

REPORT DOCUMENTATION PAGE				Form Approved OMB No. 0704-0188	
Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing this collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden to Department of Defense, Washington Headquarters Services, Directorate for Information Operations and Reports (0704-0188), 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to any penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number. PLEASE DO NOT RETURN YOUR FORM TO THE ABOVE ADDRESS.					
1. REPORT DATE (DD-MM-YYYY) 31 Oct 2008		2. REPORT TYPE FINAL		3. DATES COVERED (From - To)	
4. TITLE AND SUBTITLE Operationally Responsive Space and the Joint Force Commander				5a. CONTRACT NUMBER	
				5b. GRANT NUMBER	
				5c. PROGRAM ELEMENT NUMBER	
6. AUTHOR(S) James Meisinger Paper Advisor: Tom Parker				5d. PROJECT NUMBER	
				5e. TASK NUMBER	
				5f. WORK UNIT NUMBER	
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) Joint Military Operations Department Naval War College 686 Cushing Road Newport, RI 02841-1207				8. PERFORMING ORGANIZATION REPORT NUMBER	
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)				10. SPONSOR/MONITOR'S ACRONYM(S)	
				11. SPONSOR/MONITOR'S REPORT NUMBER(S)	
12. DISTRIBUTION / AVAILABILITY STATEMENT Approved for public release; Distribution is unlimited.					
13. SUPPLEMENTARY NOTES A paper submitted to the Naval War College faculty in partial satisfaction of the requirements of the Joint Military Operations Department. The contents of this paper reflect my own personal views and are not necessarily endorsed by the NWC or the Department of the Navy.					
14. ABSTRACT The Department of Defense activated the Operationally Responsive Space (ORS) Office in May, 2007, to improve space capability responsiveness to Joint Force Commanders. This paper examines why the office was established, changes in the space threat environment and U.S. response to those threats during the first year of the office's existence, and what activities the office has engaged in. It recommends curtailing Tier-1 and Tier-3 activities and emphasizing Tier-2; incorporating ORS into joint and service exercises, and pursuing anti-satellite (ASAT) capabilities.					
15. SUBJECT TERMS Operationally Responsive Space ORS Tier-1 Tier-2 Tier-3 ASAT China					
16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT	18. NUMBER OF PAGES 15	19a. NAME OF RESPONSIBLE PERSON Chairman, JMO Dept
a. REPORT UNCLASSIFIED	b. ABSTRACT UNCLASSIFIED	c. THIS PAGE UNCLASSIFIED			19b. TELEPHONE NUMBER (include area code) 401-841-3556

**NAVAL WAR COLLEGE
Newport, R.I.**

**OPERATIONALLY RESPONSIVE SPACE AND THE JOINT FORCE
COMMANDER**

By

James R. Meisinger

LTC, USA

A paper submitted to the Faculty of the Naval War College in partial satisfaction of the requirements of the Department of Joint Military Operations.

The contents of this paper reflect my own personal views and are not necessarily endorsed by the Naval War College or the Department of the Navy.

Signature: _____

31 October 2008

Table of Contents

Introduction	1
Background	2
Discussion/Analysis	7
Conclusions	12
Recommendations	14
Bibliography	16

Abstract

The Department of Defense activated the Operationally Responsive Space (ORS) Office in May, 2007 to improve space capability responsiveness to Joint Force Commanders. This paper examines why the office was established, discusses changes in the space threat environment and U.S. response to those threats during the first year of the office's existence, and office activities in support of the Joint Force Commander. It recommends curtailing Tier-1 and Tier-3 activities and emphasizing Tier-2; incorporating ORS into joint and service exercises, and pursuing anti-satellite (ASAT) capabilities.

INTRODUCTION

The Joint Force Commander (JFC) relies on space capabilities for efficient mission accomplishment, and this reliance continues to grow. Current military space capabilities include communications; intelligence, surveillance, and reconnaissance (ISR); space situational awareness (SSA); and precision navigation and timing (PNT)--capabilities which have taken decades and billions of dollars to develop and produce. Our increased reliance on space has not gone unnoticed by our adversaries, who have begun to test and employ various counter-space capabilities.

