieutenants, but they will be expecting such a response next time.[63] The world observed and learned from Desert Storm and Kosovo. Each succeeding challenge to U.S. interests will test our political resolve and our military capability in new ways, probing for and attempting to exploit any weakness. As the sole superpower the U.S. is virtually compelled to fulfill its role as leader of the democratic community of nations. To allow any international aggression to go unanswered will erode both the confidence of our friends and the respect of our adversaries.

One more thing to keep in mind is how the U.S. priority and progress with the TAMD program could push an adversary into acting out hostile a strategy before the deployment of TAMD defenses render his ballistic and cruise missile forces ineffective. Thus we potentially have an additional paradox in that America's TAMD program could precipitate aggression with missile-borne WMD some time in this decade. Until TAMD is deployed and available to America's allies and friends—which will not be until well into the decade of 2010, if that early—the opportunity for a bold WMD strike by a regional aggressor remains open.

Notes

[1] *Joint Vision 2010* (Washington D.C.: Chairman of the Joint Chiefs of Staff, July 1996), 4.

[2] The current ICBM and SLBM weapons do not fit this definition of global strike because they only carry nuclear weapons.

[3] John A. Tirpak, "With Stealth in the Balkans," *Air Force Magazine* 82, no. 10 (October 1999), 23-24.

[4] *Long Range Plan: Implementing USSPACECOM Vision for 2020*, (Peterson AFB, Colorado: U.S. Space Command, March 1998), 67.

[5] Lt Col Jamie G. G. Varni, USAF, et. al., "Space Operations: Through the Looking Glass," *Air Force 2025*, Vol. 3, Chap. 14 (Maxwell AFB, Alabama: Air University, 1996), 14, *Air Force 2025: "America's Vigilant Edge,"* CD-ROM, Air University, 1996.

[6] *Long Range Plan*, 67-71.

Notes

[7] Edward L. Warner III, "Nuclear Deterrence Force Still Essential," *Defense Issues* 13, no. 34, May 29, 1998, n.p.; on-line, Internet, 15 November 1999, available from http://www.defenselink.mil/pubs/di98/di1334.html.

[8] The idea of converting nuclear ballistic missiles to conventional precision warheads is not exclusive to the U.S. France has considered options for CBMs including a modification of its HADES nuclear land-mobile missile. See Jean-Lois Prome, "Towards a French Non-nuclear Deterrent?" *Military Technology*, no. 6/93 (June 1993), 46-50.

[9] Two such articles that give a good introductory overview of the conventional ICBM concept are: Lt Col John R. London III, USAF, "The Ultimate Standoff Weapon," *Airpower Journal* 7, no. 2 (Summer 1993), 58-68, and Maj Robert Gibson, USAF, "Conventionally Armed ICBMs," *Airpower Journal* 9, no. 3 (Fall 1997), 119-123.

[10] Commander Robert A. Aronson, Navy Headquarters, inteview by author, 16 December 1999.

[11] For a comprehensive summary of the U.S. Navy's thinking on new developments in long range weapons for use in precision strikes from the sea, see Owen R. Cote, Jr., *Precision Strike from the Sea: New Missions for the Navy*, A Report of the M.I.T. Security Studies Program's Second Annual Levering Smith Conference, (Cambridge, Mass.: MIT Security Studies Program, December 1997), n.p.; on-line, 18 October 1999, available at http://web.mit.edu/ssp/www/Publications/confseries/strike/strike_report.html. For a more recent and briefer summary, see Glenn W. Goodman, Jr., "Fires from the Sea," *Armed Forces Journal International*, April 2000, 46-53.

[12] Robert Wall, "USAF Weighs Multi-Role ICBM," *Aviation Week and Space Technology* 151, no. 16 (October 18, 1999), 34.

[13] *Long Range Plan*, 67.

[14] Bill Sweetman, "Space Giants Step Up Efforts to Win Low-Cost Launch Race," *Jane's International Defense Review* 33 (March 2000), 30.

[15] Ibid.

[16] United States Air Force Scientific Advisory Board, *A Space Roadmap for the 21st Century Aerospace Force*, Vol. 1, SAB-TR-98-01 (Washington, D.C.: Scientific Advisory Board, November 1998), 27. The SOV is called by other names, like Military Space Plane (MSP) and Aerospace Operations Vehicle (AOV). For simplicity this paper uses SOV to refer to all three. However, the Space Maneuver Vehicle (SMV) is something different entirely, and should not be confused with the SOV. The SMV is a much smaller design that is intended to ride a first stage launch vehicle of some type, like the SOV or an expendable launch vehicle, and provide second stage and on orbit maneuvering. It can remain in orbit for up to a year with a maximum orbital payload of around 1,200 pounds. The SMV is currently undergoing development and testing with the Air Force Research Lab at Kirtland AFB, New Mexico. See John Pike, "Military Spaceplane X-40 Space Maneuver Vehicle Integrated Tech Testbed," *Federation of American Scientists Space Policy Project Military Space Programs*, January 14, 1999, n.p.; on-line, Internet, 11 November 1999, available at http://www.fas.org/spp/military/program/launch/msp.htm.

