RENDEZVOU

Editor's Note

A 1962 nuclear explosion in space contributed significantly to the creation and implementation of the Outer Space Treaty in 1967, which outlawed weapons of mass destruction in space. As technology evolved afterwards, this treaty influenced development of space-based military capabilities and the organization of military space forces in the United States. This created serious challenges for today in fully bringing strategic space power to bear on national security issues as land, air, and sea forces become increasingly dependent upon these capabilities.

This 2010 U.S. Army War college paper compares the challenges to national space power today with those seen during the developing years of air power. The comparison illustrates how the United States compounds its space power risks to national security today in similar ways to how mindsets impacted air power implementation prior to WWII. This paper reviews the theoretical underpinnings of space power and the views that existed about air power prior to the creation of the U.S. Air Force in 1947. Through this analysis, the paper demonstrates that the United States cannot fully benefit from the strategic value of military space assets in orbit unless it adopts a new perspective on space power.

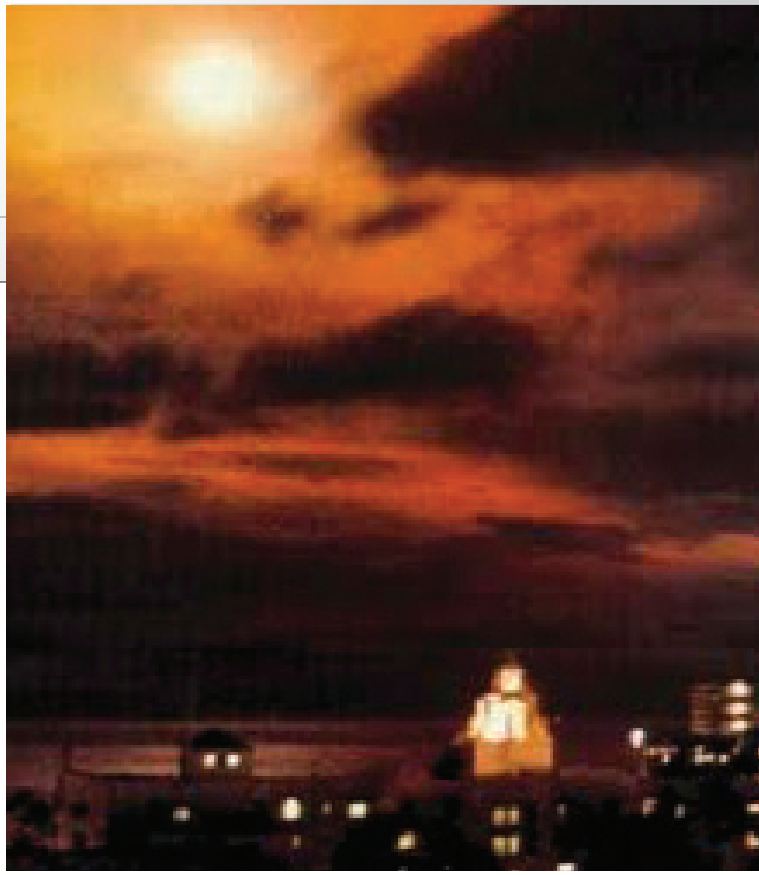
When President Barrack Obama announced in April 2010 that he wanted America to focus space research on making human deep space travel to Mars possible sometime during his lifetime, he re-introduced President John F. Kennedy's vision of space exploration.[1] In creating these visions for their respective generations, both leaders touched upon something broader than garnering future civilian or commercial space benefits. The space worlds of yesterday, today, and tomorrow all possess the same beginnings in military space power exploration.

With war still fresh in minds around the world in 1946, the United States and Soviet Union began the Cold War racing to develop missiles capable of reaching outer space. While both countries built upon technologies that began before WWII, it is important to note that the space race – and the resulting value that space assets bring to world society today – was ignited in the context of WWII's aftermath. The Soviet Union achieved the goal first by putting Sputnik into orbit on October 4, 1957. The United States followed with its own satellite – Explorer 1 – launched aboard a modified Redstone missile on January 31, 1958.[2] The significance to the world today of these developments in terms of systems that gather data in and transmit

S IN SPACE

Looking in on Military Space POWER

BY MICHAEL L. HOWARD, ASJ EDITOR-IN-CHIEF



Starfish Prime Nuclear Explosion 1962. Courtesy photo
http://en.wikipedia.org/wiki/Starfish_Prime

through space was monumental to both the civilian and military communities.[3] Not only did the two countries develop launch capabilities that would allow placing objects and eventually humans into space by numerous nations, they introduced the concept of using space for military purposes both in terms of military utility and weapons.[4]

The potential gravity of this is illustrated in a series of independent nuclear tests both countries engaged in during this same general timeframe. In 1946, the United States began a series of experiments with nuclear warheads that included exploding them at high altitudes. While the experiments were intentional, the results were not – especially the results of the blast that caused the most significant impact. Known as Operation Starfish Prime, the United States ultimately demonstrated the potential vulnerability in space when it detonated a 1.4-megaton nuclear weapon in lower-earth orbit over the South Pacific on July 9, 1962. With the world's space capability in its infancy, the explosion created an electromagnetic disturbance that created serious concern among those involved and who had a stake in the outcome.[5] The electromagnetic pulse not only disabled the seven satellites in lower-earth orbit, but it disrupted electricity on earth and created a space environment where new satellites could not operate for weeks to months.[6]

Knowledge of Starfish Prime is critical in understanding today's space problem because it introduced a critical consideration about how the U.S. military is organized today to employ space power. This historical event influenced three developments that form the basis of U.S. space power: 1) Rockets or lift capacity, 2) Satellites or data gathering and transmitting capability, and 3) The possible catastrophic effect in space from a variety of threats to include the use of nuclear weapons. America's cautious military use of space power since Starfish Prime through the remainder of the Cold War is explained primarily through a philosophy of maintaining a "sanctuary" for technological development and use in space.[7]

Starfish Prime contributed significantly to the creation and implementation of the Outer Space Treaty in 1967, which outlawed weapons of mass destruction in space. This treaty followed the sanctuary concept and served as a powerful influence on developing space-based military capabilities and organizing military space forces as technology evolved.[8] While blocking nuclear explosions in space, the treaty also created serious challenges in fully bringing strategic space power to bear on national security issues as land, air, and sea forces became increasingly dependent upon space assets.[9]

The comparison illustrates how the United States compounds its space power risks to national security today in similar ways to how mindsets impacted air power implementation prior to WWII.