These threats to our space assets have heightened the need to develop a rapid reconstitution capability. To meet this need, the Department of Defense (DOD) created the Operationally Responsive Space (ORS) Office in May, 2007, to "meet Joint Force Commanders' urgent needs for on-demand space support, augmentation or reconstitution."¹ In the future, should an adversary take away a space capability from a JFC, he will be able to turn to the ORS Office, and request replacement of the capability, and see that capability returned within days or weeks rather than years.

Unfortunately, DOD and U.S. Strategic Command (USSTRATCOM) have directed the ORS Office to examine a wide range of problems which has overwhelmed its small staff and diffused their focus on rapid reconstitution of damaged or destroyed capabilities. The ORS Office must eliminate distractions and focus entirely on the difficult challenge of rapid reconstitution, the need with the highest utility for the JFC.

¹ U.S. Department of Defense. *Implementation Plan for Operationally Responsive Space*. (Washington, DC: DoD Executive Agent for Space, 15 April 2008), 1.

BACKGROUND

JFCs need space capabilities in “operationally relevant timeframes.”² In order to meet this requirement, the ORS Office breaks down responsive capabilities into three separate categories. Tier-1 capabilities are those available through creative and non-traditional use of existing on-orbit assets such as using a weather satellite to assist in detection of poppy fields in Afghanistan. This type of work is already done to a great extent by the space staffs at the combatant commands and their subordinate commands. However, the ORS Office is expanding the definition of space capabilities to include foreign, commercial, and space entities resident in academia which are not currently available to the JFCs.³

For example, a foreign entity such as a government or multi-national consortium may launch a satellite, develop a new launch capability, or develop a new payload. A U.S. commercial entity may invest in a new communications capability or even in a new imagery capability independent of U.S. government funding. Or, university faculty and students may develop new theoretical capabilities with utility for military operations. In all three cases, the capability may not find a military customer immediately. The ORS Office will collect and track these initiatives and capabilities and act as a broker, hoping to bring the customer and provider together for a future sale.

² National Security Space Office, “Plan for Operationally Responsive Space: A Report to Congressional Defense Committees,” <http://handle.dtic.mil/100.2/ADA470387>, 17 April 2007 (accessed 15 September 2008), 3.

³ LTC Greg Glover (Chief, Architecture and Analysis Division, ORS Office), interview by the author, 30 September 2008.

Tier-2 solutions are those available within days or weeks from request by a JFC.⁴ The ORS Office has no current Tier-2 solutions available, and is not expecting any to be available until 2009 at the earliest.⁵ Several initiatives are under development, however, including imagery, signals intelligence (SIGINT), and communications capabilities. All of these initiatives are based on JFC input.

If a JFC need cannot be met by a Tier-1 or Tier-2 capability, then the ORS Office will investigate developing a Tier-3 capability.⁶ Tier-3 capabilities will be rapid acquisition programs and will be available within a year or longer. The ORS Office expects to begin producing Tier-3 capabilities by the year 2015.⁷ Unfortunately, a year is not fast enough to qualify as operationally responsive. Faced with a wait longer than a year, the JFC will pursue other options and will likely no longer need the Tier-3 capability by the time it is available, at least not for the problem that generated the need.

Threats to US Space Assets

Current threats to U.S. space assets come in several forms. In recent years several parties traditionally hostile to U.S. interests have directed electronic warfare at U.S. satellites. Iran reportedly conducted a series of satellite attacks in 2003 from its embassy located in Cuba. The attacks targeted a U.S. commercial communications satellite, with negligible effect. After pressure from the United States, the attacks came to an end.⁸

Libya is also reported to have jammed satellites. In a Space News Business Report article in 2007, Peter de Selding describes the Thuraya Satellite Telecommunications

⁴ National Security Space Office, 4.

⁵ Ibid., 11.

⁶ Ibid., 4.

⁷ Peter Wegner, "Operationally Responsive Space Plan of Action and Milestones for Tiers 1–3" (working paper, ORS Office, 10 October 2007).

