

Fighting From the Ultimate High Ground

Bottom-up refinement for developing Navy and Marine Corps space capability in the modern operational environment

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"More than any other nation, the United States relies on space-based capabilities to project and employ power on a global scale. Today, U.S. reliance on space has increased to the point where space capabilities not only enhance, but enable our way of life and way of war."

—Defense Space Strategy, 2020

The purpose of this article is to address our dependence on space-enabled capabilities and to outline a way forward for Navy and Marine Corps space planning and integration. Our national and military leaderships recognize that maintaining the advantage in the space domain is vital to our success in any future conflict; however, we continue to struggle to develop, resource, and integrate the capabilities necessary to maintain dominance in this domain. The target audiences for this article are key decision makers throughout

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the Navy and Marine Corps and the warfighters who provide tactical and operational space support to our maritime Services.

Our Dependence on Space

The days of sextants, spy glasses, and semaphore are far behind us. To maintain our position as the world's premier fighting force, we have developed the science and technology necessary to collect far more accurate intelligence, make our kill chains far shorter and faster, our weapons far more precise, and our command and control (C2) far more efficient. Because of this drive for speed and precision, we have become completely dependent on space capabilities in several key areas:

Intelligence, Surveillance, and Reconnaissance (ISR). The boundary that separates our atmosphere from space is an ongoing physics debate; however,

for the sake of international treaties, this boundary (also known as the Karman Line) is generally accepted to be one hundred kilometers above sea level. Above this altitude, national boundaries cease to exist, and rules governing the movement of satellites tend to mirror those we see in international waters—where all ships, regardless of the flags they sail under, are free to move about wherever they please on the global commons. This freedom to traverse any country's territory above one hundred kilometers has made space-based ISR the primary source of intelligence collection for ourselves as well as our adversaries. *It is important for our commanders to understand that, even when we are conducting training in our own backyards, we are under observation.*

Positioning, Navigation, and Timing. The precise and accurate positioning, navigation, and timing services pro-

vided by the global positioning system (GPS) enables a vast array of our most actionable warfighting capabilities. It enables the ability to navigate quickly from one place to another and to track and coordinate our forces' movement in realtime. It provides the guidance data necessary for our precision-guided munitions as well as the precise timing required to operate our communications systems.

Satellite Communications (SATCOM). SATCOM has become our go-to medium for beyond line of sight communications and information transfer. It is far more efficient and can provide a lower probability of detection when compared to other traditional forms of long-range over-the-horizon communications. SATCOM also provides the conduit for the common operational picture, which offers our commanders near realtime battlespace awareness.

Missile Warning. Missile warning is provided by overhead persistent infrared (OPIR) satellites that can detect objects emitting high thermal signatures, including missile launches. This capability provides our forces the advance notice necessary to cue immediate defensive actions. OPIR satellites also feed the targeting process and can assist in battle damage assessment and assessing reattack criteria.

Environmental Monitoring. The physical environment affects all aspects of military operations. It can be detrimental to our operations or used to our advantage. Our organic weather sensing capabilities are extremely limited in the data-sparse maritime domain; therefore, we rely almost exclusively on spacebased environmental monitoring satellites to inform our planning.

Space Domain Awareness (SDA). For the tactical fight, SDA provides an understanding of when friendly satellites are overhead to support operations and when adversary satellites are overhead to detect our forces and cue their kill chains. Knowing these overflight schedules can contribute significantly to counter-ISR measures, planning operational security (OPSEC), conducting tactical deception or deception in support of OPSEC, and knowing when we are able to employ offensive and de-



1stLt Adam Fountain sets up a SATCOM antenna to communicate with his sniper teams at ITX.
(Photo by author.)

fensive space weapons and capabilities. Moreover, having adequate SDA, with respect to the sensor capabilities overhead, can inform a wide range of actions that we can take to shape the adversary and give us the advantage.

Tactical Space Support and Space Control

For the sake of keeping commonly used space terminology understood, we must break out the differences between space support and space control. Space control is defined as offensive and defensive space capability employment. These are the platforms and tools that we use to target adversary space capabilities. These operations deny, degrade, disrupt, or destroy adversary space capabilities while protecting our own. Jamming an enemy SATCOM satellite is one example of space control.

