

Space: The Next Revolution in Military Affairs?

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Is the militarization of space an aspect of the contemporary Revolution in Military Affairs (RMA) or does it represent a new military revolution entirely? RMAs are conceptual models of military transformation. They highlight revolutionary improvements in how an armed force fights and wins wars. The present RMA is generally defined as a fusion of advanced information and precision-strike technologies with a new doctrine that emphasizes overwhelming dominance and rapid victory on the battlefield. The objective of this study is to discern where the role of space weapons fits within the conceptual framework of the RMA. The development of space weapons signifies technological advancement in military capability, a potential leap that represents an emphasis on high-end weaponry that is part of the contemporary revolution. However, to answer this research question, one must differentiate whether this advancement is in line with those that are part of the contemporary military revolution, or if it surpasses the principles of this concept as they are commonly defined to encompass an entirely new transformation in war fighting.

A recent case study that highlights the complex role of space militarization within the RMA conceptual framework is China's January 2007 anti-satellite weapon test. In this weapon test, the People's Liberation Army (PLA) unexpectedly destroyed an ageing Chinese weather satellite in orbit using a ground-based missile system.¹ Numerous states expressed their concern about this unexpected action, including the regional military players of Australia, Japan, and South

¹ Marc Kaufman and Dafna Linzer, "China Criticized for Anti-Satellite Missile Test; Destruction of an Aging Satellite Illustrates Vulnerability of U.S. Space Assets," *The Washington Post*, January 19, 2007, <http://www.lexisnexis.com>.

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Korea.² As expected, the United States expressed grave concern as well. Since the U.S. armed forces are significantly reliant on satellite technology, Washington has expressed distress about the security of its own space assets in light of this development.³ The weather satellite, positioned over 500 miles above the earth's surface, orbited in a range in which some American spy satellites operate. Furthermore, by successfully targeting an orbiting satellite, China joined an exclusive club of states that has been able to destroy objects in space, the others being the former Soviet Union and the United States.⁴

The PRC's apparent ability to target and destroy space assets pinpoints the advancing technological capabilities of the PLA. Moreover, it demonstrates China's understanding of the important roles held by orbital systems in modern warfare, such as in communications networking and intelligence gathering. This blend of technical know-how with strategic doctrinal vision enables a tactical advantage that represents the essence of Revolutions in Military Affairs.

As dictated by a popular American science fiction television series of the 1960s, space is indeed the final frontier. Those states that possess the economic and technological capability to deploy space-based weapons would possess clear qualitative advantage over current or potential adversaries that do not possess such elements of hard power. In addition, realist theory would predict that the militarization of space by one state would precipitate power balancing.⁵ Thus, it is important to examine the phenomenon of space weapons within the context of a potential future RMA, a process that is sympathetic to realist principles because of its potential role in the creation of an entirely new arms race. Furthermore, the importance of studying space weapons within an RMA conceptual framework helps to examine the theoretical foundation of so-called military revolutions. In sum, this study will further add to the scholarly literature on the topic of military revolutions by not only determining what constitutes the con-

² Joseph Kahn, "China Shows Assertiveness in Weapons Test," *The New York Times*, January 20, 2007, <http://www.lexisnexis.com>.

³ Kaufman and Linzer, January 19, 2007.

⁴ Kahn, January 20, 2007.

⁵ For a classical realist perspective see Hans J. Morgenthau, *Politics among Nations, Brief Edition* (New York: McGraw-Hill, 1985), 183-93.

temporary RMA, but also by exploring the feasibility of future military revolutions within an outer space context.

Theoretical Outline

LITERATURE REVIEW

Determining what constitutes a Revolution in Military Affairs has been problematic for some scholars of military power. Those who find it difficult to define this phenomenon include Liaropoulos, who argues that the definition of the term RMA is inherently debatable.⁶ He supports Gray's proposition that the discussion about the RMA lacks a unified scholarly perspective.⁷ Latham argues that, despite an increasing fascination with the subject, there is much uncertainty regarding the precise nature of the RMA as well as the transformation of military capability.⁸ He writes that scholarship on the history of RMAs generally focuses on technical advancement rather than any fundamental alteration in the socio-cultural foundation of warfare, thus leading to analyses that fall short of a thorough conceptual examination. Sterner somewhat parallels this point when he writes that the concept of the RMA as advancement in military capability based on technological and doctrinal changes ignores a significant number of historical military revolutions.⁹ He argues that the disagreement among scholars over what should be considered historical RMAs, such as the birth of large armies during the French Revolution and the advance in battlefield technology throughout the 19th century, highlights ongoing definitional difficulties without providing a common supposition regarding these military transformations.

Despite definitional disagreements, it is commonly held that the contemporary RMA rests on the elements of information technology,

⁶ Andrew N. Liaropoulos, "Revolutions in Warfare: Theoretical Paradigms and Historical Evidence – The Napoleonic and First World War Revolutions in Military Affairs," *The Journal of Military History* 70, no. 2 (2006): 365.

⁷ Ibid, 366; See Colin S. Gray, *Strategy for Chaos: Revolutions in Military Affairs and the Evidence of History* (London: Frank Cass, 2002).

