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Army Space Forces— Enabling the Joint Warfighter

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obtained from U.S. Army Space and Missile Defense Command)

Space is inherently Joint and full operational integration of Space with Land, Air, Sea, and Information capabilities is necessary to achieve the Army's Transformation objectives, an integral part of Department of Defense (DoD) Transformation, and the Army Vision.

Army Space Policy, April 2003

The Joint Operational Framework

In sharp contrast to the sequential, deliberate campaigns of the 20th century, future joint operations will emphasize rapid strategic response by all joint forces, followed by the conduct of synchronized shaping and decisive operations, distributed throughout the entire joint operations area. The joint force commander must establish early control of all battlespace dimensions (air, land, sea, space and information) and focus power against the critical elements of the adversary's structure—key capabilities, decisive points and centers of gravity—moving thereby from the attrition-based campaigns of the past to more rapid decision via disintegration of the enemy's forces and will to fight.

Space and Joint Military Operations

As a space-empowered force, the joint force commander will routinely exploit the overhead constellation of military and civilian space platforms for intelligence; focused surveillance; area reconnaissance; long-haul communications; early warning; positioning, timing and navigation; missile defense; weather/terrain/environmental monitoring; and access to the global information grid. The layered redundancy and improved capabilities provided through space will sharply improve development of situational awareness at all levels, help resolve many current operational challenges (e.g., fleeting target engagement or limits on range and mobility of terrestrial communications) and strengthen the commander's confidence in the information that supports him. Development of the capability to cross-cue intelligence and non-intelligence platforms will lead to more responsive and comprehensive targeting information. *Space support will extend from national to tactical levels* (space to mud) and prove particularly indispensable in immature theaters where existing communications infrastructure (e.g., absence of fiber optic cable networks) may be insufficient or unreliable. Overall, space-based capabilities are critical enablers for implementation of the fundamental principles of the Army's Future Force concepts, particularly with respect to achieving information superiority, creating situational awareness, and operating within the high tempo, noncontiguous, simultaneous framework of distributed operations.

Army Space Support to Operations Enduring Freedom and Iraqi Freedom

The U.S. Space and Missile Defense Command (SMDC) deployed the largest and most capable space force in our Army's history in support of Operations Enduring Freedom (OEF) and Iraqi Freedom (OIF). The deployment included six Army Space Support Teams (ARSSTs), personnel to support two Joint Space Support Teams (JSSTs), two Materiel Training and Fielding Teams, 12 rapidly-prototyped space equipment suites, Space Operations Resource Centers (SORCs) Rear and Forward, an element collocated with the U.S. Air Force's Eagle Vision 1 (EV-1) ground station, the first ever tactically mobile ground-based laser system (ZEUS), and one Joint Tactical Ground Station (JTAGS) team. These forces supported combat locations in two theaters while supporting U.S. Special Operations Command Central (SOCCENT), U.S. Central Command (CENTCOM) and two services (Army and Marines). During these two major operations, they were committed at four levels (Army, joint, combined and coalition) and integrated at four echelons (division, corps, joint task force and combined forces land component command, or CFLCC). In the continental United States, the U.S. Army Space and Missile Defense Command Operations Center (SMDCOC) conducted home station operations center tasks in support of deployed forces.

In addition to SMDC's organic elements, the Army's space force deployment included Army Tactical Exploitation of National Capabilities (TENCAP) systems, such as the Tactical Exploitation System (TES), that are organic to military intelligence (MI) battalions at division and corps for provision of national imagery intelligence (IMINT) and signals intelligence (SIGINT) to tactical commanders. Army TENCAP systems are managed and sustained by the Army Space Program Office (ASPO). There were a total of 12 TESs in theater from all services and an additional eight supporting through reachback capability. Each service had TESs that provided the integration of intelligence, surveillance and reconnaissance (ISR), targeting and blue force tracking from "space to mud." These operations collectively provided unprecedented space support to U.S. joint forces.