Company's efforts to locate the source of electronic interference with its satellite telephone operations. Thuraya satellite phones are used by many customers across the Middle East, including numerous U.S. government and military customers. Thuraya was able to geolocate the source of the jamming to three locations within Libya, and used diplomatic pressure to bring the jamming to a halt.⁹

China and Russia are both reported to have developed various types of ASAT weapons. These include ground-based laser ASATs, micro-satellites that attach to a larger satellite like a parasite and activate a destruct mechanism on command, space-based directed energy weapons, and ASAT missiles launched from fighter aircraft. The true status and maturity of these programs remains unknown, but the intention of both countries is clear: to develop the capability to attack a satellite in orbit.¹⁰ Of the two, China's investment in these types of programs is assessed to be far greater.¹¹

China's dramatic shoot-down of a retired weather satellite on January 11, 2007 moved the threat of a kinetic satellite kill from theoretical discussions to immediate reality.¹² A recent government report indicated China also likely has the ability to attack a satellite with a ground-based laser.¹³ This type of attack could blind the optical sensors of an imaging satellite or damage other satellite components such as solar panels or communications antennae. Unlike the temporary and reversible electronic interference practiced by Libya and

⁸ Michael Lutton, "Oriented Toward Superiority: Counterspace Operations and the Counterterrorism Fight," in *Space Power Integration: Perspectives from Space Weapons Officers*, ed. Kendall Brown (Maxwell AFB, AL: Air University Press, December 2006), 30.

⁹ Peter Selding, "Libya Pinpointed as Source of Months-Long Satellite Jamming in 2006," *Space News Business Report*, (7 July 2005), http://www.space.com/spacenews/archive07/libjam_0409.html (accessed 5 October 2008).

¹⁰ Matthew Mowthorpe, *The Militarization and Weaponization of Space* (Lanham, MD: Lexington Books, 2004), 102-104, 134-135.

¹¹ Michael Pillsbury, *An Assessment of China's Anti-Satellite and Space Warfare Programs, Policies and Doctrines* (Washington, DC: U.S.-China Economic and Security Review Commission, 19 January 2007), 21-45.

¹² This event was widely reported in multiple news outlets.

Iran, China's kinetic threats could cause permanent damage or a catastrophic kill to a satellite.

None of these attempts yielded significant degradation to U.S. capabilities, but the actions sent ripples of alarm through the space community, which has focused on protection of space capabilities through maneuver and redundancy rather than active defense.¹⁴ While it is a relatively simple task to shoot electrons at a satellite, it is still much more difficult to deliver meaningful effects that last and degrade operations in any significant way. These actions brought home the reality that the age of earth-to-space degradation has begun and will no doubt increase in effectiveness over time.

Current production of space capabilities has grown to rely on a predictable life-span of on-orbit assets and therefore a predictable replenishment schedule. The United States is not prepared for this new possibility of sudden, unplanned-for loss of space capability. The average time for a satellite from conception to operational status is often over 10 years and represents an investment of millions of dollars per copy with billions of dollars for entire constellations. The Department of Defense and JFCs could no longer accept the lengthy delivery times and enormous costs associated with traditional satellite procurement. However, until recently, no one had responsibility for rapid, on-orbit asset reconstitution. Without a stated customer need, few in industry were seriously investigating the problem.

The History of Responsive Space

There have been some attempts at rapid delivery of space capabilities over the last 15 years, such as NASA's "faster, better, cheaper" initiative championed by NASA Administrator Daniel Goldin in the 1990s. However, the Columbia crash investigation

¹³ U.S. Department of Defense, *Military Power of the People's Republic of China 2006, Annual Report to Congress* (Washington, DC: Office of the Secretary of Defense, 2006), 35.

concluded that the initiative was partly to blame, so it was scuttled. Goldin's efforts to lower costs and increase speed of delivery were admirable and possibly an attempt to raise risk tolerance to levels not seen since the early days of the space race. While the approach may have been appropriate for unmanned missions, our tolerance for failure is rightly much higher when human lives are at stake.¹⁵