Notes

[17] For an excellent discussion on the argument of manned versus unmanned military space flight operations see Maj David M. Tobin, USAF, "Man's Place in Space-Plane Flight Operations," *Airpower Journal*, 13, no. 3 (Fall 1999), 50-65.

[18] United States Air Force Scientific Advisory Board, *Report on United States Air Force Expeditionary Forces*, Vol. 2, Appendix G, SAB-TR-97-01 (Washington, D.C.: Scientific Advisory Board, February 1998), G-56.

[19] *Long Range Plan*, 70-71.

[20] For an excellent overview on CAV see George E. Richie, "The Common Aero Vehicle: Space Delivery System of the Future." Paper presented at the 1999 AIAA Space Technology Conference and Exposition. Albuquerque, New Mexico, September 1999.

[21] Major Dana Struckman, AFSPACE/DR, Force Applications Division, interviewed by author, 15 November 1999.

[22] Richie.

[23] LOCAAS consists of a laser radar (LADAR) sensor coupled with a multimode warhead and a maneuvering airframe that weighs around 100 pounds and looks like a mini-airplane. The LADAR sensor is capable of identifying specific types of ground targets and can distinguish among various types of tanks, vehicles, and mobile equipment to attack the programmed enemy vehicle. A powered version (P-LOCAAS) will have an extended range and search area allowing it to fly 100 km to a target area and then conduct a target search over a 90 square km area before running out of fuel. LOCAAS is currently undergoing testing at Eglin AFB as an Air Force Research Laboratory Advanced Technology Demonstration program. Assuming the program is completed as planned, the Air Force will complete the test program in 2002. John A. Tirpak, "The State of Precision Engagement," *Air Force Magazine* 83, no. 3 (March 2000), 30, and John Pike, "Low Cost Autonomous Attack System (LOCAAS) Miniature Munition Capability," *Federation of American Scientists Military Analysis Network*, November 29, 1999, n.p.; on-line, Internet, 16 February 2000, available at http://www.fas.org/man/dod-101/sys/smart/locaas.htm.

[24] The SSB is a precision GPS-guided 250-pound bomb, six feet long and six inches in diameter, designed to be as effective against hardened targets as a standard 2,000 pound class precision guided bomb. This allows a greater number of bombs to be carried by a single platform with each SSB targeted independently. Preliminary results have been encouraging, and funding to develop and acquire SSBs has been programmed in the 5-year program beginning in fiscal year 2002. John A. Tirpak, "The State of Precision Engagement," *Air Force Magazine* 83, no. 3 (March 2000), 30, and John Pike, "Small Smart Bomb Miniature Munition Capability Miniaturized Munitions Technology Demonstration (MMTD)," *Federation of American Scientists Military Analysis Network*, November 29, 1999, n.p.; on-line, Internet, 13 April 2000, available at http://www.fas.org/man/dod-101/sys/smart/mmc.htm.

[25] United States Air Force Scientific Advisory Board, *Report on United States Air Force Expeditionary Forces*, G-60. An interesting variation on the CAV concept is a "Jumbo" CAV. This is a larger version of the advanced design that can house a significantly greater payload. For example, the proposed CAV design is large enough to carry 7 LOCAAS weapons. A Jumbo CAV could carry 30 LOCAAS weapons—more

than four times as many as the regular CAV, and yet would probably cost less than twice as much. From Mr. Gregory K. Jenkins, Chief, Advanced Programs, Armament Product Group, Eglin AFB, Florida, interviewed by author, 9 November 1999.

[26] Richie.

[27] Dr. Sandra Slivinsky, Chief, Ballistic Missile Technology Division, interviewed by author, 30 November 1999.

[28] United States Air Force Scientific Advisory Board, *Report on United States Air Force Expeditionary Forces*, G-60.