Naturally, much of the authority to approve the employment of space control capabilities resides at the highest echelons of our government because of its strategic nature. This significantly hinders the training and operational employment of these systems, especially in operations where dynamic targeting of enemy capabilities is essential to mission success.

For organic on-call space integration at the tactical level, that does not

require approval from the Secretary of Defense, we have space support. Space support is simply pulling data from our space architecture, pushing it through our space support software tools, conducting the analysis, and providing the products to our tactical units to support their planning efforts. These space support products provide new insights and planning considerations vital to facilitating independent and distributed tactical actions such as expeditionary advanced base operations. Integrating space support into planning at the lowest tactical level is vital to ensuring that our tactical maneuver units inside the weapons engagement zone can operate independently without relying on operational-level space support entities far removed from the front lines.

What Right Looks Like. To quickly develop a new capability, it helps to consider those already employing it. The Army has provided tactical space support to their forces for years through Army Space Support Teams (ARSSTs). The ARSSTs provide basic space support products that enhance tactical and operational planning such as adversary overhead collection windows, GPS jammer modeling, GPS accuracy predictions, OPIR monitoring, electronic intelligence monitoring, and space weather effects. For space support that

falls beyond their organic capabilities, the ARSSTs simply submit a space support request through the joint force commander's Director of Space Forces to the Combined Space Operations Center for the needed products or effects. These functions are at the core of how tactical space support is provided to the force.

Building the Space Support Capability Within the Marine Corps. Until the Marine Corps implements its own space training pipeline, we can gain the functional expertise by attending just two schools. The school that trains Army space professionals to create space support planning products is the three-week Tactical Space Operators Course (TSOC). This course requires students to have a foundational understanding of military space applications before attending. To meet this prerequisite, TSOC accepts graduation certificates from numerous courses that teach the foundations of space, such as the two-week Army Space Cadre Basic Course. On the shortest possible timeline, this can potentially have Marines trained to provide most of the same space support capabilities as an ARSST with as little as five weeks of training. These courses have already graduated several Marines who are now capable of providing the same space support capability that the ARSSTs provide. This ARSST-like training is currently spread across the Marine Corps in small numbers, with II MEF Information Group taking the lead in standing up the first functional Marine Space Support Team (MSST).

The Marine Space Support Team. The II MIG MSST successfully integrates space planning at the tactical level to support OPSEC and deception planning and to inform signature management and EMCON procedures. When II MEF units deploy to conduct training at home and abroad, the II MIG MSST supports these units with real-world products that not only provide all of the information needed for planning but also make recommendations for detection mitigation techniques as well as shaping opportunities that can manipulate our adversary's perception of the tactical situation. They also outline the most opportune times for maneuver

and communications windows based on adversary ISR capabilities, giving our forces the ability to *conceal and reveal* when it is most advantageous. These same products also offer timelines for offensive opportunities, giving our units the exact time frames with respect to location (along with much more detailed information that can be used for targeting) to employ offensive and defensive space capabilities when adversary assets are vulnerable.

When necessary, the MSST is also able to coordinate space control in support of the MEF. As referenced earlier, space control is leveraging active measures for offensive and defensive space capability employment. Though the Marine Corps currently has not fully fielded organic space control assets, the MSST can coordinate the use of space-control assets owned by the other Services and entities within the DOD through space support request. As we begin to field future space-control capabilities across the force, it will become necessary to create Marine Space Control Planning Teams (MSCPTs) to deconflict and coordinate these capabilities and integrate them into our fires planning.

The MSST also monitors national OPIR and ELINT feeds to provide near realtime targeting support and early warning. This task is essential in gaining and maintaining battlespace awareness and facilitating dynamic targeting and maneuver.

The challenge that the II MIG MSST is facing now is that supported units are beginning to understand the importance of integrating space considerations into planning and the demand signal for space support is beginning to outpace our ability to align space-trained Marines to fill these requests.

The Way Forward

Organic space support at the tactical level within the Marine Corps is easily attainable and should become fully realized through the MSSTs. To bring the Commandant's guidance to fruition, changes need to be made in a few key areas, and although some of these issues are already being addressed at higher levels, we argue that it is essential to highlight all of the issues as we see them from the perspective of the warfighters engaged in this domain.