⁸ Andrew Latham, "Warfare Transformed: A Braudelian Perspective on the 'Revolution in Military Affairs'," *European Journal of International Relations* 8, no. 2 (2002): 232.

⁹ Eric R. Sterner, "You Say You Want a Revolution (in Military Affairs)?" *Comparative Strategy* 18, no. 4 (1999): 298.

dominant tactics, and precision-based operations.¹⁰ Although there is disagreement over whether military transformation is part of a continuous historical process or, rather, a sudden development in and convergence of doctrine, technological advancement, and organizational structure, most scholars agree that RMAs are in and of themselves specific revolutions in the conduct of warfare.¹¹

Although advancements in technology and compatible changes in doctrine are the major elements of military revolutions, additional underlying factors such as political support and policy application are integral as well. According to Stone, within the RMA framework, political support provides the impetus for engaging in conflict, but does not necessarily dictate the conduct of military engagement.¹² Liaropoulos agrees with Stone in regards to the requirement of political support for the realization of the RMA. He writes that, in order for the RMA to be a success, it must take the form of politically-minded objectives, including a clear identification of the adversary.¹³ Although the contemporary RMA relies greatly on large material capability gaps, he argues that, due to the possibility of escalation from desperate adversaries, this technical predominance will not be without external challenges. Thus, he concludes that it is unwise for the RMA to be utilized as an exclusive strategy for achieving victory. However, Biddle, somewhat echoing Stone, states that precision-guided munitions, as seen in the contemporary Revolution in Military Affairs, cannot create a transformation in the conduct of U.S. foreign policy.¹⁴ He contends that the example of the U.S.'s current involvement in Afghanistan shows how American forces cannot rely on precision-strike capabilities to defeat an enemy fighting with guerilla tactics. Biddle echoes this sentiment when he writes that military doctrine, specifically the manner in which forces are deployed, is much more impor-

¹⁰ Latham 2002, 238.

¹¹ Sterner 1999, 298; Patrick M. Morgan, "The Impact of the Revolution in Military Affairs (RMA)," *Journal of Strategic Studies* 23, no. 1 (2000): 135.

¹² John Stone, "Politics, Technology, and the Revolution in Military Affairs," *The Journal of Strategic Studies* 27, no. 3 (2004): 415-16.

¹³ Liaropoulos, 382.

¹⁴ Stephen Biddle, "Afghanistan and the Future of Warfare," *Foreign Affairs* 82, no. 2 (2003): 31-46. <http://web.ebscohost.com>.

tant than what advanced-technology militaries possess.¹⁵ Hoffman argues that post-9/11 terrorist threats can not be fought with missile defense shields and space weapons systems.¹⁶ In sum, asymmetric methods can make those states reliant on RMA capabilities vulnerable to attack. A lack of flexibility by policymakers will make the RMA a static strategy for victory, and thus leave their armed forces, although advanced, exploitable by relatively weaker challengers.

The primary advantage of the RMA is that it can provide a state with an enormous tactical advantage over its adversaries. Shaw argues that the technological focus of the RMA provided the United States with a qualitative advantage over the outgoing Soviet Union and the rising People's Republic of China.¹⁷ The contemporary RMA was a transformation that enabled the U.S. to possess overwhelming tactical superiority over the two great powers which were the closest to posing a potential threat to its security. However, as the post-Cold War period progressed, the U.S. entered into conflicts against international actors with much weaker capabilities, such as Iraq. As a result, the United States harnessed its enormous advantage in force capabilities to ensure not only overwhelming victory, but one that was surely immediate and decisive. These principles were established as the new doctrine of American warfare, one that was compatible with the emerging technology that enabled the implementation of the RMA.

Like those who are critical of the compatibility between the RMA and present threats, some analysts doubt the benefits of space militarization entirely. DeBlois, Garwin, Kemp, and Marwell all state that space weapons are neither appropriate for the threats that the U.S. currently faces, nor are they superior in capability to ground-based systems.¹⁸ Furthermore, since they hold that space weapons are extremely costly and relatively vulnerable, these authors argue that it is wiser to implement existing operational resources. On the other hand, Hyten writes that space militarization can surely provide a tactical

¹⁵ See Stephen Biddle, *Military Power: Explaining Victory and Defeat in Modern Battle* (Princeton: Princeton University Press, 2004).

¹⁶ See Frank G. Hoffman, "Complex Irregular Warfare: The Next Revolution in Military Affairs," *Orbis* 50, no. 3 (2006): 395-411.

¹⁷ Martin Shaw, *The New Western Way of War* (Malden, MA: Polity, 2005), 33.