[29] *Long Range Plan*, 70

[30] An interesting thought, and potential problem for command and control, is that having a weapon that can hit any worldwide target in a matter of hours will be ready for launch more quickly than the NCA decision process to allow its use. No weapon will work until someone pulls the trigger. For the past 40 plus years only nuclear missiles had such quick responsiveness. But the Cold War experience did not help prepare national leaders for future decisions with conventional weapons like CBMs and SOVs because the greatest value of nuclear missiles is deterrence—everyone was afraid of using them. Hence, the decision to launch a nuclear missile needs to be a slow and deliberate process. Not so with conventional missiles or SOV platforms. And future speed-of-light weapons capable of hitting global targets, like the space-based laser, will test the decision making process in the extreme.

[31] Major Struckman.

[32] Ibid.

[33] Ibid.

[34] Ibid.

[35] Sweetman, 32.

[36] Ibid, 33.

[37] Also worth noting is the fact that the B-2 designed to execute stealthy attacks under the cover of darkness, never in the light of day. Hence, B-2 combat operations will always be limited to hours of darkness over a target area, unlike global strikes through space that could be conducted at any time of the day or night.

[38] Michael A. Rampino, "Concepts of Operations for a Reusable Launch Space Vehicle," *Beyond the Paths of Heaven: The Emergence of Space Power Thought*. Edited by Bruce M. DeBlois, Col, USAF. Maxwell AFB, Alabama: Air University Press, September 1999, 467-468.

[39] Ibid., 474-475.

[40] The White House National Science and Technology Council, *Fact Sheet: National Space Policy*, September 19, 1996, n.p.; on-line, Internet, 29 March 2000, available from http://www.whitehouse.gov/WH/EOP/OSTP/NSTC/html/fs/fs-5.html.

[41] *Long Range Plan*, 65.

[42] Hence the call for "Defending the Homeland" in *A National Security Strategy for a New Century*, 16.

[43] Sweetman, 30.

[44] There is, however, no reason why the new CAV capability cannot be incorporated into ICBM and SLBM systems. The desire is to keep the ICBM and SLBM systems

purely nuclear and have the SOV used only for conventional strikes, thus avoiding the nuclear stigma.

[45] Major Brian Fredriksson, AFSPACE/DR, interviewed by author, 15 November 1999.

[46] Colonel William J. Mulcahy, Jr., USSPACECOM/DR, interviewed by author, 15 November 1999.

[47] Lt Col Eric Reffett, Center for Aerospace Doctrine, Research, and Education (CADRE), interviewed by author, 8 November 1999.

[48] "Global Engagement IV Final Report," Draft report (Maxwell AFB, Alabama: Air Force Wargaming Institute, November 1999) 2-3.

[49] General Joseph W. Ashy, USAF (Ret.), interviewed by author, 13 December 1999.

[50] Ibid.

[51] General John A. Shaud, USAF (Ret.), interviewed by author, 11 Jan 2000.

[52] *Aerospace Future Capabilities Game 1998 Final Report*, (Washington D.C.: SAIC, 5 August 1998), 16.

[53] Ibid., 112 and 117, and *Aerospace Future Capabilities Game 1999 Final Report*, (Washington D.C.: SAIC, October 1999), 85 and 107.

[54] Captain Thomas Meyer and Captain Jonathan Thompson, "Space Warfare in the Aerospace Future Capabilities Game 1999," *Space Tactics Bulletin* 7, no. 1 (Fall 1999), 8.

[55] *Aerospace Future Capabilities Game 1998 Final Report*, 118.

[56] *Aerospace Future Capabilities Game 1999 Final Report*, ES-7 and -8.

[57] Ibid., ES-6-ES-7.

[58] Air Force Doctrine Document (AFDD) 1, *Air Force Basic Doctrine*, September 1997, 43.

[59] Coercing an aggressor by threatening or taking away what he considers most dear is an asymmetric strategy that goes far beyond choosing physical targets. Every conceivable weakness a potential adversary has must be continually assessed by persistent intelligence activity. This intelligence must then be regularly evaluated in terms of what the adversary holds dearest and fears most, and what is the best means by which the U.S. can exploit that weakness. The result could be a computer network attack, a psychological operation, physical destruction—whatever best suits the targeted weakness. Unfortunately, the adversaries from whom we have the most to fear are usually those who have the least to lose.

[60] Karl Mueller, "Strategies of Coercion: Denial, Punishment, and the Future of Airpower," *Security Studies* 7, no. 3 (Spring 1998), 216.

[61] Robert A. Pape, *Bombing to Win: Air Power and Coercion in War*, (Ithaca, NY: Cornell University Press, 1996), 314.