Several studies and experts in recent years advocated for a separate military service for space.[10] A recommended model for establishing this priority in space is in how the U.S. Air Force broke away from the U.S. Army to become an independent service.[11] Although space power discussion today parallels those of air power prior to WWII, the arguments that arise about the employment of space power are more important than the discussion of a separate service.

This paper compares the challenges to national space power today with those seen during the developing years of air power.

A JTAGS Soldier works on a satellite dish at Misawa Air Base, Japan. *Photo courtesy USASMDC/ARSTRAT*

The comparison illustrates how the United States compounds its space power risks to national security today in similar ways to how mindsets impacted air power implementation prior to WWII. This paper reviews the theoretical underpinnings of space power and the views that existed about air power prior to the creation of the U.S. Air Force in 1947.[12] Through this analysis, the paper demonstrates that the United States cannot fully benefit from the strategic value of military space assets in orbit unless it adopts a new perspective on space power.

Today's Space Situation

Recognizing the space power problem areas and what to do about them is not the primary issue with today's national security space power situation. Rather, the key challenge rests in having the national strategic foresight and willpower to follow through on recommended solutions.[13] In 2001, the Rumsfeld Commission identified numerous national space issues and made recommendations on how to address them. Among the recommendations were: 1) Centralized management of space programs and overall acquisition of space platforms for national security and 2) Creation of a military space department when conditions allow.[14] The Rumsfeld Commission further warned that if reform did not occur, a catastrophic event in space could eventually happen, ultimately forcing the nation into action. The commission referred to it as a possible space Pearl Harbor.[15]

In 2008, the Allard Commission reported that a potential for the space Pearl Harbor had actually increased.[16] The central problem remained in not having a single line of authority to the President for military space.[17] The Allard Commission repeated the warnings of the Rumsfeld Commission and highlighted a lack of action on many of the 2001 recommendations. Among other reforms, the Allard Commission recommended that the Department of Defense establish a military space corps.[18] In March 2010, the Senate Armed Services Committee held a subcommittee hearing on space programs. Members and witnesses expressed the familiar concern over the many space acquisition programs that lag behind schedule and run significantly over budget, along with the overall space organizational structure issues mentioned in the 2001 and 2008 efforts.[19]

The question becomes one of where to find and prevent vulnerabilities in space. The Rumsfeld Commission highlighted the fact that China was developing ways to interrupt America's dependence on space.[20] China provided America a wake-up call in 2007 when it destroyed one of its own weather satellites with a direct-ascent anti-satellite weapon in lower-earth orbit. By so doing, China clearly demonstrated that it possessed the capability, know-how, and willingness to interrupt the "sanctuary" of space.[21] Additionally, the 2001 report noted that China, Iran, North Korea, and other adversarial countries were potentially capable of jamming satellite transmissions.[22] Since then, open sources indicate that North Korea and Iran – among others – possess satellite jamming technology and there is recent evidence that adversaries have jammed U.S. commercial satellites.[23]

This leads to the main relevance of the space issue – an explanation of what the military requires or obtains from space. Space-based capabilities fall into four mission areas: 1) Space force enhancement, 2) Space support, 3) Space control, and 4) Space force application. Space force enhancement is the heart of space power – it delivers space products. These products include: 1) Intelligence-surveillance-reconnaissance information from space necessary to make combat and other assessments, 2) Tactical missile warning of nuclear detonation or ballistic missile launches, 3) Environmental monitoring of meteorological, oceanographic, and space environment factors, 4) Satellite communications, which includes secure and unsecure ways to

GAO directly linked the acquisition problems with the convoluted organizational structure that includes "cultural barriers" – strongly indicating that the problem as a whole is in leadership, organization, and management.

communicate both traditional information and data generated or passed through space systems, and 5) Space-based positioning-navigation-timing – known by most as GPS – that assist with navigation and munitions guidance. Collectively, the intent of these products is to improve the overall effectiveness of the joint military force.[24]

Space support includes the national ability to deploy satellites into space, keep the satellites operational, and replace satellites as needed.[25] Space control is essentially maintaining freedom of action in accessing information that is either derived in or transferred through space assets while being able to deny it for an adversary.[26] Space force application includes combat action "in, through, and from" space that are intended to "influence the course and outcome of conflict."[27] This is where missile defense fits in. The fact that missile defense is included in the space equation is important because missile defense is largely left out of military space power discussions yet its development as a global tool since 2001 has had the "most impact" on the weapons in space issue.[28]

Recognizing space as a U.S. national military asset helps bring the concern for anti-satellite and jamming events into clearer focus – along with the emerging missile capabilities of Iran and North Korea. Military and civilian leaders today who are intimately involved in the military space enterprise correctly articulate the central importance of commercial and military space platforms. These platforms are essential in accomplishing everyday key transactions across the domestic-information-military-economy spectrum. In fact, space is "in the fabric" of what America's joint military force does – the military would not be able to fight as it does today without space capabilities.[29] These space advantages give military power a new level of accuracy, agility, range, and effectiveness – ultimately changing the "very nature of war," according to one DoD senior official.[30]