The military, possibly taking a cue from NASA, initiated the ongoing Tactical Satellite (TACSAT) series of experiments in 2003 as an attempt at rapid and inexpensive delivery of space capabilities. Each experiment carries a payload with high operational utility for the warfighter. For example, TACSAT 1 carries a secure communications payload as well as several types of imagers. TACSAT 2 carries more communications payloads and even more capable imagers. The highlight of TACSAT 3 is a hyperspectral imagery payload with high utility for JFC intelligence collection. Unlike an electro-optical imager, which captures images in a single band of light, hyperspectral imagers capture images across many layers of emitted energy. For example, a hyperspectral imager can detect subtle differences in terrain or foliage undetectable by other collectors. TACSAT 4 provides blue force tracking (BFT) and communications on the move (COTM), a cell-phone like capability.¹⁶

NASA and the U.S. Air Force have also attempted several types of space-planes over the last several decades as a cheaper, more responsive alternative to the space shuttle. A space-plane would take off from a runway, fly through the atmosphere as an aircraft, depart the atmosphere into orbit where it would execute its mission as a spacecraft, reenter the

¹⁴ Joan Johnson-Freese, *Space as a Strategic Asset* (New York: Columbia University Press, 2007), 93.

¹⁵ Keith Cowing, "NASA Responds to the Columbia Accident Report: Farewell to Faster – Better – Cheaper," *SpaceRef.com*, 15 September 2003, <http://www.spaceref.com/news/viewnews.html?id=864> (accessed 5 October 2008).

¹⁶ Tom Doyne, et. al., "ORS and TacSat Activities Including the Emerging ORS Enterprise." (Paper presented at the 5th Responsive Space Conference, Los Angeles, CA, 23-26 April 2007), 2-5.

atmosphere and resume flight as an aircraft, and finally land on a traditional runway. So far, NASA and the Air Force have been unable to overcome the technological difficulties and produce a working space-plane, but the utility of such a craft for a JFC is clear. A space-plane could deliver a munition anywhere in the world in a matter of minutes or hours, could launch a small satellite, or even attack an enemy satellite.¹⁷

These are just a few examples of attempts at more rapid and less expensive delivery of space capabilities. NASA's efforts primarily addressed frustration with costs of space payloads and speed of delivery, although focused on civil space activities. The TACSAT experiments focus on military specific capabilities with a clear emphasis on communications and ISR. However, the TACSAT experiments are multi-year experiments which still do not come close to operationally relevant timelines.

The ORS office was created to realize this capability; but in order to achieve speeds of delivery relevant to an operational commander's timelines, the ORS Office must discover ways to deliver capabilities faster and hopefully cheaper than currently available. The capabilities are admittedly not going to be "better" than the current multi-billion dollar satellites, and that is not the intention. They will fill short-term capability gaps for JFCs until the acquisition community develops a longer term solution.

DISCUSSION / ANALYSIS

The ORS Office has recently provided or is currently exploring several capabilities for JFC commanders. PACOM recently asked for help with a UHF communications shortfall. The ORS Office engaged with the UHF capability's program manager and

¹⁷ Loring Wirbel, *Star Wars: US Tools of Space Supremacy* (London: Pluto Books, 2004), 144-145.

determined he already had a plan to eliminate the shortfall. The ORS Office helped him resolve the issue with additional funding which allowed him to speed up the program. PACOM accepted the solution and is a satisfied customer.¹⁸ The PACOM project demonstrated the ORS Office's ability to execute its Tier-1 responsibilities.

A second effort involved a Space Situational Awareness (SSA) shortfall regarding the geo-synchronous belt of satellites. The details are classified, but the ORS Office researched and found four potential solutions, two of which were space based. USSTRATCOM's space force provider, Air Force Space Command, declined to fund the space-based options, so the requesting JFC selected one of the other solutions.¹⁹ While a space solution was not used, this was a success story for the ORS Office and clearly fell within its Tier-1 mandate. In all, these Tier 1 experiences also provided experience at addressing issues and finding solutions, as well as establishing relationships with JFC staffs and initiating dialogue regarding their needs.