The “Revolving Door” of Officers Trained in Operations in the Information Environment (OIE). Currently, there is no primary MOS for space officers. The 0540 Space Operations Staff Officer is a Free MOS, but this non-primary MOS is not a feasible solution for the skills and expertise needed to do the job full-time in a way that truly enables the force. Officers from all primary MOSSs arrive at the MIGs on two- to three-year orders, conduct the necessary training to do space support (which can take several weeks to several months depending on school



Concept of Marine space integration at the operational level. (Photo by author.)

timelines and limited seat availability), then after a relatively short time doing the job, the monitors cut them orders to a unit where they fall back in on roles and responsibilities mandated by their primary MOSs. Returning to the force in a non-space support capacity, their skills atrophy and the space training and experience gained, and the funding used to build the capability, is lost. The *Commandant's Planning Guidance* has directed that the Marine Corps must conduct OIE. The MIGs were created to conduct this specific mission, but we do not yet have the primary MOS needed to retain subject matter expertise and fulfill our Commandant's task and purpose. As long as we are attempting to do OIE with free MOSs, we will continue to flounder in the place we are now, not having adequate experience and subject matter expertise to align well-trained Marines to our seventh warfighting function. We must change this if we expect to sustain meaningful OIE within the Marine Corps. By building a primary career path for Marines tasked with the OIE mission, these Marines can begin to intelligently develop a way forward for Marine Corps multi-domain operations.

Enlisted Space Marines. There are currently no enlisted space MOSs. This is a significant shortfall considering that if we plan to have organic space support capabilities, we will do so with no space support personnel allocated for the mission. The ARSSTs consist of two space officers (a major and a captain) and four enlisted soldiers specialized in intelligence, SATCOM, signals intelligence, and geospatial intelligence, respectively. Though the II MIG MSST is currently providing space support equivalent to a fully manned ARSST, it is doing so with only a handful of TSOC-trained Marines.

MIG Table of Organization and Equipment (TO&E). The MIG TO&E does not currently support aligning Marines to MSST functions as there are no space billet identification codes on the TO&E beyond two 0540s. To properly man a MSST, we would have to pull Marines from other duties allocated within the TO&E and align them to duties that do not currently exist. If



Marines under the Milky Way Galaxy during Exercise TALISMAN SABER 2017. (Photo by LCpl Breanna Weisenberger.)

the Marine Corps plans to have space support capability, a TO&E Change Request must be submitted to create MSSTs and MSCPTs at the MIGs. The initial manning requirements should consist of four MSSTs and two MSCPTs per MIG. This allows the flexibility to maintain a standing team at the MIG for reachback support and CONUS operations as well as the capability to deploy teams to theater in support of MEF units abroad. These teams can plug into the information operations cells at the MEU, maneuver unit's fire coordination nodes, and the maritime operations centers (MOCs) to coordinate the employment of space-control capabilities at the theater level. The capability to forward deploy MSSTs and MSCPTs is essential when operating in a denied, degraded, and disrupted space operations environment, as the ability to "reachback" is held at significant risk in modern conflict.

Competing Now and In the Future. Until the Marine Corps fully realizes and fields its new space-control programs of record, we must focus on what we can do *now* to support our tactical units. With a couple of organizational changes and a small amount of hardware and software, we can begin providing space support capability across the entire Marine Corps through MSSTs

who are organized and deployed from the MIGs. This will facilitate the full integration of space planning down to the lowest tactical levels. At the operational level, the MSCPTs will coordinate the space control aspects of the multi-domain approach to fires. As our new space programs of records come online and employment concepts are confirmed and implemented, we will see these organic capabilities become fully integrated and responsive within our fire support plans.

How the Navy is Addressing the Problem

As a critical component in integrating Navy and Marine space capabilities, it is helpful to look at how the Navy faces these same challenges. With the re-commissioning of U.S. Space Command came the re-commissioning of Naval Space Command, now the "third hat" of the Commander, Tenth Fleet, who also serves as Commander, Fleet Cyber Command. Under his guidance and direction, both cyber and space's instrumental roles in fleet operations are beginning to be recognized. Navy Warfare Development Command has concurrently taken steps toward evolving the integration of space capabilities in fleet operations beginning with the Fleet Experiment

2017 Exercise. This effort has grown substantially with increasing inclusion of space elements into fleet battle problems and naval representation at joint globally integrated exercises. Through exercises like these, the recognition of the need for a broader understanding of the space domain as an integral part of the battlespace has become commonly shared with the Marine Corps, which is now refocusing its force design toward amphibious operations and the full integration of the Navy-Marine Corps team. To take full advantage of the opportunities and to confront the challenges of today's multi-domain combat environment, the Navy and Marine Corps will both need to continue to develop and integrate the necessary skills and capabilities for fighting from the space domain. Highlighted here are some ways that the Navy is approaching these common challenges—with them come opportunities for the Navy-Marine Corps team to evolve together to improve space integration in all aspects of warfare from the sea.