The military and commercial space enterprise provides the joint force "the ability to see with clarity, communicate with certainty, navigate with accuracy, strike with precision, and operate with assurance."[31] The military population, in general though, does not fully realize this dependence upon space capabilities – oblivious to the potential threats that exist to these capabilities and assuming the capabilities will always be present.[32] There is also no single line through which commanders can access space products. Instead, staffs must coordinate through complicated processes that are further complicated by stove-pipe organizations that make it difficult to access what the commands desire. In general terms, military combatant commands receive intelligence-surveillance-reconnaissance information primarily through military intelligence channels, while national weather information arrives through a combination of civilian and military systems. For the most part, commanders request missile defense and other space services come through U.S. Strategic Command but, even then, through different channels.[33]

A Standard Missile (SM-3) is launched from the Aegis combat system equipped Arleigh Burke class destroyer USS Decatur (DDG 73) during a Missile Defense Agency ballistic missile flight test. *Photo courtesy U.S. Navy*

Other systemic problem areas include insufficient space program development and acquisition, program cost over-runs and delays, and poor space management and coordination. The program acquisition processes are "broken" and the overall management of military space is "fractured."[34] While testimony this year from Department of Defense and U.S. Air Force officials acknowledged remaining problems in space acquisition, they claimed there was significant improvement in space acquisition and operational management aspect of space since 2001 commission. The U.S. Navy official countered that the current structure for space was not the "perfect organizational alignment."[35] The Government Accountability Office (GAO) official testified organizational management lingers as a major concern.[36] In written testimony, the GAO directly linked the acquisition problems with the convoluted organizational structure that includes "cultural barriers" – strongly indicating that the problem as a whole is in leadership, organization, and management.[37]

In addition to the military's assertions that space power is in the "fabric" of modern-day military operations, the following three quotes summarize the military space power condition today:

The dissonance is loud: Space power has had such an impact on how war is fought that it now has some believing it changed the "very nature of war," yet cultural barriers negatively impact the contribution of space in today's national security environment.

- "Recent studies and reviews examining the leadership, organizations, and management of national security space have all found that there is no single authority responsible below the President and that (the) authorities and responsibilities are spread across the department."[38]
- "Diffuse leadership … makes it difficult to hold any one person or (an) organization accountable for balancing needs against wants, for resolving conflicts among the many organizations involved with space, and for ensuring that resources are dedicated where they need to be dedicated."[39]
- "In fact, DoD is now facing a situation where satellites with advances in capability will be residing for years in space without users being able to take full advantage of them because investments and planning for ground, user, and space components were not well-coordinated."[40]

Evolving Space Power Theory

Realistic space power theory in today's terms is a relatively new and untouched topic. This fact is unfortunately complicated by technological capabilities that are evolving quicker than the theoretical discussions and resulting national policy about them. The dissonance is loud: Space power has had such an impact on how war is fought that it now has some believing it changed the "very nature of war," yet cultural barriers negatively impact the contribution of space in today's national security environment.[41] This overall situation combines with the current nature of the national security environment and places the military at a rare and critical intersection in determining how to provide for future national space needs.[42]

This launcher executed the first successful engagement of a SCUD missile in Operation Desert Storm, Jan. 17, 1991. *Photo courtesy U.S. Army*

In 1999, the author of Space Power Theory defined space power in detail: "Space power is the combination of technology, demographics, economic, industrial, military, national will, and other factors to contribute to the coercive and persuasive ability of a country to politically influence the actions of other states and other kinds of players, or to otherwise achieve national goals through space activity." The author further explained space power theory as "a theoretical concept of how and why space resources work with other factors to contribute to implementation of policy and achieve defined goals. A theory proceeds from facts, makes assumptions, and predicts a result caused by the relationship of factors within the concept."[43]

Space power theory is about using the sum of what can be done in space for strategic reasons in international politics.[44] In a book the publisher expects out later this year – Theory of Space Power: The Perils of Strategic Analogy – the author provides a concise starting point for a discussion on space power theory in the form of a definition. The author similarly defines space, air, land, and sea powers for their domains as: The "ability in peace, crisis, and war to exert prompt and sustained influence in and from" those specific domains. Additionally, he quotes Colin Gray's definition of strategy: "The use that is made of force and the threat of force for the ends of policy." [45] The author further provides several attributes that are helpful in understanding space power theory – the theory must be logical and explain how space relates to the overall strategy that it is supposed to help. Most important: "A theory of space power should provide a common framework from which all can refer and a conceptual means by which space power is exploited to its full potential."[46]

The purpose of theory, then, is to explain what, why, and how something does what it does. Yet today, the United States lacks that comprehensive perspective that explains the integration of space capabilities into military operations, despite the organizational recommendations that external studies since 2001 have consistently revealed. One controlling factor in this lack of clarity is the incorrect linkage of space and air powers. In the late 1950s, the U.S. Air Force began the linkage by referring to the two domains as "aerospace" and indicating there was no distinction between them.[47] Even today, efforts to combine space and air powers are a "political artificiality."[48] Space is actually a location with boundaries and different properties that can influence action or be exploited to gain an objective. As such, it must be controlled as an independent domain from air – it achieves different things differently.[49]

In order to improve the nation's organization for how it manages military space, a political re-awakening would need to clearly establish that space is not a sanctuary where operations are assumed secure.

This perspective of linking air and space power, however, has had at least a limiting effect in today's military and world security contexts by restricting the ability to accurately identify independent attributes of space power.[50] Space Power Theory provided necessary insight into this mindset. The author explained four phases of technology development, in which space power discovery is first, exploration of the ideas about how to use the technology second, general acceptance for the ideas that worked third, and actual utility where the capabilities become a part of everyday life fourth. The author believed in 1999 at the time of the writing, that the United States was in the third phase of development in which it was becoming accustomed to the benefits of space. He noted that there was a "relative immaturity" of space systems and concepts on how to use them that impacted useful theoretical discussion.[51] Using the author's definitions, the United States is now in the fourth phase in which technology is proving itself useful to society.