¹⁸ Bruce M. DeBlois, et al., "Space Weapons: Crossing the U.S. Rubicon," *International Security* 29, no. 2 (2004): 51-52.

advantage for the United States. However, he contends that, without a clearly defined doctrine for implementation, as well as a lack of consultation with other space faring nations, this effort will undoubtedly transform outer space into a new arena of armed conflict.¹⁹

The present heavy reliance on satellites for information gathering in the conduct of warfare indicates that space technology is an integral component of the contemporary RMA. What this study seeks to address is whether current as well as proposed space-based military systems can be considered parts of a new military revolution. Morgan writes that, in the first Gulf War, the U.S. military utilized the services of a wide satellite network to gain intelligence and provide tactical guidance for weapons systems.²⁰ Randolph by implication places military space-based assets within the context of the RMA as well. He writes that satellite networks are an enormous resource to military endeavors in that they permit the U.S. to maintain its informational advantage, a critical aspect of the contemporary RMA.²¹ Mowthorpe agrees with this sentiment when he argues that the tactical advantage of space as a new frontier of warfare is a primary factor of the present military revolution.²² However, Gray and Sheldon argue that the militarization of space is not a component of the contemporary RMA, but a method by which the contemporary RMA can be implemented.²³ They provide a key argument when they both surmise that space militarization can be considered an RMA when outer space is used as a battleground such as land or sea is used today. In contrast, O'Hanlon places space weapons within the contemporary RMA context, specifically in what he labels the school of "Global Reach, Global Power." He writes that some U.S. military officials believe that advancement should continue into the realm of outer space with such hypothetical

¹⁹ John E. Hyten, "A Sea of Peace or a Theater of War? Dealing with the Inevitable Conflict of Space," *Air and Space Power Journal* 16, no. 3 (2002): 90.

²⁰ Morgan, 133.

²¹ Stephen P. Randolph, "Controlling Space," in *Transforming America's Military*, ed. Hans Binnendijk (Washington: National Defense University Press, 2002), 309.

²² Matthew Mowthorpe, "The Revolution in Military Affairs (RMA): The United States, Russian, and Chinese Views," *The Journal of Social, Political, and Economic Studies* 30, no. 2 (2005): 141.

²³ Colin S. Gray and John B. Sheldon, "Space Power and the Revolution in Military Affairs," *Airpower Journal* 13, no. 3 (1999): 23-40.

weapons systems such as direct-energy and intercontinental artillery systems.²⁴ Latham encapsulates the argument simply when he states that history has witnessed occasional transformations in the manner of armed conflict.²⁵ Thus, based on certain strategic factors, the potential exists for space militarization to represent a new dawn in military revolutions at some future point.

A particular camp of military analysts argues for what Gray and Sheldon consider the manifestation of space weapons as a new RMA: that of the exploitation of outer space as a new terrain for warfare. Some analysts with an American-centric perspective argue that the benefits of space weapons require the United States armed forces to establish a dominant foothold in outer space. Dolman writes that the United States is most dependent on space for its security, and thus should ensure its military predominance in space.²⁶ Lambakis supports this notion by highlighting the tactical benefits of space weapons, particularly the proposed national missile defense system. He writes that missile defense would provide the U.S. military with a comprehensive worldwide defense matrix that would deter potential ballistic missile attacks.²⁷

There are others, though, who go beyond conceptual arguments of space weapons within the RMA framework. Those who focus on the negative consequences of space militarization, particularly its potential to establish a new arms race, generally examine these possibilities through a classical realist perspective, one that focuses on balancing strategies against improvements in military capabilities by other international actors. Moore argues that such attempts by the United States to militarize space will progress into a new Cold War, with China being the most probable adversary.²⁸ Tellis writes that the PRC's development of space-based weapons systems, such as the an-

²⁴ Michael E. O'Hanlon, *Technological Change and the Future of Warfare* (Washington, DC: Brookings Institution, 2000), 89 & 103.

²⁵ Andrew Latham, "Re-imagining Warfare: The 'Revolution in Military Affairs,'" in *Contemporary War and Strategy*, ed. Craig A. Snyder (New York: Routledge, 1999), 210-11.

²⁶ Everett C. Dolman, "U.S. Military Transformation and Weapons in Space," *SAIS Review* 36, no. 1 (2006): 163.

²⁷ See Steven Lambakis, "Missile Defense from Space," *Policy Review* Feb/March 2007.

²⁸ See Mike Moore, "A New Cold War?," *SAIS Review* 26, no. 1 (2006): 175-188.

ti-satellite test of January 2007, is an effort to counter U.S. military dominance.²⁹ Lambakis argues the point more broadly when he states that the spread of space-related technology can provide nations with military leverage against the United States.³⁰

The literature on the militarization of space within the framework on the Revolution in Military Affairs is extremely minimal. Due to the lack of broad debate, a more proper discussion must be initiated on where space weapons fit within military revolutions. Albeit informative, the available texts that examine space militarization as part of the RMA are more descriptive in nature and do not provide an extensive theoretical foundation as the basis for their respective conclusions. For example, Gray and Sheldon do indeed position their argument against space weapons as part of the contemporary RMA on strong theoretical principles. However, scholars such as O'Hanlon primarily focus on the hard facts of what systems have been proposed by the U.S. military, while those such as Dolman and Lambakis emphasize within their studies the implications of space militarization. Scholars of the RMA such as Latham and Liaropoulos provide a thorough theoretical discussion of the nature and definition of transformative trends in military history. This study attempts to fill the theoretical gap among the pieces provided by the existing literature on space weapons within the RMA framework.

By attempting to discern whether space militarization is an aspect of what is generally considered to be the contemporary RMA or whether it represents a new military revolution, this study serves to highlight the effects of space weapons systems on international security. If space militarization signifies a new transformation in war fighting, then we may indeed witness a new arms race among the world's industrialized military powers.