Formalizing a Path for a Space Cadre: Addressing the "Revolving Door." Like the Marine Corps, the Navy has not had the structure to retain its subject matter expertise in space operations. The Navy's approach to developing space professionals has been its Space Cadre force structure. The Space Cadre—officers holding the additional qualification

designators VS5-VS8—do not belong to a single designator or community but are made up of professional career officers from numerous communities who have cultivated some familiarity and proficiency with space capabilities. From this massing of diverse experiences, they gain the benefit of the creative sourcing of ideas. However, the principal disadvantage is that most of these officers, once qualified, will never work in a space-related billet again. For almost every one of these communities, a specifically space-focused tour is viewed as a dissociated tour or a tour outside of what they should be doing to stay on track for promotion within their communities. One tour is an advantage; two or more is anathema. This situation is a direct parallel to the situation facing the Marine Corps. To address this challenge, in the May issue of *Proceedings*, VADM Brown discussed the development of a new Navy Maritime Space Officer designator—providing a permanent career path for officers to develop the level of operational space expertise needed now and in the future. The Marine Corps will likewise need to develop a Service-appropriate solution for the challenges they face in retaining space experience and expertise.

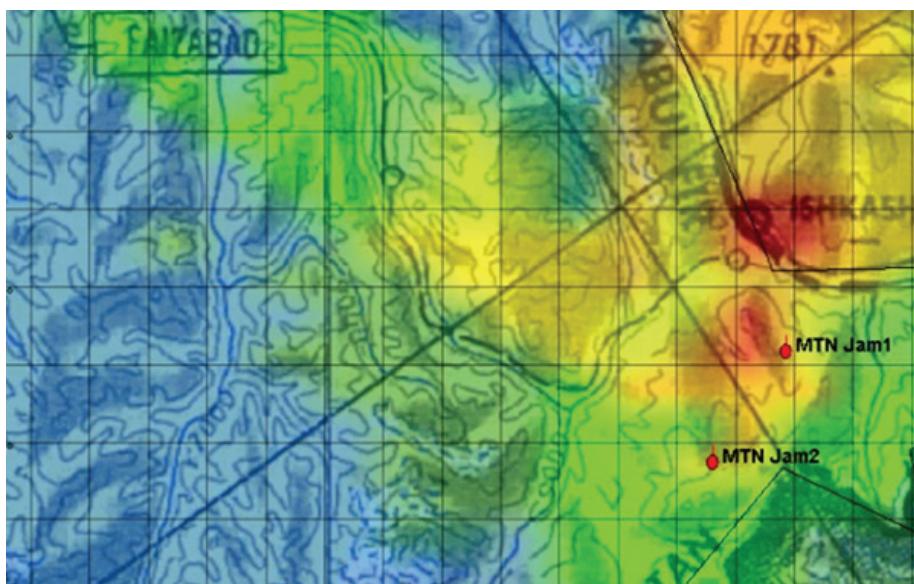
Space Integration at the Operational Level. Evolutionary stasis has been a barrier to effective changes in the integration of space capabilities in naval and

naval-supported operations in theater. Initial efforts at integration were oriented around an officer assigned to space operations only as a collateral duty and frequently without formal training or prior experience. This is changing. The expansion of space training for deploying units and the integration of primary-duty space officers at the MOC, and into the organization of the Information Warfare Commander, is the beginning of a positive change in expanding space-enabled lethality from the sea. This brings us one step forward in addressing the difficult challenge of tactical situation management. Further, by establishing space integration capabilities at the MOCs, there is a real opportunity to create a focal point capable of facilitating the requirements and reachback for all afloat operational units in theater. Everything from deconfliction of satellite broadcast requirements to prioritizing imagery collection requirements supporting independent ballistic missile defense deployers can be facilitated through a common flow-point.