Public perception and possibly reality about the space domain is different today than it was when the Space Power Theory author made these observations. Even the first Gulf War is credited by some with being the first space war primarily because it introduced not only GPS-guided munitions, but also communication, intelligence-surveillance-reconnaissance, and environmental monitoring were each critically useful.[52] Although the integration of these capabilities was not nearly to the degree it is in today's conflicts, a significant misperception existed then. These capabilities came from what was perceived as a virtually uncontested space environment when, in fact, they did not. Some would argue that the very real potential of someone contesting America's use of space actually always existed and that there was a false sense of security that the United States would always benefit from security in space.

To a certain extent, this persistent view of space as a sanctuary – "conflict cannot happen here at all"[53] – remains today even though the reality of the threat appears more obvious in recent years. President Dwight Eisenhower first established the idea in 1957 with his space policy that treated space primarily as a sanctuary for military reconnaissance purposes. His administration reiterated this approach in 1958 when it further established military utility in space with communication and weather added to reconnaissance. The 1967 Outer Space Treaty grounded the sanctuary principle into the historical reality of space.[54] Various administrations dealt with international space issues over the years – each creating enough room in national space policy to adjust as needed if a threat became real, but with some mixed signals.[55]

In order to improve the nation's organization for how it manages military space, a political re-awakening would need to clearly establish that space is not a sanctuary where operations are assumed secure. Instead, the nation must recognize that space is actually a contested domain.[56] Two critical points about the necessary mindset: 1) "Space is a (global) commons. It is used by all nations. You don't need a satellite up there to use the environment. With a credit card and a Web site, you can extract information from space," and 2) A nation has "the inherent right of self defense to operate in the medium just like it would at sea or in (the) air. All the rules apply in that environment as they do in the other commons."[57]

DH-4s in flight. *Photo Courtesy Lewis Lupton Kaylor collection, Corporal, Photographic Section, Air Service, United States Army*

Air Power Big Picture

The struggles of the U.S. Army Air Corps to break away from the confines of the U.S. Army are well-known, yet the fight to establish air power's independence was actually with both the land and sea proponents. The air power theoretical discussion centered on how, from the air community's perspective, the virtues of air power were limited from their true potential by organizational biases and, from the sea and land power communities, how a separate military service for air power would distract from necessary air support to the land and sea forces. The core belief eventually emerged that cultural and doctrinal influences had a limiting effect on air power projection. WWII bore out some of the argument and, in the end, an independent service for air emerged.

The reason Brigadier General Billy Mitchell is significant to the emergence of air power is not that the demonstrations and subsequent court martial cemented polarity in the issue. Rather, they illustrate the explosiveness of the air power situa-

Brigadier General Billy Mitchell showed the potentially devastating effect of air power in bombarding warships while the United States unintentionally demonstrated the potentially devastating effect of space power in Starfish Prime.

tion at the time. Some accounts of Mitchell's actions after WWI paint him as a caricature of insubordination, harmful to his own cause while others place his actions as heroic in becoming the father of the U.S. Air Force. Although he was a vocal air power advocate since service in WWI, he is famed mostly for conducting a series of aerial bombings of mothballed battleships in the 1920s. In the end, he felt the tests proved his point about air power superiority. When he publicly accused U.S. Army and U.S. Navy officials for treason in regard to how they handled the information, he received a court martial and was dismissed from the U.S. Army. [58]

Just as the Soviet Union and the United States began the Cold War testing the missile-satellite-nuclear aspects that created the genesis of today's space power equation, the beginnings of military air power thinking came from personal experiences of men who fought in and survived WWI. This perspective provides some important insight. Along with other early-day air power theorists, Mitchell experienced the "slaughter that was the first-world-war."[59] This led him – them – to believe that the technology in air power was the "silver bullet" that would revolutionize warfare and somehow avoid the "carnage" of war.[60] It also led theorists to "overpromise" what technology could provide to the nation's overall combat strength.[61]

Mitchell's primary point in his argument and demonstrations was that battleships were vulnerable to aircraft bombardment and, therefore, air power presented a superior method to sea power in defending the United States.[62] This idea of air power being superior is clear in a biographer's consolidation of Mitchell's thesis:

> "Air power, organized into a separate, equal (to U.S. Army and U.S. Navy) and autonomous air force under a unified department of defense, could serve as the most effective and economical means of defending the continental United States. If the matter ever came to fighting an overseas enemy, airpower could decisively attack the enemy's vital centers without first defeating his armies and navies. Attacks on such vital targets would render war so decisive and quick that the total suffering would be less than otherwise … therefore, such bombing would be more humane than conventional trench warfare. Air power is best generated by nations with populations that are air-minded; the United States has great potential for air power but needs to develop it. Air power is best controlled by an airman in a centralized way to facilitate its offensive use."[63]

A plane takes off from a ship deck on it's way to make a bombing run. *Photo courtesy U.S. Navy*

There are no similarly strong advocates for space today. There are only warnings from the space community and external studies such as the Rumsfeld and Allard Commissions. A positive aspect about this, though, is that there are also no similarly written thesis to Mitchell's that is widely accepted and that purports space as being able to do more than it can do.[64] There is a general maturity about the overall military debate in which advocates on either side of issues recognize that space technology opens doors to additional dimensions but also realize that, in the end, the technology will not change war's nature.[65] This is in line with the current philosophy that war is "purposeful violence to achieve policy ends."[66] While there is a basic recognition that space is changing the character of war, the reality remains that vulnerabilities exist: Mitchell showed the potentially devastating effect of air power in bombarding warships while the United States unintentionally demonstrated the potentially devastating effect of space power in Starfish Prime.

Other historical correlations exist with the emergence of military air and space powers. An important question that will always remain unanswered is whether or not a different perspective of air power prior to WWII – heeding Mitchell's warnings – would have made a difference. It is a fair question, specifically in regard not only to Pearl Harbor but to the numerous U.S. warships destroyed by enemy aerial bombings during the war. The

Just as Mitchell's assumptions provided the framework for his thesis on air power, they also provide an excellent method in identifying potentially key attributes of emerging space power.

air power capability remained under the control of land and sea power through its developing years just as, later, space power evolved as a natural extension to air power in some minds. There was strong sentiment before WWII that air power needed independence in order to remove limitations and reach full potential. That same sentiment exists today in regard to space power.[67]

Detailed Comparative Analysis

With this big picture in mind, the broad similarities provide an introduction to a more detailed and necessary comparative analysis of earlier assumptions about air power and observations about space power today. For the purposes of this comparison, this paper uses eight primary assumptions that Mitchell discussed in his view of air power theory. Just as Mitchell's assumptions provided the framework for his thesis on air power, they also provide an excellent method in identifying potentially key attributes of emerging space power. The purpose of the comparison is to find potential reasons for air power becoming an independent domain while space power remains harnessed.