REVOLUTIONS IN MILITARY AFFAIRS (RMA)

Revolutions in Military Affairs (RMA) are phenomena that combine advancements in battlefield technology, transformations in military doctrine, and a supportive political context to alter the method by

²⁹ Ashley J. Tellis, "China's Military Space Strategy," *Survival* 49, no. 3 (2007): 44-45.

³⁰ Lambakis 2007, 47.

which wars are fought. Although there is scholarly disagreement over the definition of a military revolution, based on recent military developments that will be presented here, this study agrees with the view that (1) an RMA is presently occurring, and that (2) this RMA is based on the utilization of precision-strike and information-gathering technology within a (3) new military doctrine that promotes the use of such hardware to ensure an enormous tactical advantage over a state's adversaries. Furthermore, this study contends that RMAs are indeed revolutions, but as shown by history, they are part of a continual evolution of military advancement.³¹

The present military revolution dates to the 1970s when a nascent high-tech war zone could be found in the midst of the Vietnam War, one that incorporated infant models of smart weapons and other support equipment for precision-guided operations. Also, during the same period, Russian military planners, led by Marshal Ogarkov, began to analyze what they saw as a coming leap in American military capabilities.³² By the 1980s, the doctrine of precision-strike began to be heavily considered as an aspect of U.S. military doctrine.³³ The 1991 Gulf War, the first comprehensive implementation of information-intensive and precision-strike technology in a military conflict, proved to the American armed forces that this advanced technology could be used to wage not only a victorious conflict but also ensure an absolute defeat of the enemy.³⁴ Since the Gulf War, this tactical method has been routinely used by the U.S. armed forces, such as in the 1999 bombing campaign in Kosovo and present operations in Afghanistan and Iraq.³⁵

The contemporary RMA would not be possible without advancements made in information technology, telecommunications, and sensor equipment. This new gadgetry permitted the U.S. to collect intelligence and combine this information with precision-strike missile technology to target the vulnerabilities of its adversaries.³⁶ How-

³¹ Latham 1999, 224; Morgan 135.

³² Morgan, 133.

³³ Latham 2002, 237.

³⁴ Stone, 418.

³⁵ Morgan, 134.

³⁶ Mowthorpe, 138, 140.

ever, other elements have been required in order for the application of advanced technology to be considered a true military revolution. Liaropolous cites the example of how the allied forces in World War I were able to effectively implement a military transformation and thus win the Great War. Technology alone could not have made this so. The fusion of social mobilization and national resources required was to apply new technologies, such as machine guns and artillery systems capable of indirect fire, as an integral method of warfare against the Central Powers.³⁷

Thus, although technology is important, RMAs require a politico-strategic context in which to develop. First, there must be a clear adversary in mind in order to provide the incentive to allocate the immense funds and political capital that are necessary to undertake such a transformation. Knox and Murray conclude that military institutions that attempt to transform their war-fighting methods without considering specific challengers will find it hard to do so.³⁸ For example, Latham writes that, in the post-Cold War world order, powerful states have not been the paramount adversaries. Instead, non-state actors and forces from developing nations, i.e. Iraq in the 1991 Gulf War and the Balkans in the 1999 Kosovo Campaign, are now the immediate threats to American interests.³⁹ The advanced weaponry of the RMA enabled the U.S. to decisively defeat these opponents, as they had much weaker resources and forces. Second, the contemporary RMA has been founded within a political doctrine influenced by the Vietnam War era, and places a strong emphasis on limiting harm to military and civilian personnel (on all sides). Some observers have thus argued that this RMA is the most recent attempt to place constraints on conflict between states.⁴⁰ In order to achieve victory, the strategic objective is now to narrowly direct one's forces at the enemy's vital targets to disable their capability to fight.⁴¹ For example, this doctrine has been physically manifested in the rise of precision-

³⁷ Liaropolous, 383.

³⁸ Williamson Murray and Macgregor Knox, "The future behind us," in *The Dynamics of Military Revolution: 1300-2050*, ed. Macgregor Knox and Williamson Murray (New York: Cambridge University Press, 2001), 182.

³⁹ Latham 1999, 222.

⁴⁰ Stone, 419.

⁴¹ Latham 2002, 245.

strike munitions, a method in which targets can be destroyed with minimal or no collateral damage, while quickly ensuring victory.

The United States is the only country that has undertaken a comprehensive effort to adopt what is considered the contemporary RMA. This is largely due to its massive economy and thus ability to generate a large defense budget. Furthermore, the U.S. has the largest military research and development (R & D) program of any state and has been the most successful in adding these advances to improve its military capability.⁴² As a result, the majority of this study is U.S.-centric, although the People's Republic of China (PRC), and to a lesser extent Russia (including the Soviet Union), are focused upon as well since they have also pursued their own indigenous space weapons program within an RMA framework. Thus they could become potential challengers to American interests in the arena of outer space.