The ORS Office director, Dr. Peter Wegner, has designated several priorities for Tier-2 efforts: imagery collection, signals intelligence (SIGINT) collection, and communications enhancement and restoration. These priorities make sound operational sense, given the threats to JFC imagery and communications capabilities described earlier in the paper. These priorities also follow nicely from the JFC Tier-1 projects undertaken so far. However, they do not approach the real potential of ORS for the JFC. They indicate a pattern of

¹⁸ Glover, interview.

¹⁹ LTC James Pruneski (Deputy Director, ORS Office), e-mail message to author, 2 Nov 08.

thought that incremental changes to current capabilities are what the JFC needs, rather than reaching for entirely new capabilities for which JFCs don't even know to ask.²⁰

Expanding into ASATs

Doctrinally stated, the ORS Office is focused on operational enablers, referred to as space force enhancement, space control, and space support, rather than on combat capabilities able to attack the enemy and defend against enemy attack, known doctrinally as “space force application.”²¹ This focus is directed by USSTRATCOM in the ORS Initial Concept of Operations published the month the office was formed.²²

However, our near-peer competitor in space, China, has revealed readiness and capability to destroy on-orbit assets. Also, several lesser competitors have demonstrated the ability to temporarily degrade on-orbit assets. The ORS focus on replacement of destroyed capabilities is important, but the JFC needs an anti-satellite (ASAT) capability for his own use, and he needs a counter-ASAT capability that can prevent an enemy attack from succeeding. Some may contend that incremental steps are all that the nascent ORS office can handle at the current time due to its limited size. While true, that does not stop the enemy from developing these capabilities, and it does not change the JFC's potential need for them in the near future.²³

²⁰ U.S. Government Accountability Office, *Defense Space Activities: DOD Needs to Further Clarify the Operationally Responsive Space Concept and Plan to Integrate and Support Future Satellites* (Washington, DC: GAO, July 2008), 19.

²¹ Chairman, U.S. Joint Chiefs of Staff, *Joint Doctrine for Space Operations*, Joint Publication (JP) 3-14 (Washington, DC: CJCS, 9 August 2002), IV-10.

²² U.S. Strategic Command, *Operationally Responsive Space (ORS) Initial Concept of Operations* (Offutt AFB, NE: USSTRATCOM, 7 May 2007), 7.

²³ Glenn Krizay, *ASAT's: Part of a Coherent Space Control Policy*, Strategy Research Project (Carlisle Barracks, PA: USAWC), 10.

The 21 February 2008 shoot-down of a crippled U.S. satellite by the U.S. Navy over the Pacific Ocean illustrated a possible use of ASAT capabilities by a JFC Commander.²⁴ This shoot-down was executed in a highly publicized manner with weeks of advanced warning, a scenario at variance with the operational security and Tier-2 speed with which a JFC may have used the capability. Also, the fact that the target satellite was a U.S. satellite meant we knew everything about its capabilities and design, eliminating some of the intelligence challenges a JFC would face in an attempt to attack a hostile satellite. These challenges notwithstanding, the capability could be made available to the JFC with USSTRATCOM as the force provider in a supporting role, through the efforts of the ORS Office.

This will require a major shift in thinking by the military space community. U.S. Air Force Brig. Gen. Jay Santee, Vice Commander of the 14th Air Force, recently used the analogy of changing the game from track and field to football. “We’re about to enter a contact sport,” he said; amplifying by stating “Pick up almost anything we do and it is constructed on the basis of not having anybody trying to stop you.”²⁵ The JFC commander has always played a contact sport and needs his space capabilities to survive in that environment. This shift in thinking will have significant resource implications and accompanying political struggles which are a subject for further research.