The Mission and Tasks Supported

Of the four space mission areas (Space Force Enhancement, Space Control, Space Support and Space Force Application), the Space Support Element Toolset-Light (SSET-L) provided the ARSSTs and JSSTs capabilities primarily in support of Space Force Enhancement. To a lesser extent, these teams supported Space Control, Information Operations (IO) and Missile Defense/Missile Warning (MD/MW). This support included but was not limited to:

- Global Positioning System Accuracy (GPS ACC)/Navigational Accuracy (NAV ACC) products. This included analysis and implications of GPS jamming and analysis of GPS interference reports.
- Satellite Reconnaissance Advanced Notification (SATRAN) reporting. These reports provided information on Red, Gray and Blue overflights.
- Three-dimensional (3D) "fly-thrus" for both air and ground route planning.
- Two-dimensional (2D) imagery and map products. These included large charts, rectified city images and imagery. The products supported long-range surveillance detachments (LRSDs), corps aviation assets and map requirements (production of imagery maps for city planners, developers, showing lines of communications and war damage) from the Office of Reconstruction and Humanitarian Assistance (ORHA)/Coalition Provisional Authority (CPA). The SSET-L provided the 1st Marine Expeditionary Force Topographic Team access to timely commercial imagery, which they could not acquire rapidly without the SSET-L.

- 3D perspective views (still perspective views of a specific “look angle”).
- Development of space-related candidate targets.
- Support to Friendly Force Tracking (FFT). This included assessing technical tasks, architectures and requirements for managing and displaying the FFT picture, to include ensuring the blue force tracking system Grenadier BRAT (Beyond Line-of-Sight Reporting and Tracking) data was tracked and displayed in a timely manner.
- Analysis of Computer Network Operations (CNO) from a space perspective. This analysis was integrated into various IO plans.
- Missile Analysis Support. This included briefings on Iraqi missile systems and included developing missile profiles for air defense elements.
- Missile Warning (MW)/Tactical Ballistic Missile (TBM) Warning. The SSET-L was used to receive and display real-world TBM warning using data feeds from Command and Control Personal Computer (C2PC), Integrated Broadcast System-Simplex (IBS-S) and IBS-Integrated (IBS-I). This task-integrated data feeds from the Defense Support Program (DSP) and from multiple sea-based and land-based radars. Also provided was analysis of missile coverage and TBM Warning Plans and contingency operations (CONOPS) for notification throughout the Area of Operations.
- Development of Annex N (Space) to various Operations Orders.
- Development of the Space Intelligence Estimate (SIE).
- SATCOM Planning and Assessments. This included:
 - Sun-Conjunction Activity/Information Analysis/Reports/Charts, which provided outage times for communications systems.
 - Ultra-High Frequency (UHF) satellite communications (SATCOM) troubleshooting to investigate incidents of interference.
 - Tracking of SATCOM status and monitoring of SATCOM operational capabilities.
 - UHF Scintillation analysis and products.
 - HF Illumination Charts.
 - Support to daily targeting board meetings and working groups, Operational Planning Group (OPG) meetings and information operations meetings.
 - Download of before-and-after national imagery to support target development and battle damage assessment (BDA) in Deep Operations Coordination Centers (DOCC) and in some cases to support Army Tactical Missile System (ATACMS) strikes.

Critical to the deployed space forces’ ability to accomplish these missions and tasks was their capability to reach back, using organic, secure, high-bandwidth communications, to multiple operations centers, databases and organizations. Further developments of communications support to space forces are certain to retain organic and robust reachback capabilities.

Space and Missile Defense Command Operations Center

The SMDCOC also made substantial contributions to the success of joint operations in support of OIF. The SMDCOC served as a single point of contact supporting space-related and command

and control efforts. It also maintained an operational support database on the Secret Internet Protocol Router Network (SIPRNet), which was accessible to all Army space operators. As a result, the SMDCOC served as a “one-stop shop” of sorts for the Army space operations, allowing them to submit requests for information (RFIs), query previous RFIs, link to key space sites and receive intelligence updates. During the earlier phases of OIF, the SMDCOC received scores of RFIs that were routed to deployed units.

Space-Based Blue Force Tracking and the Space-Based Blue Force Tracking Mission Management Center

The Global Positioning System (GPS) once again proved its effectiveness in OIF, contributing to all aspects of position, velocity, navigation and timing (PVNT) and supporting all the services. Perhaps one of the most significant and valuable uses of GPS was Space-Based Blue Force Tracking (SB-BFT), a system that can be credited for the campaign’s greatest success in helping to avoid incidents of fratricide.