Revolutionary — "The coming of aviation was revolutionary."[68] In terms of technology – and the socio-economical aspect – this assumption is essentially true for both air and space capabilities. Air power improved the range, speed, and maneuverability in war so that there was more flexibility in moving troops and hitting targets.[69] Introduction of space power virtually eliminated the "tyranny of distance" in terms of generating in and moving data through satellites while drastically improving accuracy for navigation and munitions through the GPS-type capability.[70] As for revolutionizing war, the advents of both air and space powers are more accurately described as changing the character of war because they introduced new dimensions to the war equation.[71]

Prime Requirement — "Command of the air is a prime requirement."[72] The basic premise of this appears true for both dimensions – although there may have been some bravado with the original air power assumption in line with overselling the concept.[73] However, the ability to maintain air superiority is now considered the heart of air power: "When were the last time American troops attacked from the air?"[74] Also: It is "hard to fight when someone is shooting at you from above."[75] It is difficult to maintain similar superiority on the space side today because the concept really is not yet defined. Because of the international competitiveness in space, however, the United States must virtually guarantee access to space assets for an area of operations.[76] The reason for dominance is that U.S. forces

C-47 transports like these were part of the D-Day, June 6, 1944, landing in Normandy, France on Omaha and Utah beaches *Photo courtesy U.S. Navy*

benefit from a clear advantage – and therefore they rely upon – space force enhancement capabilities.[77]

Inherently Offensive — "Air power is inherently offensive: The bomber will always get through."[78] Again, the basic premise possesses some truth for both domains. "There is no doubt that air power was a significant contributor, but it didn't win the war all by itself."[79] Contrary to the original idea in the assumption, air power did not bring the war to an early end.[80] This is equally true for the possibilities of space power. Imaging satellites extend strategic depth for commanders beyond what they have ever seen before and, by so doing, they give an offensive advantage to those with the capability. This does not necessarily translate to making war easier or less bloody.[81] As for the bomber-can-get-through mentality, this is seen today in an over reliance on satellite-acquired intelligence data and other space services.

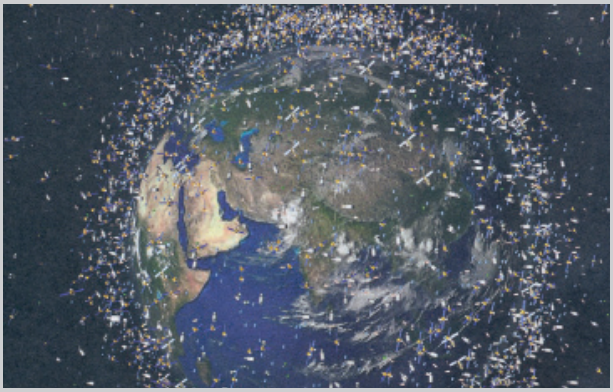
Evasive Nature — "Antiaircraft artillery is ineffective."[82] This assumption did not prove itself with air power and, from a literal sense in terms of missiles, is not true at all for space power. On the air power side, the thought was that at least some aircraft would get through when there was an overwhelming number of aircraft flying in a formation properly suited for the attack – the unfortunate result of that approach was that bombers were shot down and the unnecessary loss of life.[83] As was illustrated by the Chinese anti-satellite event, a hit in lower-earth orbit increases debris that places all assets in that orbit at risk.[84] Also, because of the laws of physics that define the space domain, satellites are "sitting ducks" to missiles launched by state or non-state players with the capability.[85] Potential protections include multi-domain solutions with additional redundancies in space systems and capabilities so that services do not necessarily rely upon limited tracks, hardening of the satellites

The missing link for creating a separate military service for space is the empirical proof that space power can make a significant contribution to war's victory or in defense of the United States.

themselves so that they can withstand the elements, and entering international partnerships to increase those entities with equity in a safer space environment.[86]

Economy of Force — "Air power could defend the continental United States more economically than the Navy, and the latter's form of warfare is obsolescent."[87] Again, the premise in this assumption is wrong in suggesting that any new geographic power domain could eliminate another. There will always be a need for land forces, sea forces, and air forces.[88] However, improvements in accuracy and overall delivery systems – precision munitions enabled by space data, over-the-horizon communications, overhead intelligence – have increased effectiveness.[89] They have become a significant contributor to economy of force at the operational level of war – primarily by providing information an adversary cannot acquire. Improvements in space-enabled munitions accuracy and overall delivery systems have increased the effectiveness and economy of force that come from air power.[90]

Unique Breed of the Airman — "Airmen are a special and elite breed of people, and they alone can understand the proper employment of air power."[91] This assumption – and the Mitchell persona – may have fueled the grassroots culture among pilots and those who belonged to the U.S. Army Air Corps. Deeper inside the assumption, though, is the idea that there is a requirement for unique people who understand the technology in order to tweak it to its full potential.[92] While the need for this is also true on the space side, the same cultural identity does not exist today within space power community as it did within air power in the early days.[93] In both cases, though, there is a strong requirement for individuals who are capable of understanding the attributes across the other domains in order to find ways to fully exploit the capability to the needs of national military power.[94]



Computer representation of traffic bottleneck caused by satellites and other debris put into orbit. *Image courtesy European Space Agency.*