[62] Naturally, the decision to attack preemptively is fraught with potential dilemmas, political and military. Such an attack could actually precipitate the invasion, or at least give the adversary an excuse for it. Also, the U.S. risks appearing to be the aggressor if it strikes first. Preemptive attacks have their place, but must be carefully weighed against the potential political and military outcomes and effects.

Notes

[63] "Bin Laden to leave Afghanistan, fears U.S. attack, report says," *Middle East Times: Egypt Edition*, 30 July 1999, n.p.; on-line, Internet, 4 April 2000, available from http://www.metimes.com/issue99-31/reg/bin_laden_to.htm.

Chapter 4

PROMPT GLOBAL STRIKES THROUGH SPACE: MAKING THE CHOICE

> ***Tomorrow's Promise.*** *The aerospace force, with the right organization, training, and equipment, could deliver precisely calibrated effects, from taking a picture to dropping a precision munition, anywhere on earth, in less than an hour from the "go" order, with surprise and immunity to most defenses.*
>
> —USAF Scientific Advisory Board
> *A Space Roadmap for the 21st Century Aerospace Force*

Strategic Choices

The U.S. must vigilantly seek the optimal balance of benefits and liabilities for the best mix of military capabilities. The core warfighting competencies of the military services within the realms of land, sea, air, and space are continually improving. As the U.S. military becomes organizationally and doctrinally more joint, its ability to shape, respond, and prepare for the future will certainly become ever more efficient and effective. But deciding what the optimum balance of military capabilities should be, as well as how much and what type of a military to have, has not yet been done in the truly strategic sense. The first Quadrennial Defense Review (QDR) in 1997 was a golden opportunity for the DOD to set the military on a wholly new strategic course. Unfortunately, it fell short of what General Ronald Fogleman, the Air Force Chief of Staff at the time, would like to have seen.

> [General] Fogleman said his reaction to the final QDR report was one of sadness; a sense of missed opportunity; a feeling of dread about the armed services' future suffering because no one had the fortitude to impose "true strategic change" on the U.S. military at the end of the twentieth century.[1]

Instead, the first QDR was more a codification of the status quo among the military services rather than attempting any dramatic shifts.[2] Perhaps the upcoming QDR will be an opportunity for the "true strategic change" longed for by General Fogleman. What is clear is that the time for strategic decision on a prompt global strike through space capability is upon us.

> The next U.S. administration is going to have to tackle the question of space warfare, and the [SOV] will be the most visible symbol of what may be an energetic controversy. The rights and wrongs of an increased military presence in space may be debated, but there is no disputing that the technical means to establish such a presence are closer to reality today than they have been in decades.[3]

With that in mind, this chapter examines the military value of the concept of global strikes through space in 2010 and beyond in comparison to future U.S. military force posture without such a capability. Arguments offered here are not intended to be a detailed analysis but rather to provoke discussion in the debate over the efficacy of global strikes through space. The frame of reference for this chapter is the first and "worst case" threat from the three hypothetical 2010 cases in chapters 2 and 3: a strategic surprise regional invasion by a niche competitor rogue state who initiates WMD attacks at the outset to inhibit a timely and effective U.S. military response.

Summary and Reflection

This examination of the potential military value of global strikes through space is both a summary of and a reflection upon the previous two chapters. Here we consider

four factors that decision-makers need to bear in mind: time, cost, deployment, and employment.

Time

There are two aspects of "time" considered here that affect the strategic choice for global strikes through space. The first is how quickly such a capability can be available for deployment, and the second is how responsive this capability can be for combat operations.

Given the go-ahead, a CBM capability with the first generation CAVs could be deployed as early as 2005 while the SOV capability would not be available until 2012 at the earliest. One motivation for deploying CBMs is to provide an initial prompt global strike capability until the SOV comes on line, using the logic that some capability sooner is better than none until later. However, deploying only eight launch tubes total, four on the East Coast and four on the West Coast, is such a limited capability that a determined aggressor using the described "WMD first" strategy would have little to fear from CBM "silver bullets." If the enemy succeeded in holding U.S. expeditionary forces at bay, the CBM-only global strike force could only make token strikes.[4] If the invasion takes place in 2012 with some operational SOVs available, the weight of the combined CBM and SOV attacks could be considerable. The enemy would certainly have to factor in much greater attrition estimates for his invading forces. Viewed in this light, a wise enemy strategy might be to prepare his forces for the invasion to take place no later than 2010 before the SOV is available to interfere with his bold move.