Exercises Key to JFC Acceptance

Once a new capability is identified, either an incremental improvement to an existing capability or an entirely new capability, the ORS Office, in coordination with USSTRATCOM, has responsibility to deliver it to the JFC. The ORS establishing

²⁴ This event was widely reported in multiple news outlets.

documents focus extensively on acquisition related activities leading up to and including successful demonstration and experimentation, followed by a jump directly into combat operations. They do not include any plan to incorporate capabilities into joint exercises after experimentation is complete.²⁵

This methodology is faulty for several reasons. First of all JFCs at all levels are reluctant to place much trust and confidence in capabilities unproven on the battlefield. If a capability cannot be proven in battle, JFCs want to know that it performed well in simulated combat. Demonstrating a capability in a test environment or in an experiment will not build the same level of confidence in the mind of the JFC as showing its value during the annual Ulchi Focus Lens exercise in Korea or at the National Training Center (NTC) in California or at any of a number of annual exercises designed to put military forces to the test across the full range of military operations.

One may contend that our nation's extended combat operations in Iraq and Afghanistan have provided a testing ground and experimentation laboratory for numerous capabilities. Some have accelerated into full-fledged operational capabilities much faster than would have been possible without a war, and in some cases without benefit of exercises. For ORS, however, Iraq and Afghanistan do not offer the promise they offer to more conventional capabilities with ready application against those specific enemies and in those specific locations. The adversaries in Afghanistan and Iraq do not have the sophistication or expertise to deliver combat effects against satellites, demonstrated by the absence of such effects over the last five years.

²⁵ John Liang, "Air Force Space Official Says New ORS Thought Process Needed," *Inside the Air Force*, 22 August 2008, 1.

²⁶ National Security Space Office, 7; U.S. Department of Defense, *Implementation Plan*, 14; U.S Strategic Command, *Operationally Responsive Space*, 10. All miss this important step.

Under the ORS Office's current plan, it may be forced to wait a long time for an opportunity to move a Tier-2 capability directly into combat operations in Iraq or Afghanistan. Exercises, however, both joint and service, can provide a valuable bridge to combat employment by building confidence and familiarity in JFCs and their staffs.

CONCLUSIONS

Tier-1 efforts, defined by the ORS Office as creative and innovative use of current space capabilities, are a duplication of efforts already underway at other activities, most notably at the JFC staffs and subordinate commands. JFCs have trained space professionals assigned from across the services with responsibility to ensure their command gets maximum operational effectiveness from space assets. While the ORS Office may have additional expertise to offer, the Tier-1 task is indistinguishable from the JFC's organic space staff's responsibility.

The ORS Office also includes in its Tier-1 activities the cataloguing of foreign, academic, and commercial space capabilities. This effort is also duplicated elsewhere. The United States Strategic Command Joint Intelligence Center (USSTRATCOM JIC), which inherited the intelligence expertise and Unified Command Plan (UCP) missions of the deactivated U.S. Space Command, already has responsibility for maintaining situational awareness of foreign and commercial space capabilities. Additionally, the National Geospatial-Intelligence Agency (NGA) is responsible for contracting commercial space collection. Finally, USSTRATCOM's Global Innovation and Strategy Center (GISC) is

chartered to access capabilities in industry and academia and is probably in a better position to pull in space capabilities from those sources.²⁷

The ORS Tier-2 concept is the only truly unique function the office performs. It follows the faster-better-cheaper legacy pioneered by NASA in the previous decade, and is the only function that meets the operational timeline needs of the JFC without getting pulled into the current operations challenges posed by Tier-1 problems.

The ORS Office defines Tier-3 capabilities as those requiring a year or more to bring to bear on a JFC problem. This timeline is too long for the JFC to use for an operational need. In the event of a lost or damaged on-orbit capability, the JFC cannot afford to wait for months or a year for a replacement. He will either develop a work around on his own or alter his plans and operations to function in the less than optimal circumstances forced upon him. In either case, he is functioning less capably than he could with the asset in place. While valuable, Tier-3 capabilities will prove operationally useful only when they achieve Tier-2 timeliness.

The ORS Office should broaden its view beyond the traditional operational support capabilities of communications and ISR, and beyond the limited function of replacement and augmentation. It must explore and take ownership of combat capabilities as they become available in the community. The Initial Concept of Operations (CONOPS) and Implementation Plan allow for the limited mission set they have assumed, but the vision of the office must be expanded to include all operationally responsive space capabilities, including combat space capabilities.²⁸

²⁷ U.S. Strategic Command Official Web Site, "Organization," <http://www.stratcom.mil/organization.html> (accessed 24 Oct 08).