Navy and Marine Space Integration at Echelon

The fight in the space domain is primarily going to be at the combatant command theater-strategic level of war. The timing and tempo of operations involving military space capabilities along with the many compartmented capabilities, which need to be coordinated and sequenced at this higher level of war, represent as much as 80 percent of the space fight. Planning and development of the processes and procedures for that segment are well understood and mature. What is less developed is the twenty percent of the fight that exists below the theater-strategic level. The Marine Corps is principally a force for the theater-operational to high-to-low tactical levels of war and will be a crucial facet of the twenty percent fight. Developing Marines with the skills to provide tactical-level support and grow them to integrate Marine space requirements at the MOC needs to be the key focus of any developing organic space capability in the Marine Corps.

The evolutionary development of organic Marine Corps space forces



Heat map depicting GPS jamming effects in the battlespace. (Photo by author.)

will be best served if that development is focused on growing the capability through the assignment of space-skilled Marines to tours requiring increasing technical proficiency. A starting point for space-skilled Marines is the MSST providing support at the tactical level of war. While the tactical level is where space capabilities will be brought directly to the fight, it is not the only place where Marines need to have a voice in space operations. We propose a struc-

Space Tactics. However, no authoritative/directive publication defining what the uniform space organization of a MOC looks like or how it is to be implemented has yet been released. This need is evidenced by the conspicuous absence of organization standards for the required manning and training to support the MOC Space Cell in the Navy's 2018 *Maritime Operation Center Standardization Manual*, despite space being identified as one

success looks like—quickly drive the changes that we need to make, regardless of administrative challenges or difficulty. What is needed is an adaptive solution that can be implemented *now* and retains the ability to evolve in the future. What has always distinguished our Naval Services has been our adaptability and boldness in pressing forward in new directions, with new capabilities, and our ability to evolve faster and with more agility than our adversaries. We must look to those traditions, now more than any time in the past 30 years, and once again dynamically adapt our force to rise to these new challenges. This is how we will win a future war from the sea—by employing all of our combat capabilities and maritime operational art through every domain and by fighting first from the ultimate high ground.

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ture for developing space proficiency from the tactical level to the operational level where the Marine Corps can integrate its need for space capabilities as part of the Navy-Marine Corps team.

Marine Space Support Within the Amphibious Ready Group (ARG). Space-skilled Marines assigned to the MEU/MEB will simultaneously provide real-time space support to the vanguard of Marine Corps expeditionary operations and develop the necessary skills to assess the space control needs of Marine forces as part of more extensive operations. Those skills—reflecting operational experience to determine needs of the force—are fundamental to integrating Marine space capabilities at the operational level. Organic Marine Space Officers/Elements at the MEU/MEB could integrate into a common Navy-Marine Corps Space Operation Element for ARG/MEU or Expeditionary Strike Group deployment to consolidate unit-level requests, reduce duplication of effort, and further refine a common understanding of the amphibious operational environment.

Navy/Marine Corps Integration at the Operational Level. The integration of space capabilities at the MOC in support of maritime forces has been in development since 2015, with new doctrine being published as recently as late 2020 in the form of *Navy Tactics, Techniques, and Procedures 3-14.1, Navy*

of the key emerging Navy capability initiatives. The nascent organizational structure integrating maritime space requirements is maturing, but the absence of guidance is delaying what could be a dynamic force-multiplying evolution of capability.

Now is the time for continuous and dynamic experimentation in finding what works best for standardizing the organization. These experiments should explore and evaluate multiple constructs to rapidly mature the doctrine, organization, training, materiel, leadership, personnel, and facilities of space operations. A space operations cell at the MOC is a natural place for theater/operational-level integration between Navy and Marine Corps space planners. It could serve as an instrumental interface point to prevent unnecessary duplication of effort, confusion, and conflict between competing requirements. One of the most significant things that the Marine Corps can do, in addition to fielding organic MSST capability at the tactical level, is to field and integrate an MSCPT at the MOC.

Conclusion

We cannot let bureaucratic hurdles delay developing, resourcing, implementing, and integrating the capabilities necessary to establish resilience and maintain superiority in the space domain. We must let the end state—what

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"Investments will prioritize ground, air, sea, and space forces that can deploy, survive, operate, maneuver, and regenerate in all domains while under attack. Transitioning from large, centralized, unhardened infrastructure to smaller, dispersed, resilient, adaptive basing that include active and passive defenses will also be prioritized."

—National Defense Strategy