Considering response time for conducting the attacks themselves, global strikes through space offer potentially the fastest available weapons delivery of any military

capability until and unless a ground or space-based laser weapon is deployed, which is not estimated to happen until 2020 at the earliest, if ever.[5] Launched from CONUS directly into the target area, global strikes through space would be persistent, unstoppable, and risk no friendly casualties if delivered on enemy-only formations and targets. But the same argument applies to the CBM-only force prior to SOV operations in 2012, except that the weight of CBM strikes would likely be insufficient to stop a determined aggressor from achieving the objective. On the other hand, if the adversary could be made to believe that the meager CBM capability could still precisely target some asymmetric weakness or vulnerability, it might be a sufficient deterrent to make the aggressor hesitate from starting the invasion in the first place. This would truly be "silver bullet deterrence."

Cost

A true cost and operational effectiveness analysis is beyond the scope of this paper. But what is important to note is the extreme budget strain the Air Force is experiencing with all that it wants to do with the space half of its aerospace mission.

The present Air Force space budget is about $7 billion a year out of a total annual Air Force budget of around $75 billion. Of that $7 billion, about $4.1 billion is for new systems and procurement with the balance for operations and maintenance of existing systems.[6] Unfortunately, the space budget over the next 20 years reveals shortfalls that "begin almost immediately." The funding beyond 2001 will not even cover baseline programs, much less proposed initiatives and improvements.[7] The USAF Scientific Advisory Board foresaw the budget problem as it reported:

> The Air Force faces huge budget problems in space (and almost everywhere else) whether this study's recommendations are acted on or

> not. There is no way out of this dilemma that does not involve both changing fiscal priorities and divesting large pieces of today's Air Force mission and infrastructure.[8]

Whereas the Scientific Advisory Board kept the budgetary recommendations within Air Force lines, General Joseph W. Ashy's opinion is that a larger DOD view on budgetary issues is required to make a real difference. In his view, the Air Force is "trying to do two-fourths of the U.S. military mission with one-third of the budget," meaning the Air Force is responsible for two very different mediums of Air and Space while the mediums of Land and Sea are covered singly by the other services.[9] General Ashy believes that unless the Air Force gets the proper portion of the DOD budget to do what is needed in air and space, the Air Force could lose the space medium to a new and separate military service. If that were to happen, General Ashy's view is that the lion's share of funding would go into space while the traditional air breathing Air Force would revert to a much smaller service within DOD, perhaps similar to the old Army Air Corps. It is difficult to imagine such a drastic outcome, but influential people have already expressed great concern over the Air Force's lack of progress with the potential of "Space Power" and suggested a new "Space Force" is a realistic option.[10]

The technical capability to field a CBM and SOV force armed with CAVs filled with any manner of mini-UAV reconnaissance vehicles or munitions is quite feasible, but expensive. The true question is not how much it would cost but how much military value it would provide in comparison with all other military capabilities regardless of service, which is exactly the optimization question that should apply across all the military services.

Deployment

The proposed deployment scheme for CBMs and SOVs was discussed earlier in detail. The important question to consider here is whether or not the deployment of these systems is at all feasible, especially considering the political aspects.

By itself, the tremendous political weight of the nuclear stigma associated with the CBM concept would in all likelihood make it virtually impossible to convince decision-makers to deploy such a system. The nuclear mindset runs too deep, and it is better to keep that "unique weapon" mindset isolated from conventional military tools until nuclear weapons are eliminated from all military arsenals, if that were possible. Besides the problem of a CBM launch teasing the nuclear genie by potentially risking misidentification as a nuclear strike, deploying a CBM capability can be viewed as generally contrary to U.S. nonproliferation policy. The U.S. would certainly set a poor example to the world if the sole superpower strives to inhibit proliferation of missiles and their technologies but employs those same technologies in a conventional weapons system aimed at any point around the globe. These and like arguments far outweigh the "silver bullet" capability gained by deploying such a system.[11] Of course this would give up attaining a global strikes through space capability that could be ready the middle of this decade with CBMs, while a SOV capability will not be available until 2012 at the earliest.

The SOV, on the other hand, is a natural for military use. With NASA taking the lead on technology and system development and the Air Force contributing to the effort as an interested partner, the SOV is virtually guaranteed to become a reality. Obviously, nondestructive military applications will most certainly be the mainstay of SOV operations—routine and emergency satellite launch, service, recovery, and the like. The

point is that the SOV force is bound to "be there" whenever the Force Application piece of USSPACECOM's mission clears the policy hurdles, which is one reason why it is smart the Air Force is working now to ensure the vehicle is designed to suit all missions. So the only real question is whether or not to build the Force Application part of the mission up front in the initial deployment or wait. An SOV fleet postured to perform nondestructive missions would be significantly different than one organized and equipped for global strike operations. In particular, there would likely need to be a greater number SOVs in the fleet as well as a dedicated stockpile of precision munitions and CAVs. Most importantly, and perhaps the most difficult to work out, the command and control structure and procedures must be set up to employ the weapons in a timely and effective manner. Naturally, this would involve routine combat exercises and inspections as with any operational force. But all these issues can be worked out just as they were when new weapons concepts entered the inventory in the past.