Total War — "Future wars will be total: The ascendancy of the ground defensive will persist; everybody is a combatant."[95] This grounding assumption once again possesses a hint of salesmanship in terms of promoting the importance of the new domain. Since WWII, America experienced conflicts in which the different domains contributed differently – for example, the wars in Afghanistan and Iraq rely primarily on land power while air power dominated the conflicts in Kosovo and Bosnia in the 1990s.[96] As for space power, this is entirely a joint force endeavor in which the capabilities derived in and passed through space directly impact full-spectrum operations.[97]

Fragile Centers of Gravity — "Civilian morale is fragile."[98] This assumption underestimated the resilience of people. The idea in this assumption was that aerial bombing of civilian targets would cause the enemy to submit more quickly and this would therefore lead to a faster resolution to war – which was not the case.[99] Following this concept during WWII proved to be an expensive endeavor in terms of human lives. This type of overarching statement is equally untrue for space power. While there is some potential relevance to the broader perspective of attacking enemy centers of gravity, they will likely differ between conflicts. More importantly, the types of effects that can come out of space give commanders greater latitude – depending on what is desired – in shaping an adversary's behaviors.[100]

Findings

From this analysis, the missing link for creating a separate military service for space is the empirical proof that space power can make a significant contribution to war's victory or in defense of the United States. Although space power emerged as a critical enabler of combat power during the Iraq and Afghanistan wars, it has not proven that it can deliver the "game-changer" while getting its nose bloodied in combat on par with air power's combat test in WWII. This fact does not speak to the value space power provides to the nation today or its future potential contributions in national security efforts – just as air power had not yet proven itself until WWII. The degree of proof necessary to settle the debate about the organization of military space in today's world simply does not yet exist.[101]

Several key points about air and space powers emerge from comparing the assumptions that existed about air power from its earliest days with key attributes found in today's space power situation. The primary similarity in air and space powers – with entirely different attributes – is that both served as critical enablers to land and sea powers during the evolving years of their disciplines. With space power, that status continues. Conversely, the primary difference between the two is that air power came into its own during WWII. Air power proved, through its offensive nature and deep strategic bombing of enemy target areas, that it can be depended upon under combat conditions to come through with significant contributions.

The analysis reveals key areas of concern in regard to developing a new national perspective on space that will allow reform. The United States generally does well in responding to national security situations after they show up. It does not, however, do as well in seeing through bureaucracies and taking strategic measures that would potentially sidestep crisis.[102] Although it is unknown whether or not the Pearl Harbor attack was avoidable, maintaining absolute control of the air domain over a theater of operations proved a critical capability as WWII events unfolded. Unfortunately, there is no vision for how to raise space power into a similar principle contributor to war's victory – something that would take space power to the next level. A potential seam area for this development lies within space capabilities that can influence an adversary's center of gravity.[103]

Space Power Theory, the 1999 book referred to in this paper, included a series of beliefs held at the time by the author. "Space power, alone, is insufficient to control the outcome of terrestrial conflict or ensure the attainment of terrestrial political objectives."[104] While writing before the Iraq and Afghanistan wars, the author essentially predicted that space power's strong relevance would come by seeking synergy with air, land, and sea powers.[105] This prediction explained how space power would likely change the character – not nature – of war for the current generation of American fighters. This also helps explain the gap between the magnitude of dependency on military space power and the seriousness of organizational shortfalls.

With space power at its current level of maturity and integration into military operations, more non-politicized open discussion needs to occur across the services and within the operational communities which benefit from and depend upon them. Equally, these discussions must extend across government and the commercial ends of space to identify the best ways to proceed for the nation. The Mitchell comparison model gives a basis for these discussions. The model provides critical insight into how the United States can identify potential space power attributes from which significant contributions can emerge and contribute to war's victory. Until there is recognition of the attributes and potential contributions, the status of military space power in America will remain as a critical enabler delivering space-based data to the land, air, and sea domains vice a true power provider that fully fights in its own right.

ENDNOTES

1 Barrack Obama, nationally televised NASA speech at the Kennedy Space Center, Florida, April 15, 2010. Transcript available at http://www.nasa.gov/about/obama_ksc_pod.html

2 Sputnik sent signals to earth for approximately three weeks and Explorer three months before the batteries that enabled their transmissions expired – Sputnik burned up as it entered earth's atmosphere after three months in orbit while Explorer orbited for another 12 years before its destruction at reentry.

3 See also Roger Launius, NASA: A History of the U.S. Civil Space Program, (Malabar, Florida: Krieger Publishing Company, 1994). The author is NASA's chief historian and provides a detailed history of space events and issues.

4 Many other significant satellite and missile developments progressed at this time. The events mentioned in this paper are intended to highlight the point about military technological development.

5 See also George C. Marshall Institute, Washington Roundtable on Science and Public Policy, Forum on National Security Space: Space Issues in 2007, (Washington DC, January 22, 2007). The extreme side of the equation – the catastrophic event side – is the vulnerability to nuclear event in space or a missile strike on a space platform. As shown in the Starfish Prime example – and although there may be low likelihood of it occurring – even the possibility is a critical factor in considering space protection as North Korea and others are obtaining this capacity. Cost estimates in 2007 exceed $50 billion in damages in space from a blast similar to Starfish Prime. These costs, however, do not account for the negative effect the lost services had on activities that rely upon space assets and the earth's power grid.

6 "Operation Dominic: 1962 - Christmas Island, Johnston Island, Central Pacific," January 3, 2005, http://nuclearweaponarchive.org/USA/Tests/Dominic.html (accessed March 22, 2010).

7 Matthew Mawthorpe, The Militarization and Weaponization of Space, (Lanham, Maryland: Lexington Books, The Rowman & Littlefield Publishing Group, Inc., 2004), 31. The term "sanctuary" refers to the intent that there should be no international conflict in the domain.

8 Ibid, 15-16.

9 The actual impact of the Outer Space Treaty on using space for military purposes or even possessing weapons there is debated among experts. One major agreement, though, is that the treaty bans weapons of mass destruction in space. Another take away from the debate is that the treaty – and potential devastation from nuclear use – inhibits exploring the full potential of military use in space.