²⁸ U.S. Department of Defense. *Implementation Plan*, 3; U.S Strategic Command, *Operationally Responsive Space*, 7.

Until the office incorporates its capabilities into exercises, the capabilities will be considered a side-show and risk being ignored completely. All new capabilities face an uphill battle for relevance until they truly demonstrate value to the JFC. The JFC measures value by how much a capability contributes to his mission accomplishment, and what would have happened if the capability had not been there. If it contributes significantly, no other element could have made the contribution, and it did not consume more than its share of his staff's time and effort, then it will be invited back.

RECOMMENDATIONS

The very real and emerging threats to our space capabilities raise the urgency of developing capabilities to attack adversary satellites and defend against ASAT attacks directed at our on-orbit assets.²⁹ The ORS Office's current focus on ISR, communications, and other operational enablers is necessary, but dangerously limited. For example, a JFC can employ an ASAT capability during the shaping phase of an operation to deny an enemy access to space-based intelligence collection and during combat operations to disrupt enemy communications. Accordingly, the ORS Office must add offensive and defensive capabilities to their Tier-2 portfolio.

Operationally responsive space capabilities must become commonplace in our joint exercises to ensure their acceptance by JFCs. As soon as possible, these capabilities must be incorporated into the annual Ulchi Focus Lens exercise in Korea and other JFC exercises as

²⁹ This recommendation does not violate the terms of the 1967 Outer Space Treaty, which prohibits emplacement of weapons of mass destruction in outer space, not weapons in general.

well as service-specific training venues such as the National Training Center, Twenty-Nine Palms, and Red Flag.³⁰ Joint Forces Command should be brought in as an enabler and to assess ORS at JTF preparation exercises.

Because of the limited assets of the ORS Office, the duplication of effort with other activities carrying out Tier-1 functions, and the non-operational timeline of Tier-3 capabilities, this paper recommends limiting the Tier-1 and Tier-3 activities in the ORS Office. The correct way ahead is clearly to focus on developing Tier-2 capabilities and delivering results to the JFC so he can truly operationalize space, achieve his objectives, and save lives.

³⁰ These are premier training venues for the U.S. Army, U.S. Marine Corps, and U.S. Air Force. Although multiple services train at each, they focus on honing service specific combat skills.

BIBLIOGRAPHY

- Berube, Mark. "National Security Space Office: Operationally Responsive Space Commercial Space Transportation Advisory Committee." PowerPoint. 11 October 2007.
- Cowing, Keith. "NASA Responds to the Columbia Accident Report: Farewell to Faster – Better – Cheaper." *SpaceRef.com*, 15 September 2003.
<http://www.spaceref.com/news/viewnews.html?id=864> (accessed 5 October 2008).
- Dalbello, Richard. "Putting the 'Operational' in Operationally Responsive Space." Space News Business Report.
www.space.com/spacenews/archive06/DalBelloOpEd_041007.html
(accessed 5 September 2008).
- Davis, Chad. "Towards Improved Operational Command and Control of Space Weapons." Research paper, Newport, RI: U.S. Naval War College, Joint Military Operations Department, 10 May 2007.
- Doyne, Tom, et. al. "ORS and TacSat Activities Including the Emerging ORS Enterprise." Paper presented at the 5th Responsive Space Conference, Los Angeles, CA, 23-26 April 2007.
- Glover, Greg, and Glasco, Joe. "Operationally Responsive Space Office: COCOM / JFC Engagement." Powerpoint. August 2008.
- Jasani, Bhupendra and Lee, Christopher. *Countdown to Space War*. London: Taylor & Francis, 1984.
- Johnson-Freese, Joan. *Space as a Strategic Asset*. New York: Columbia University Press, 2007.
- Kosiak, Steven. *Arming the Heavens: A Preliminary Assessment of the Potential Cost and Cost-Effectiveness of Space-Based Weapons*. Washington DC: Center for Strategic and Budgetary Assessments, 2007.
- Krizay, Glenn. *ASAT's: Part of a Coherent Space Control Policy*. Strategy Research Project. Carlisle Barracks, PA: U.S. Army War College, 10 April 2000.
- Lee, Christopher. *War in Space*. London: Hamish Hamilton, 1986.
- Liang, John. "Air Force Space Official Says New ORS Thought Process Needed." *Inside the Air Force*, August 22, 2008.