One potentially beneficial approach to maximizing utility for minimal cost would be to create a "Civil Reserve Space Fleet" based on the Civil Reserve Air Fleet (CRAF) concept already in place.[12] The idea is to build a national space fleet of civilian (NASA) and military (Air Force) SOVs such that the government can "call up" NASA's SOVs in time of urgent need to execute nondestructive missions while the Air Force owned SOVs could swing largely to the Force Application mission. Naturally NASA and the Air Force would have to work even more closely together to ensure commonality between the two sets of SOVs so payloads are as interchangeable as possible. The obvious benefit from this "CRSF" arrangement is a greater capability to surge with military launches without the military having to own and operate a larger number of SOVs. Using the

same reasoning, NASA and Air Force SOVs would both be used to maximize national space launch capability for peacetime operations.

Employment

The obvious employment benefits of a global strikes through space capability are what make the concept so attractive. Striking virtually any point on the surface of the earth within a few hours and with potentially complete surprise is a militarist's dream. The U.S. would have a potent new weapon with considerable deterrent capability against a multiplicity of adversaries. When deterrence fails the weapon gives our NCA the option of immediate strikes regardless of forward-deployed force posture or hindrances to regional operations. With a sufficiently sized SOV fleet, the weight of persistent attacks could be considerable, and potentially the key to deterring or halting a major aggression. And all this has the politically significant "bonus" that no friendly U.S. forces need be placed within reach of the enemy's weapons. With such strong potential, this concept is sure to evoke a great deal of controversy if and when it begins to truly compete with existing military programs, force structure, and service mindsets.

Whatever the command and control structure for SOV combat operations, Strategic Command (STRATCOM) should not be involved. As the combatant command for U.S. strategic nuclear forces, STRATCOM should remain solely devoted to the mission of controlling those exceptionally unique weapons. Just as launching a CBM would be crossing the lines dividing conventional and nuclear forces, so would placing STRATCOM in the command and control chain for SOV operations. USSPACECOM is the obvious choice since Force Application is part of their mission, and the Air Force would then naturally be responsible for routine SOV launch and control as they are with

today's peacetime launch platforms. Modeling STRATCOM's current Single Integrated Operations Plan (SIOP) process could be beneficial for SOV combat employment planning.[13] Since global strikes through space benefit largely from the rapid application of force, a process for analyzing and selecting target sets for SOV attack would be an obvious necessity. Unlike STRATCOM's SIOP, however, conventional attacks with the wide variety of munitions available would make for a more complicated targeting plan. Because of the current political sensitivities with weapons through space and striking an enemy directly from the CONUS, it is likely that the NCA will initially keep firm control over SOV strikes. Starting out with a SIOP-like planning and execution process may be the quickest way to set up a viable NCA control process and at the same time serve the regional CINCs well.

Weighing the Strategic Risks

Does the U.S. need a capability to strike an enemy from CONUS to respond virtually immediately to an aggression with no dependence on forward deployed or expeditionary forces? Can U.S. forward-based and expeditionary military forces really be effectively blunted by an aggressive enemy freely employing WMD? Can a capability to conduct global strikes through space reduce the likelihood of aggression, strategic surprise, and a *fait accompli* that would require great effort, expense, and risk of casualties to reverse? Analysts must continually weigh the likelihood or probability that circumstances hypothesized here could occur by 2010 or thereafter, and what cost the U.S. should be willing to pay to ensure it has a capability to promptly strike an aggressor at will, regardless of the enemy's location or strategy.

Beyond the obvious risk of an aggressive WMD-wielding enemy, another strategic risk is a "space arms race," or rather "space arms evolution." Other space faring countries could decide to deploy their own strike capability through space as their space launch capabilities mature. Should the U.S. yield the initiative to competitors and/or adversaries in deploying such a capability? Turning this point around, perhaps it is a better strategic approach for the U.S. to shun all weapons that impinge upon the sanctity of space, save the obvious exception of nuclear ICBMs and SLBMs which long-view optimists surely hope will eventually become extinct themselves. Either way the U.S. accepts strategic risk. For over 30 years of nuclear confrontation during the Cold War the U.S. accepted the strategic risk of Mutual Assured Destruction (MAD) with the Soviet Union.[14] Yet nowadays politicians seem casualty averse in the extreme, and a multi-billion dollar National Missile Defense program is under serious consideration to protect the U.S. homeland from possible future rogue actor long-range WMD missile attacks. Such attacks, although undeniably terrorizing, do not compare to the extreme damage of the MAD Cold War world of just 10 years ago. So, what is an acceptable strategic risk? And how far should the U.S. go defensively to reduce that risk? And how far offensively, such as with the capability for global strikes through space?