10 Brigadier General (Ret.) Rick Larned, U.S. Air Force, Colonel (Ret.) Cathy Swan, U.S. Air Force, and Lieutenant Colonel (Ret.) Peter Swan, U.S. Air Force, National Security Space Strategy Considerations, (lulu.com, 2010), 38. The authors explore space strategy developments and, in this context, recommend that now is a good time to review organization considerations. The authors indicate that the U.S. military is adaptive to imperfect management

structures and, therefore, a national space strategy is the kingpin in being able to fully implement military space power

[11] This concept of following the U.S. Air Force model for creating a space force within DoD was discussed in a non-attribution forum during the 2009 U.S. Army Space Cadre Symposium in Colorado Springs, Colorado, August 3-7, 2009. This question will be the subject of a future article by the author.

[12] The U.S. Air Force was established as a separate service on September 18, 1947. Its linage began in 1909 as the Aeronautical Section of the U.S. Army Signal Corps and continued in 1914 as the Aviation Section of the U.S. Army Signal Corps, 1918 as the U.S. Army Air Service, 1926 as U.S. Army Air Corps, and 1941 as the U.S. Army Air Service.

[13] Dr. John Sheldon, George C. Marshall Institute Fellow and U.S. Air Force Air University Visiting Professor of Advanced Air and Space Studies, telephone interview by author, April 28, 2010.

[14] U.S. Department of Defense, Rumsfeld Commission: Report of the Commission to Assess United States National Security Space Management and Organization, (Washington DC: U.S. Department of Defense, January 11, 2001), 80-81.

[15] Ibid, 22-25.

[16] U.S. Congress, Allard Commission: Independent Assessment Panel Report on the Leadership, Management, and Organization for National Security Space, (Washington DC: U.S. Congress, July 2008), 11.

[17] Ibid, ES3-ES4.

[18] Sharon Hartman, "An Inside Look at the Allard Commission … And That's the Way It Was," Army Space Journal, (Summer Edition 2009): 20.

[19] U.S. Congress, Senate, Armed Services Subcommittee on Strategic Forces, President Obama's 2011 Budget Request for Military Space Programs, March 10, 2010.

[20] U.S. Department of Defense, Rumsfeld Commission: Report of the Commission to Assess United States National Security Space Management and Organization, 22-23.

[21] Phillip C. Saunders and Charles D. Lutes, "China's ASAT Test: Motivations and Implications," Joint Force Quarterly no. 46 (3rd Quarter 2007): 39-40. This is significant because China's anti-satellite weapon hit so high in lower-earth orbit, the blast polluted space with destructive debris impacting space operations for other nations.

[22] U.S. Department of Defense, Rumsfeld Commission: Report of the Commission to Assess United States National Security Space Management and Organization, 19.

[23] Brigadier General Kurt Story, U.S. Army, Deputy Commanding General for Operations, U.S. Army Space and Missile Defense Command / Army Forces Strategic Command (USASMDC/ARSTRAT), " 'Space' on the Battlefield," presentation in open forum, USASMDC/ARSTRAT Senior Enlisted Leader Conference, Cocoa Beach, Florida, March 24, 2010.

[24] U.S. Joint Chiefs of Staff, Space Operations, Joint Publication 3-14 (Washington DC: U.S. Joint Chiefs of Staff, January 6, 2009), II-2 - II-3.

[25] Ibid, II-3.

[26] Ibid, II-5.

[27] Ibid, II-10. Space law experts indicate that the Outer Space Treaty does not impact this concept.

[28] Matthew Mawthorpe, The Militarization and Weaponization of Space, 205.

[29] General C. Robert Kehler, U.S. Air Force, Commanding General, U.S. Air Force Space Command, "Straight from Headquarters – the Air Force Space Command Commanding General," presentation in open forum, 26th National Space Symposium, Colorado Springs, Colorado, April 13, 2010.

[30] William J. Lynn III, Deputy Secretary of Defense, "Beyond the Budget: Challenges and Priorities," presentation in open forum, 26th National Space Symposium, Colorado Springs, Colorado, April 14. 2010.

[31] U.S. Congress, Senate, President Obama's 2011 Budget Request for Military Space Programs.

[32] Brigadier General Kurt Story, U.S. Army, " 'Space' on the Battlefield."

[33] Management of space assets does not follow a single line of authority. The National Reconnaissance Office manages space assets for intelligence, while most of the remaining space aspects are managed through U.S. Strategic Command and service component commands with the U.S. Air Force as the lead agency. Missile defense is also managed similarly through U.S. Strategic Command and components, with the U.S. Army in the lead. One of the recommendations from the 2008 Commission study was to streamline these procedures into DoD.

[34] U.S. Congress, Senate, President Obama's 2011 Budget Request for Military Space Programs.

[35] Ibid.

[36] Ibid.

[37] U.S. Government Accountability Office, Space Acquisitions: DoD Poised to Enhance Space Capabilities, but Persistent Challenges Remain in Developing Space Systems: Statement of Cristina T. Chaplain, Director, Acquisition and Sourcing Management (Washington DC: U.S. Government Accountability Office, GAO-10-447T, March 10, 2010), 13.

[38] Ibid.

[39] Ibid, 14.

[40] Ibid.

[41] The assertions by military leaders that space is in the "fabric" of operations and that it has changed war's nature is relatively new. It requires deeper analysis that examines the actual nature of war and whether or not impacts that come from space capabilities meet the high standards required to change war's nature. This will be the subject of a future paper by the author. As noted in this current paper, the assertions about the condition of the organization of space assets within DoD is well-documented since 2001.

[42] General C. Robert Kehler, U.S. Air Force, "Straight from Headquarters – the Air Force Space Command Commanding General."

[43] Jim Oberg, Space Power Theory, (Government Printing Office, March 1999), 10-11.