Despite its many strategic benefits, the contemporary RMA has not been without its critics. For one, the technology of the RMA is suitable to open spaces but not urban conflict.⁴³ This has been an obstacle in the present American occupation of Iraq. As American forces are facing difficulties in combating an insurgency that utilizes the maze of streets and unassuming structures in Iraq's cities to wage battle, U.S. forces have found it challenging to apply the RMA's advanced weaponry and military systems to suppress the insurgents. Another criticism is that military revolutions can never take the place of military strategy.⁴⁴ The argument goes that war itself will never profoundly change. Despite attempts to limit the number of deaths and level of destruction, military personnel and civilians alike will be killed in conflict for the foreseeable future, unless some unimaginable transformation in how wars are won occurs or armed conflict is abolished completely.⁴⁵

Although both of these concerns are legitimate and grounded in strategic realities, these obstacles will prevent neither the continuation of the contemporary RMA nor future military revolutions. As long as

⁴² Morgan, 151.

⁴³ Lawrence Freedman, "A Theory of Battle or a Theory of War," *Journal of Strategic Studies* 28, no. 3 (2005): 428.

⁴⁴ Murray and Knox, 193.

⁴⁵ The latter is much less likely.

there are wars there will be advancements in the resources used by the international community's armed forces and transformations in the applications of such technologies. Innovation gives tactical advantage over other international actors. Thus, it is possible that the future will witness perpetual Revolutions in Military Affairs.

THE WEAPONIZATION OF SPACE

At present, space weapons are more theoretical than a reality. Multiple programs are in development but weapons systems have not been deployed in outer space. Those weapons that have been developed, that most observers consider to be within the category of space weaponry, are the developing national missile defense system of the United States and other allied nations, and the anti-satellite weapon tested by China in January 2007. However, these weapons systems have not fully manifested themselves as military hardware that can be practically implemented in a combat setting. Thus, the discussion of whether or not current space weaponry is part of the contemporary RMA or constitutes a new military revolution entirely, must be structured around a dichotomy of existing weapons systems and those that are not yet fully functional.

The United States and Soviet Union first started to experiment with space weapons during the heyday of the Cold War. In 1959 the U.S. military conducted its first test of an anti-satellite weapon. Moscow followed suit with its own test in 1968.⁴⁶ Understanding the opportunity for destruction that space presented, governments around the world agreed to place limitations on the use of outer space for military purposes during this period. The United Nations Outer Space Treaty was established in 1967, a framework that stated space should be only used for peaceful purposes, banned the deployment of nuclear weapons in space.⁴⁷ The 1972 Anti-ballistic Missile Treaty, signed by the U.S. and Soviet Union, effectively banned the use of

⁴⁶DeBlois, Garwin, Kemp, and Marwell, 54.

⁴⁷ United Nations, "Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies," in *United Nations Treaties and Principles on Outer Space* (New York: United Nations, 2002), 3-8; Michael Krepon, "Space Assurance or Space Weapons," *Georgetown Journal of International Affairs* 5, no. 2 (2004): 7.

weapons in space entirely.⁴⁸ The U.S., under the George W. Bush administration, withdrew from this agreement in 2002 so that it could continue plans for a missile defense system. Although the Cold War ended, American military planners have continued to look to outer space as a means by which they can further strategic dominance vis-à-vis other international actors.

So far space has been more of a base for tactical support instead of a platform for offensive strikes. Satellite systems have primarily served this function. The U.S. military is the most reliant on satellite technology of all the world's armed forces.⁴⁹ Although one should not consider military satellites used for combat purposes as a type of space weapon per se, they can be accurately characterized as military "space assets" since they provide essential information for military activities. This has been made evident by the 1991 Gulf War, in which American armed forces utilized a network of 64 satellites for intelligence gathering and weapons guidance.⁵⁰ Since then, there has been increasing reliance on satellite technology for battlefield communications and information collection. Based on these developments, satellite systems have been and continue to be an enormously vital space asset for American armed forces.

Space Weapons and the Revolution in Military Affairs

AS CONTEMPORARY RMA

Conceptualizing space weaponry within the RMA framework is a task that depends on what is considered to be a "space weapon." Satellites, as we have seen, serve a major support function for those RMA-centered information and precision-strike technologies utilized by the U.S. armed forces. But this hardware should be considered military assets and not weapons per se. However, they should be considered a part of the contemporary RMA since they have served such an important function of American war fighting since the Gulf War.⁵¹ In addition, theorists who study the Revolutions in Military Affairs

⁴⁸ DeBlois, et. al., 53.

⁴⁹ Dolman, 163.

⁵⁰ Morgan, 133.

⁵¹ Ibid, 133.

overwhelmingly consider the utilization of satellite technology for military purposes an integral aspect of the contemporary RMA.⁵² Satellites have provided the opportunity to collect and digest information related to the battlefield, a process that is integral to the “informationization” component of the contemporary RMA.⁵³

Space weapons should be considered a component of the contemporary RMA to the extent that space weaponry, or space assets, is characterized as satellite technology. First, satellites have ensured the rapid spread of information, a critical aspect of the RMA as we know it today. Second, satellite technology has been utilized to guide precision-strike munitions, as witnessed in American military campaigns since the early 1990s. Third, satellite-based systems have proven to be effective in ensuring quick military victories for the U.S. on the battlefield, a factor that is crucial to the political support of warfare in recent history. Based on these principles, space-based weapons systems are indeed part of the contemporary RMA framework.