As with all matters of military force structure, logic and rationale have their say on strategic decisions about how to actually invest limited resources, but generally the incumbents of politics and mindset hold sway. Exposed here are the raw nerves of all the military services and every state and congressional representative with a vested interest in military policy. If any new military concept is to become a reality it must have sufficient advocates and champions in order to emerge a survivor in the strategic arena of national

defense. But for every survivor there are casualties, meaning programs delayed, slashed, or canceled to compensate for new ones, not to mention damaged egos and derailed careers. Regardless of the true reasons why resources get spent on particular programs, one thing is certain. When a crisis erupts the military will use what forces and capabilities it has at the time, and a determined aggressor will only react to what can affect him.

Conclusion

As stated at the close of the first chapter, the purpose of this paper is to advance the debate over the military application of force through space. Many of the concepts described are not new, but the above summary of arguments, notions, and reflections is intended to offer some new grist for the mill.

All the military services are leveraging advanced technologies to make warfare in their medium—land, sea, and aerospace—more lean, lethal, efficient, and effective. The DOD is forever striving to get the biggest return on the nation's military investment, as it should. Despite the military drawdown of the past decade, much of today's military force structure still reflects its Cold War origins. Optimization within military service lines cannot accomplish true strategic change. What is needed and long overdue is a universal approach across service lines that could potentially yield much greater gains for national military capability and efficiency. But the pivotal and most difficult question is how—how does the U.S. go about invoking such universal strategic change in the kinds and proportions of capabilities needed in its military?

Now and for the foreseeable future, America has no peer adversary to posture its military forces against. Preparing for the seemingly ubiquitous and sometimes faceless

WMD threat is perhaps the single greatest challenge for the DOD today, and one that requires sober judgments and judicious investments to counter. But such a threat is really not enough to stimulate a revolution in national defense—the sole superpower may be stung by limited WMD strikes, but national existence is not really threatened by rogue actors. With the services still finding their center-balance after the drawdown of the 1990s, and with the defense budget now flattened out for the foreseeable future, there seems to be no overwhelming urgency within political or military circles to create huge savings. Without external motivators—like a threat to national survival or another dictum to cut spending—the world's only superpower is left to motivate itself.

The ultimate question on the issue of global strikes through space is one of decision. Right now the initiative rests with the Air Force as the current husband of space for DOD. The Air Force is at an historic crossroads. Although an "Aerospace Force," the Air Force must choose how to balance its resources against opportunities in the competing realms of air and space power. The Air Force's *raison d'etre* has always been air power, and its first love is the airplane. But the mission of the Air Force today is "To defend the United States through control and exploitation of air and space."[15] The amalgam of "air and space" into "aerospace" does not take away from the fact that its exploitation requires great effort and investments. Splitting limited Air Force resources between air and space means draconian compromise and sacrifice. And the decision to invest in space force application for a global strike capability could be particularly unsettling. Competition for resources between traditional airplane-based and potential spaceborne approaches could tear at the invisible seams of the Aerospace Force.

How will the Air Force ensure the decision it makes is the best for the nation as a whole? What is it willing to sacrifice to do so? Furthermore, can the Air Force achieve the promise of space with the expected resources? Should it strive to convince the DOD and the nation that the promise of space is worth additional sacrifices from all four military services to optimize the national defense? These questions cut to the heart of Air Force identity, strategy, and above all service to the country. The answers must come from the complex web of everyday politics and mindsets. If Billy Mitchell were here today as an advocate for "strategic bombing through space," it is questionable whether he could rally the same support he did for the airplane between the World Wars. But someone must try. When, how, and to what extent the U.S. chooses to exploit space for its defense are today's critical strategic questions. Space is the future, and the future is upon us.

Notes

[1] George C. Wilson, *This War Really Matters: Inside the Fight for Defense Dollars* (Washington D.C.: CQ Press, 2000), 43.

[2] Ibid., 40.

[3] Bill Sweetman, "Securing Space for the Military," *Jane's International Defense Review*, 1 March 1999, n.p.; on-line, Internet, 4 April 2000, available from http://www.janes.com/defence/features/RAeS_aeards/securingspace.html.