The Army SB-BFT and the Space-Based Blue Force Tracking Mission Management Center (SB-BFT MMC) worked closely with Special Operations Forces (SOF) by monitoring aircraft and ground forces faced with emergency or in extreme situations and alerting SOF command-and-control nodes of the situation. The SB-BFT MMC also worked closely with the CFLCC by providing Near-Real-Time Blue Force Tracking data to the V Corps commander in support of his operations.

Spectral Operations Resource Center

The SMDC Spectral Operations Resource Center Forward (SORC FWD) provided imagery support to OIF, including the preparation of high-resolution images to coalition forces that permitted a better understanding of the terrain in specific areas of operation. Of particular importance, the SORC produced imagery-based spectral products for airdrop planning. These included two- and three-dimensional perspectives of terrain and vegetation used to identify and eliminate sites that were unsuitable for airborne assault operations. Standard maps were also created to support ordinary mission planning. The standard image maps were derived from high- and medium-resolution commercial imagery.

Intelligence, Surveillance and Reconnaissance

One of the most important warfighting advantages provided by space-based assets is in the Intelligence, Surveillance and Reconnaissance (ISR) realm. Space-based ISR capabilities often provide the first “eyes on target” in support of terrestrial military operations. In OIF, SMDC personnel and organizations, particularly the ARSSTs and Army TENCAP programs such as TES, made significant contributions to joint operations in the realm of ISR. The ARSST was able to provide the ground commander with information on potential enemy positions. Archived satellite imagery was merged with more recent spectral imagery to identify changes in the spectral reflectance of the Earth’s surface in a particular geographical location. These changes were then typed by spectral signatures and analyzed to provide change detection information, e.g., a change over time from one image to another. This influenced the targeting process and enabled ground force commanders to identify areas of change and to concentrate their forces on potential enemy hiding places. Using French SPOT (Satellite Pour l’Observation de la Terre) overflights and Satellites Advance Notice Charts, the ARSSTs were able to provide satellite overflight times and potential friendly force vulnerability windows to their supported units.

One of the major ISR success stories from OIF combat operations was Army TENCAP, specifically the TES as part of an integrated “space to mud” ISR architecture. TES Forward and Main systems were especially significant in focusing corps IMINT support for targeting and greatly enhanced U.S. Air Force close air support (CAS) and air interdiction (AI) for forward maneuver forces. TES, managed and sustained by the Army Space Program Office (ASPO), reduced theater and national imagery by as much as six to ten hours and national and theater SIGINT support for targeting operations by as much as 30 minutes to two hours. This capability enhanced the tactical commander’s ability to gain situational awareness across vast distances and shape the deep battlefield for successful maneuver of advancing U.S. forces. Additionally, TENCAP was part of an integrated missile warning architecture, as it received unit-level missile warning data from JTAGS.

Conclusion

The success of joint operations depends heavily on improved support and force enhancement capabilities provided by space-based assets. OIF truly demonstrated the value of a space-enabled operation. Secure space-based communications made long-distance, real-time coordination and conferencing possible and gave tactical commanders an increased degree of command and control over their units.

The relevance of Army space support to joint warfighters is widely recognized across the force. Space Support Elements will become an integral part of the new Future Force modularity design efforts. Space officers are now undergoing training for assignment to the 3d Infantry Division, 10th Mountain Division, 101st Airborne Division (Air Assault) and 4th Infantry Division. As the Army continues design efforts for the operational land echelon—the Unit of Execution (UEy)—Space Support Elements will also be a critical organic part of this effort.

Space capabilities have been integrated into joint operations at all levels and now represent an indispensable component of the warfighting package. As ever-smaller forces are given greater responsibilities, it is likely that there will be an increasing demand for, and reliance upon, space-based force enhancement capabilities. With that in mind, future joint operations will also focus on denying this same capability to threat forces to ensure that the joint force commander can continue to achieve information superiority, in turn both saving lives and enabling success on the battlefield.