Officials from China, Russia, and the United States, the three states that are currently pursuing RMA-related programs, have all agreed that outer space is crucial to the effective establishment of a military revolution. Since the major elements of the contemporary RMA, such as precision-guided weapons and information-gathering/dissemination, are supported by military space assets, then space is a necessary resource for the modern military revolution.⁵⁴ The uniform view of these three states lends credence to the argument that space weapons can be placed within the context of the Revolutions in Military Affairs. However, as will be discussed below, there are potential wide-ranging implications for the proliferation of space weaponization within the RMA context, especially since China possesses the ability to develop anti-satellite weaponry without a transparent military doctrine.

Beyond satellite technology, there is practically no present use of outer space for warfare purposes. The January 2007 anti-satellite test conducted by China, although a sign of advanced technical developments by the PRC, and perhaps a sign of Beijing’s future military im-

⁵² See Latham, 2002 and Morgan.

⁵³ Latham 1997, 226-227.

⁵⁴ Mowthorpe, 152.

provements, should for now be considered an isolated incident since there has not been a repeat of such an occurrence. Furthermore, since the National Missile Defense system of the United States is not yet fully online, this system should not be considered an example of space weaponization. Thus, at the present time space serves as a vital resource for armed forces, albeit to a limited degree. This is most likely due to the legacy of the Anti-ballistic Missile Treaty of 1972 that effectively banned the use of weaponry in outer space.⁵⁵ As mentioned, the U.S. abrogated this treaty in 2002, showing that Washington was willing to pursue military developments, i.e. missile defense, that would pave the road towards the realization of outer space as a new field of battle.

In sum, space has not yet been utilized to its full potential as a sphere for warfare. This is not to rule out the possibility that it one day will be harnessed to a great extent for further strategic purposes. Despite the lack of deployments of weapons or other space assets, the continual evolution of military technology and doctrine, as prescribed by the RMA theoretical framework, will ensure that outer space is one day utilized for its potential as a tactically advantageous plain of war-fighting.⁵⁶

SPACE WEAPONS AS FUTURE RMA

Going beyond existing technologies to more advanced assets and weaponry allows for the possibility of space weapons to represent an eventual entirely new military revolution. Some advanced space-based armaments that are currently in the planning stages or have not yet been realized are potentially representative of a future RMA framework. These technologies are true space weapons in that they would broaden war-fighting to transform outer space into a new domain of battle.⁵⁷

Technologies that could fall within this future framework, if they become operational, would be those such as Falcon, the proposed American space-plane. Falcon is a program that has been under development by the Defense Advanced Research Projects Agency

⁵⁵ DeBlois, 53.

⁵⁶ Latham 1999, 224.

⁵⁷ See Gray and Sheldon.

(DARPA) of the U.S. Department of Defense. It entails the construction of an aircraft labeled the Hypersonic Cruise Vehicle (HCV), a new form of weapons transportation that could carry a 12,000 lb payload to a distance of over 9,000 nautical miles in less than two hours.⁵⁸ The Small Launch Vehicle (SLV), another component of the Falcon Program, would be able to launch military payloads, such as intelligence-gathering technology, into low earth orbit.⁵⁹

Open-source information on proposed space-based weapon systems from other international actors is rather minimal. Systems that have been made known include those under development by China. According to Tellis, Beijing has been able to develop its laser weapons program to a level that could one day make them an operational asset of the People's Liberation Army (PLA).⁶⁰ These could theoretically destroy orbital military assets from ground-based installations. Another system is the newly tested anti-satellite weapon. If this system ever becomes fully operational, it could destroy military satellites in low-earth orbit, such as those responsible for intelligence-gathering, as well as spacecraft in medium-earth orbit.⁶¹ India has also been mentioned has a potential candidate for developing space-based weapons. Hitchens speculates that Indian military planners have discussed developing their own anti-satellite weapons program due to a proposal by the air force to create a command structure that would initiate space weapons development.⁶² Russia, although having tested an anti-satellite system in the late 1960s, and possessing the research and development capabilities to undertake a space weapons program, has not seriously considered any initiative to produce space weapons systems.⁶³

In order for these weapon systems to constitute a new RMA, they must not only go beyond the drawing board and testing stage, but

⁵⁸ Defense Advanced Research Projects Agency, U.S. Department of Defense, "Falcon," February 18, 2008, <http://www.darpa.mil/tto/programs/Falcon.htm> (accessed April 21, 2008).

⁵⁹ Ibid.

⁶⁰ Tellis, 55.

⁶¹ Ibid, 53.

⁶² Theresa Hitchens, *Developments in Military Space: Movement toward space weapons* (Washington: Center for Defense Information, 2003), 9.

⁶³ Ibid, 10.

must also be used by armed forces as a routine part of warfare. In a manner similar to the use of satellite technology today, the Hypersonic Cruise Vehicle of the United States, or laser weapons of the PRC, must become a standard element of military hardware that is utilized as an integral part of battlefield operations in order for them to be considered part of a future military revolution.⁶⁴ If and when the American missile defense system comes online, this could also theoretically be considered a component of a new space-based military revolution since it is not only an element of advanced space weaponry but is also intended to be a regular defensive mechanism against potential missile strikes against the U.S. and its allies. Essentially, if space weapons systems are only utilized rarely, then they will not be able to generate the transformation in warfare that is needed to constitute an RMA. On the contrary, if they are regular components of warfare, then they will have changed how wars are fought and brought about a new RMA.