- Lutton, Michael. "Oriented Toward Superiority: Counterspace Operations and the Counterterrorism Fight." In *Space Power Integration: Perspectives from Space Weapons Officers*, edited by Kendall Brown. Maxwell AFB, AL: Air University Press, December 2006.
- Martel, William, ed. *The Technological Arsenal: Emerging Defense Capabilities*. Washington and London: Smithsonian Institution Press, 2001.
- Mowthorpe, Matthew. *The Militarization and Weaponization of Space*. Lanham, MD: Lexington Books, 2004.
- National Security Space Office. "Plan for Operationally Responsive Space: A Report to Congressional Defense Committees." <http://handle.dtic.mil/100.2/ADA470387>. 17 April 2007 (accessed 15 September 2008).
- Office of Force Transformation. "Operationally Responsive Space: A New Business Model." Powerpoint. Undated.
- Oldenburg, James. *Wright Flyer Paper No. 24 Fighting the War above Iraq: Employing Space Forces to Defeat an Insurgency*. Maxwell AFB, AL: Air University Press, May 2007.
- Pillsbury, Michael. *An Assessment of China's Anti-Satellite and Space Warfare Programs, Policies and Doctrines*. Washington, DC: U.S.-China Economic and Security Review Commission, 19 January 2007.
- Schuler, Mark. "It Isn't Space, It's Warfare! Joint Warfighting Space and the Command and Control of Deployable Space Forces." In *Space Power Integration: Perspectives from Space Weapons Officers*, edited by Kendall Brown. Maxwell AFB, AL: Air University Press, December 2006.
- Selding, Peter. "Libya Pinpointed as Source of Months-Long Satellite Jamming in 2006." *Space News Business Report* (7 July 2005). http://www.space.com/spacenews/archive07/libjam_0409.html (accessed 5 October 2008).
- U.S. Congress. Senate. *Statement of Arthur K. Cebrowski, Director of Force Transformation, Office of the Secretary of Defense; Before the Subcommittee on Strategic Forces, Armed Services Committee*. 108th Cong., 2nd sess., 25 March 2004.
- U.S. Office of the Chairman of the Joint Chiefs of Staff. *Joint Doctrine for Space Operations*. Joint Publication (JP) 3-14. Washington, DC: CJCS, 9 August 2002.

U.S. Department of Defense. *Military Power of the People's Republic of China 2006, Annual Report to Congress*. Washington, DC: Office of the Secretary of Defense, 2006.

-----, *Implementation Plan for Operationally Responsive Space*. Washington, DC: DoD Executive Agent for Space, 15 April 2008.

U.S. Government Accountability Office. *Defense Space Activities: DOD Needs to Further Clarify the Operationally Responsive Space Concept and Plan to Integrate and Support Future Satellites*. Washington, DC: GAO, July 2008.

U.S. Strategic Command Official Web Site. "Organization."
<http://www.stratcom.mil/organization.html> (accessed 24 Oct 08).

U.S. Strategic Command. *Operationally Responsive Space (ORS) Initial Concept of Operations*. Offutt AFB, NE: USSTRATCOM, 7 May 2007.

Wegner, Peter. "Operationally Responsive Space (ORS): ORS Overview and Way Ahead." PowerPoint. 8 July 2008.

-----, "Operationally Responsive Space Plan of Action and Milestones For Tiers 1 – 3." Working paper, ORS Office, 10 October 2007.

Wirbel, Loring. *Star Wars: US Tools of Space Supremacy*. London: Pluto Press, 2004.