[44] Dr. John B. Sheldon, Theory of Space Power: The Perils of Strategic Analogy, (N.P.: Taylor and Francis Publishing, November 2010), 3. Page number corresponds to the draft manuscript, but Dr. Sheldon addresses this issue in chapter one of the manuscript. Dr. Sheldon provided the author a draft copy of his book for the purposes of

this paper and written permission to reference his work.

[45] Ibid, 29-30.

[46] Ibid, 4.

[47] Matthew Mawthorpe, The Militarization and Weaponization of Space, 14.

[48] Lieutenant Colonel Michael R. Mantz, U.S. Air Force, The New Sword: A Theory of Space Combat Power, (Maxwell Air Force Base, Alabama: Air University, 1995), 79. This book provides a very valuable early view of space power and its theory.

[49] Ibid, 80.

[50] Dr. John B. Sheldon, Theory of Space Power: The Perils of Strategic Analogy, 198-201. Page numbers correspond with chapter four in the draft manuscript.

[51] Jim Oberg, Space Power Theory, 119.

[52] Brigadier General (Ret.) Rick Larned, U.S. Air Force, telephone interview by author, May 6, 2010.

[53] Dr. John B. Sheldon, telephone interview by author, May 5, 2010.

[54] Matthew Mawthorpe, The Militarization and Weaponization of Space, 14-15.

[55] Dr. John B. Sheldon, telephone interview by author, May 5, 2010. On one hand, the United States as a nation relies heavily – critically – on what it obtains from space while on the other, the space environment is treated with kid gloves. It is as if there is a concern that any aggressive behaviors to protect U.S. equities in space will trigger an escalation in the potential for space war.

[56] Ibid.

[57] General (Ret.) Lance Lord, U.S. Air Force, former Commanding General, U.S. Air Force Space Command, telephone interview by author, May 4, 2010. In his comments, however, General Lord was clear that he did not see a need to create a separate space service in the military. He felt the central issue has to do with resources and that organization is a "fourth order" issue.

[58] David R. Mets, The Air Campaign: John Warden and the Classical Airpower Theorists, revised, (Maxwell Air Force Base, Alabama: Air University Press, April 1999), 31-50.

[59] Dr. John B. Sheldon, telephone interview by author, May 5, 2010.

[60] Ibid.

[61] Ibid.

[62] David R. Mets, The Air Campaign: John Warden and the Classical Airpower Theorists, 42.

[63] Ibid, 34-35.

[64] Jim Oberg, Space Power Theory, 127.

[65] General (Ret.) Lance Lord, U.S. Air Force, telephone interview by author, May 4, 2010.

[66] Dr. John B. Sheldon, telephone interview by author, May 5, 2010.

[67] Ibid.

[68] David R. Mets, The Air Campaign: John Warden and the Classical Airpower Theorists, 34.

[69] Brigadier General (Ret.) Rick Larned, U.S. Air Force, telephone interview by author, May 6, 2010.

[70] General (Ret.) Lance Lord, U.S. Air Force, telephone interview by author, May 4, 2010.

[71] Dr. John B. Sheldon, telephone interview by author, May 5, 2010.

[72] David R. Mets, The Air Campaign: John Warden and the Classical Airpower Theorists, 34.

[73] Dr. John B. Sheldon, telephone interview by author, May 5, 2010.

[74] Brigadier General (Ret.) Rick Larned, U.S. Air Force, telephone interview by author, May 6, 2010.

[75] General (Ret.) Lance Lord, U.S. Air Force, telephone interview by author, May 4, 2010.

[76] Ibid.

[77] Brigadier General (Ret.) Rick Larned, U.S. Air Force, telephone interview by author, May 6, 2010.

[78] David R. Mets, The Air Campaign: John Warden and the Classical Airpower Theorists, 34.

[79] General (Ret.) Lance Lord, U.S. Air Force, telephone interview by author, May 4, 2010.

[80] Dr. John B. Sheldon, telephone interview by author, May 5, 2010.

[81] Ibid.

[82] David R. Mets, The Air Campaign: John Warden and the Classical Airpower Theorists, 34.

[83] General (Ret.) Lance Lord, U.S. Air Force, telephone interview by author, May 4, 2010.

[84] Ibid.

[85] Brigadier General (Ret.) Rick Larned, U.S. Air Force, telephone interview by author, May 6, 2010.

[86] Dr. John B. Sheldon, telephone interview by author, May 5, 2010.

[87] David R. Mets, The Air Campaign: John Warden and the Classical Airpower Theorists, 34.

[88] Dr. John B. Sheldon, telephone interview by author, May 5, 2010.

[89] Brigadier General (Ret.) Rick Larned, U.S. Air Force, telephone interview by author, May 6, 2010.

[90] Ibid.

[91] David R. Mets, The Air Campaign: John Warden and the Classical Airpower Theorists, 34.

[92] General (Ret.) Lance Lord, U.S. Air Force, telephone interview by author, May 4, 2010.

[93] Dr. John B. Sheldon, telephone interview by author, May 5, 2010.

[94] General (Ret.) Lance Lord, U.S. Air Force, telephone interview by author, May 4, 2010.

[95] David R. Mets, The Air Campaign: John Warden and the Classical Airpower Theorists, 34.

[96] Dr. John B. Sheldon, telephone interview by author, May 5, 2010.

[97] General (Ret.) Lance Lord, U.S. Air Force, telephone interview by author, May 4, 2010.

[98] David R. Mets, The Air Campaign: John Warden and the Classical Airpower Theorists, 34.

[99] Brigadier General (Ret.) Rick Larned, U.S. Air Force, telephone interview by author, May 6, 2010.

[100] General (Ret.) Lance Lord, U.S. Air Force, telephone interview by author, May 4, 2010.

[101] Dr. John B. Sheldon, telephone interview by author, May 5, 2010.

[102] Dr. John B. Sheldon, telephone interview by author, April 28, 2010.

[103] General (Ret.) Lance Lord, U.S. Air Force, telephone interview by author, May 4, 2010.

[104] Jim Oberg, Space Power Theory, 127.

[105] Ibid.