Suffice it to say, transformations in war-fighting will not end with the contemporary revolution in military affairs. For one, scholars of the RMA generally contend that history has witnessed repeated military revolutions.⁶⁵ Thus, by this logic history has not witnessed the last RMA. Furthermore, it can be said that the technologies that have been an aspect of military revolutions throughout history were actually continually evolving and being improved.⁶⁶ Current space technology can thus be used as a foundation on which further developments in military space assets can be realized. As such, the next RMA could indeed occur in space. Again, this would require outer space to be used as a regular field of armed conflict, no different from the manner in which the air, land, and sea are utilized by the United States today.⁶⁷

⁶⁴ See Morgan. Although he examines three different approaches to analyzing the RMA, Morgan consistently emphasizes the transformative role of new military technology in military revolutions. Also, see Latham 1999. He contends that the application of new technology on the battlefield alters how wars are fought by challenging the contemporary status-quo of military doctrine.

⁶⁵ See Liaropolous.

⁶⁶ Latham 1999, 224.

⁶⁷ Again, see Gray and Sheldon.

As previously outlined by the theoretical framework of the Revolution in Military Affairs, in order for an RMA to be effectively developed, it cannot rely on technology alone. Military revolutions are motivated by political necessity and within particular social contexts. These factors shape military doctrine which in turn determines how armed forces conduct battle.⁶⁸ In order for space weapons to be used as a routine tool of warfare, they must have political support. They must be viewed as an effective, superior means of fighting conflicts. In addition, a skilled workforce is required to develop this weaponry.⁶⁹ Although there are many burgeoning space weapons systems that are either being currently designed and/or tested, a large number of personnel are still needed to further the production of this technology. Also, experts will be needed to build upon these advancements to develop additional innovative space-based systems.

A new military doctrine will also have to be written. RMAs, since they embody transformations in the conduct of warfare, require changes in the concept of battle. Such a doctrine would stipulate how space weaponry is to be used to achieve victory over one's adversaries. It would dictate the utilization of these new assets as a regular part of conflict, or what Morgan labels a "...new strategic approach to the use of force."⁷⁰ Such a doctrine, though, has not yet been developed. According to the present U.S. National Space Policy:

The United States is committed to the use of outer space by all nations for peaceful purposes, and for the benefit of all humanity. Consistent with this principle, "peaceful purposes" allow U.S. defense and intelligence-related activities in pursuit of national interests.⁷¹

The Space Policy goes on to state that in regards to American military uses of outer space (at least those that are unclassified) the United States reserves the right to conduct photoreconnaissance and commu-

⁶⁸ Murray and Knox, 177-78.

⁶⁹ Morgan, 137.

⁷⁰ Ibid, 135.

⁷¹ The White House, *U.S. National Space Policy* (Washington: 2006), 1.

nications-related activities.⁷² However, not surprisingly, since such technology is not yet operational, it does not establish a solid doctrine for the military uses of outer space during a conflict. Changes to American space policy, though, may very well be seen in the future if new technological capabilities create the necessity.

Perhaps most importantly, for space weaponry to engender a new military revolution, these systems must be developed and deployed with a clear adversary in mind. As discussed above, it has been difficult to effectively implement a new RMA without considering a specific challenger to one's national interests.⁷³ American military planners would have to consider which state or non-state actors would be vulnerable to the capabilities provided by the deployment of space-based weapons systems. At present, a well-defined adversary is not outlined in the space policy of the U.S. This could be very well due to the lack of space-based weapons systems, the functional development of which would create the strategic environment in which an adversary could be more clearly defined. As with changes in military doctrine in regards to the uses of outer space, the future may witness the clarification of what constitutes a threat to U.S. security vis-à-vis outer space as the technology develops and becomes practical enough for everyday use.

Despite the strong potential for these developments, it is quite possible that the phenomenon of space-based weapons will never move beyond the theoretical stage and manifest itself into practical use. Some observers criticize efforts to develop space weapons for financial, political, and practical reasons.⁷⁴ Krepon argues that since the United States already has dominance over the air, land, and sea, there is no need for it to do so in outer space.⁷⁵ If decision makers see no benefit in the use of these systems and instead view them as too costly for their own purposes, then the future of space weapons as a military revolution will stop dead in its tracks. As history shows, though, advancements always seem to find a way to the surface.⁷⁶

⁷² Ibid, 8 and 10.

⁷³ See Murray and Knox, 182.

⁷⁴ See DeBlois, Garwin, Kemp, and Marwell.

⁷⁵ Krepon, 6.

⁷⁶ For a discussion of historical RMAs see Liaropolous.