[4] Increasing the number of CBM launch tubes would increase strike capability, but at the expense of nuclear launch tubes of the ICBM force.

[5] *Long Range Plan: Implementing USSPACECOM Vision for 2020*, (Peterson AFB, Colorado: U.S. Space Command, March 1998), 63. The USAF Scientific Advisory Board recommended that the Air Force "not proceed with large-scale, on-orbit high-energy laser demonstrations such as the proposed Space Based Laser Readiness Demonstrator, but pursue aggressively the precursor efforts needed to enable global energy projection at the earliest feasible date." From United States Air Force Scientific Advisory Board, *A Space Roadmap for the 21st Century Aerospace Force*, xiii.

[6] John T. Correll, "A Roadmap for Space," *Air Force Magazine* 82, no. 3 (March 1999), 25.

[7] Ibid.

[8] United States Air Force Scientific Advisory Board, *A Space Roadmap for the 21st Century Aerospace Force*, xvii.

Notes

[9] General Joseph W. Ashy, USAF (Ret.), interviewed by author, 13 December 1999.

[10] See Senator Bob Smith (R-N.H.), "The Challenge of Space Power," *Airpower Journal* 13, no. 1 (Spring 1999), 32-39.

[11] Even if the CBM force was deployed with reconnaissance payloads only—no munitions—launching any long-range ballistic missile would send all the wrong messages to the nuclear and non-nuclear missile capable countries worldwide.

[12] The CRAF permits a surge in military air transport capability by using civilian aircraft for personnel and cargo transport to augment military transport aircraft fleet.

[13] The SIOP is the war plan for using nuclear forces in various potential contingencies.

[14] MAD is the deterrent posture wherein two nuclear powers have sufficient nuclear strike capability to withstand a first strike nuclear attack and still retaliate with sufficient force to destroy the attacker. If one shoots, both are guaranteed to lose.

[15] Department of the Air Force, *Air Force Handbook for the 106th Congress*, (Washington, D.C.: Assistant Secretary of the Air Force, 1999), 4; on-line, Internet, 30 March 2000, available from http://www.doctrine.af.mil/library/misc/afhandbook.pdf.

Glossary

ABL	Airborne Laser
ABM	Anti-Ballistic Missile
ACC	Air Combat Command
AOV	Aerospace Operations Vehicle – Another name for Space Operations Vehicle (SOV)
ATD	Advanced Technology Demonstration
AFSPACE	Air Force Space Command
BMDO	Ballistic Missile Defense Organization
CAV	Common Aero Vehicle
CB	Chemical and Biological
CBM	Conventional Ballistic Missile
CONUS	Contiguous U.S.
CONOPS	Concept of Operations
CRAF	Civil Reserve Air Fleet
CSAF	Chief of Staff of the Air Force
DARPA	Defense Advanced Research Projects Agency
DOD	Department of Defense
EAF	Expeditionary Air Force
EMP	Electromagnetic Pulse
Futures Games	Aerospace Future Capabilities Games – CSAF sponsored wargames conducted by HQ USAF/XPX at the William F. Bolger Center for Leadership Development, Potomac, Maryland.
GE IV	Global Engagement IV – Fourth in the series of CSAF sponsored Global Engagement wargames conducted at the Air Force Wargaming Institute, Maxwell AFB, Alabama.
ICBM	Intercontinental Ballistic Missile
ISR	Intelligence, Surveillance, and Reconnaissance
LOCAAS	Low Cost Autonomous Attack System

MAD	Mutual Assured Destruction
MNS	Mission Need Statement
MRC	Major Regional Conflict
MSP	Military Space Plane – Another name for Space Operations Vehicle (SOV)
NASA	National Aeronautics and Space Administration
NASTI	NBC-Arming Sponsor of Terrorism and Intervention
NBC	Nuclear, Biological, Chemical
NCA	National Command Authority
RLV	Reusable Launch Vehicle
SEAD	Suppression of Enemy Air Defenses
SIOP	Single Integrated Operations Plan
SLBM	Sea Launched Ballistic Missile
SMV	Space Maneuver Vehicle
SOV	Space Operations Vehicle
SSB	Small Smart Bomb
STRATCOM	Strategic Command
TAMD	Theater Air and Missile Defense
THAAD	Theater High Altitude Air Defense
TMD	Theater Missile Defense
QDR	Quadrennial Defense Review
UCAV	Unmanned Combat Air Vehicle
USSPACECOM	U.S. Space Command
WMD	Weapon(s) of Mass Destruction

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