Implications

The weaponization of space by the great powers would no doubt generate a significant level of concern throughout the international community. As previously stated, the utilization of outer space for military purposes should be considered a new RMA when it reaches a level at which states can use these resources as a regular part of their war-fighting strategy. However, such increased strength in the military power of a state would most likely result in other international actors undertaking similar measures to maximize their own power. As noted by neorealist theorists such as Mearsheimer and Waltz, this scenario would create an international system in which the balance of power would be placed in flux.⁷⁷ Based on this realist logic, as American power in outer space increases, great powers such as China will either attempt to establish its own military foothold in space, or undertake other countermeasures, in order to contain U.S. dominance. Even at this present time, despite a lack of fully-operational U.S. space weaponry, China is attempting to develop armaments that could counter the technological superiority of American forces, which includes U.S. military space assets.⁷⁸ As summarized by Moore, the potential for control of outer space by the United States could generate international concern and thus create a new arms race, and even potentially a new 21st century Cold War.⁷⁹

Some observers, however, believe that the far superior military capability of the United States relative to other armed forces ensures a large enough gap to prevent challengers from effectively confronting the U.S. military for the foreseeable future.⁸⁰ Furthermore, both China and Russia have been insistent on an international ban on the deployment of space-based weapons, despite China's own anti-satellite weapon test, and Russia's assertions that it will retaliate if any nation

⁷⁷ Kenneth N. Waltz, "Structural Realism after the Cold War," *International Security* 25, no. 1 (2000), 28 and John J. Mearsheimer, *The Tragedy of Great Power Politics* (New York: W.W. Norton & Company, 2001), 139-40.

⁷⁸ Moore, 180.

⁷⁹ Ibid, 185.

⁸⁰ Tellis, 59; Stone, 424.

deploys space-based weaponry.⁸¹ The concept of balancing would deem such an action a contradictory move, as it is not a traditional example of a balancing strategy. Observers, though, should expect an attempt by Beijing to counter any potential U.S. dominance of space if and when the new RMA in space occurs. It should be noted that Beijing's space weapons program is far superior to that of the Soviet Union during the Cold War, a realization which should give American military planners some pause.⁸² It seems unlikely, however, that these efforts will be successful at countering American military hardware. The future, however, may witness a completely different threat environment, particularly if other states decide to undertake their own space-based weapons programs.

As highlighted above, the majority of threats faced by the U.S. today are either from non-state actors or developing states. Because of this, the contemporary RMA has been criticized for its ineffectiveness in combating these forces. Elements that can combat the U.S. with unconventional methods, i.e. guerilla/insurgent warfare, are able to challenge information-intensive and precision-strike military technology via asymmetric means.⁸³ Krepon argues that less-advanced challengers could indeed sabotage U.S. space assets, specifically those dependent on ground-based elements. A recent study by the RAND Corporation notes that China is conducting a broad research program to develop asymmetric means to combat the contemporary RMA framework of the United States in the event of a potential conflict. Such areas that have been researched include computer network attacks and satellite jamming.⁸⁴ Furthermore, these weaker adversaries can potentially threaten the likelihood of short conflicts, through unconventional tactics, thereby removing the necessary political support

⁸¹ Moore, 185; "Russia promises retaliation if weapons deployed in space," *RIA Novosti*, September 27, 2007, <http://en.rian.ru/russia/20070927/81302492.html> (accessed December 1, 2008); John Zarocostas and Nicholas Kralev, "Russia, China propose arms ban in space; Global treaty plan seen as response to U.S. moves," *The Washington Times*, February 13, 2008.

⁸² *Ibid.*, 62.

⁸³ See Hoffman 2006 for a discussion of this threat.

⁸⁴ Roger Cliff, et. al. *Entering the Dragon's Lair: Chinese Antiaccess Strategies and Their Implications for the United States* (Arlington: RAND Corporation, 2007), 54, 57-58.

for the RMA that rests upon rapid engagements.⁸⁵ Thus, a future space-based RMA must consider policy considerations that would take into account threats from these low-level adversaries.

Conclusion

Space weapons certainly are a component of the contemporary Revolution in Military Affairs. American military space assets are an integral aspect of the current military revolution because of their routine support function for information gathering and precision-strike bombing. Future military technology for use in space, if it becomes operational as well as a regular part of armed conflict, should be considered a new RMA since it will transform the way in which future wars are fought. However, its success is contingent upon political support, the realization of its worth against the future adversaries of the United States, and a functional military doctrine that could establish a strategy by which these systems are regarded as an integral aspect of how warfare is conducted.

Space-based weaponry could also bring new challenges to the United States as other states attempt to balance against its newfound power. At this point, it is difficult to accurately determine if this could lead to a new arms race, especially since potential competitors such as China do not yet have technical and financial parity with the U.S. Despite such doubts, there is still room for legitimate concern. Policy-makers should, of course, take this into consideration when debating any space weaponry developments they may want to pursue.

Revolutions in Military Affairs are a concept that has been applied to a phenomenon of perpetual military transformation more so than a planned revolution itself. It is doubtful that military planners sit down every so many decades to determine that they are going to revolutionize the way their armed forces conduct war. Rather, RMAs are conceived of as the highpoints of a continuous evolution in warfare which represent the pinnacle of that stage in military development. As such, the international community is sure to witness a future

⁸⁵ Stone, 424.

military revolution, the genesis of which may be orbiting the Earth right now.