

# Seed Money Available to Develop and Prototype National Space Reconnaissance Data Capabilities

## How MERIT Can Help Your Program

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The JCS Joint Vision 2010 highlights the concept of gaining “dominant battlespace awareness”—a clear picture of friendly and enemy operations within a theater. To implement this vision, each of the Services is building weapon and support systems that are hungry for intelligence and reconnaissance data from space. Without constant updates, many of these systems are less effective. With timely, accurate intelligence data, they provide the information necessary to give us the advantage on air, sea, and land. Any way you slice it, reconnaissance and surveillance information provided by National Reconnaissance Office (NRO) systems are becoming a necessary ingredient for most programs.

The Military Exploitation of Reconnaissance and Intelligence Technology (MERIT) program provides seed money to develop and prototype capabilities that increase the utility and accessibility of national space reconnaissance data for the tactical operator. The most successful MERIT projects involve P<sup>3</sup>I (Preplanned Product Improvement) for ongoing programs, rather than attempt a new start. For that reason, MERIT is looking for good ideas from program offices on how to better utilize national reconnaissance data in their systems to meet mission requirements.

### MERIT History

In 1982, Deputy Secretary of Defense, Frank Carlucci, initiated the MERIT program under the Defense Reconnaissance Support Program (DRSP). MERIT’s purpose was to “examine and demonstrate technologies and methods that would improve the application of reconnaissance systems to military operations.” In 1994,



CORONA SATELLITE  
IMAGE OF THE SARY  
OZEK IRBM COMPLEX,  
USSR, SEPT. 17, 1971.  
Photo courtesy National  
Reconnaissance Office



E-8C JOINT STARS U.S. Air Force photo

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A FIRST STRIKE TOMAHAWK MISSILE IS LAUNCHED FROM THE AFT SECTION OF THE U.S. NAVY'S TICONDEROGA CLASS



the DRSP became the Defense Space Reconnaissance Program (DSRP), narrowing MERIT's focus to space reconnaissance improvements. Over the years, MERIT has funded many successful projects that have been integrated into military operations, includ-

## Is MERIT For You?

If your program has requirements for national space data or for data derived from national intelligence assets, such as mapping, targeting, or point positioning products from the National Imagery and Mapping Agency (NIMA) or Defense Intelligence Agency (DIA), it may be a candidate for participation in MERIT. MERIT funds research and development prototyping (related to the use of national data in your system) with all its inherent risks. Since MERIT takes the financial risk, your program does not have much to lose and very much to gain by looking into MERIT.

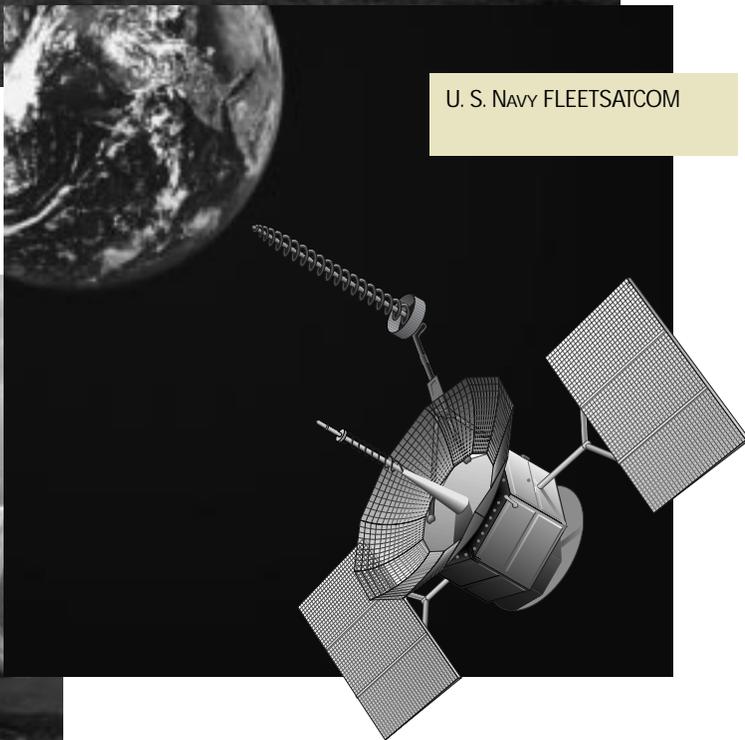
## Success Stories

Due to the nature of the MERIT Program, many success stories are classified. However, many are not. For example:

**Joint STARS.** The Joint STARS Program Office and Special Projects Directorate at Hanscom Air Force Base, Mass., successfully demonstrated software to improve the positioning accuracy of Joint STARS using national satellite imagery. The Joint STARS Imagery Geolocation Improvement (JIGI) program modified an imagery exploitation tool, originally developed for intelligence community use, to accept Joint STARS radar imagery. The tool performed automatic registration of the aircraft imagery to the more accurate national systems. After registration was complete, features and targets in the airborne imagery were located to nearly the same degree of accuracy as in the national imagery (often an order-of-magnitude improvement). MERIT funded the installation of JIGI on-board the Joint STARS test contingent's aircraft as a proof-of-concept, for Contingency Operations and exercise participation. MERIT is also funding the adaptation of this technology for use with the U-2R/S, P-3, AC-130U, and the Predator, Global Hawk, and Darkstar Unmanned Aerial Vehicles.

**HAYFIELD.** The HAYFIELD software-programmable, cryptographic, multi-

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ing: the Joint Stars Imagery Geolocation Improvement program, the TRAP (Tactical and Related Applications) Data Dissemination System that distributes intelligence data via UHF SATCOM, and the National Imagery Transmission Format (NITF).

chip module (MCM) also originated in MERIT. HAYFIELD eliminates the hassle of bringing authentication codes into the field, which are classified and need to be secured. HAYFIELD provides up to four channels of independent and simultaneous data decryption, while reducing size, weight, and power requirements. It is reprogrammable to facilitate the periodic algorithm changes required to meet security requirements, and has the means to implement additional algorithms as needed. HAYFIELD will be installed in tactical radios such as the Army's Commanders' Tactical Terminal, U.S. Special Operations Command's Multi-mission Advanced Tactical Terminal (MATT), and the Advance Secure Digital Radio. The National Security Agency (NSA) manages the current production of HAYFIELD chips.

**ANVIL.** MERIT partially funded the development of the ANVIL image classifier for detecting targets in multi-spectral imagery, including Landsat and SPOT, in near-real time. This process operates at a sub-pixel level,<sup>1</sup> enabling detection and identification of targets too small to be seen by the human eye. ANVIL will be incorporated into Eagle Vision, a transportable receive and processing system for live commercial imagery in support of aircraft mission planning.

**RADIANT MERCURY.** RADIANT MERCURY performs automated sanitization and downgrading of outgoing, classified, tactical messages. The MERIT effort focused on automatically downgrading national imagery. These functions are performed by using an operator-modifiable rules set, which governs if and how formatted message data are modified, and to which communications lines the messages may be released. RADIANT MERCURY has been accredited by NSA for operational use.

### New Programs

**National Eagle.** National Eagle is modifying the Office of the Secretary of Defense/U.S. Air Force Eagle Vision deployable commercial imagery

ground station to integrate national and commercial imagery. This modification and integration will ultimately help build the DoD standard products needed to feed "three-D fly through" mission planning systems. The products have been used for mission planning and rehearsal at Aviano Air Base, and Vicenza, Italy, by the 1st Armored Division in Tuzla, and at the Dayton-Bosnia Peace Conference. They will be combined into a NIMA relational digital database.

**Time-critical Targeting.** Time-critical Targeting's objective is to improve the responsiveness of the TOMAHAWK cruise missile by integrating the use of other sources of national imagery to its mission planning system. The ability of the TOMAHAWK mission planning system to use alternate-source imagery increases reference material availability, improving performance against time-critical targets by an order of magnitude.

**Terrain Extraction of National Imagery.** MERIT is funding the Army Space Program Office to adapt terrain extraction algorithms to accept a combination of airborne and national imagery in the Enhanced Tactical Radar Correlator (ETRAC) image processing van. These algorithms may provide ETRAC operators with alternatives in obtaining high-resolution Digital Terrain Elevation Data (DTED) in theater. High-level DTED is available only for a small portion of the earth's surface.

**Spatial Image Prescreening Program (SIPP).** SIPP's value is its potential to accurately screen large quantities of imagery in a short time. SIPP is developing software that automatically screens all types of imagery for target detection/discrimination purposes and to build specialized acceleration hardware that improves processing time to seconds or fractions of a second. The process combines morphology with fractal theory, resulting in extremely fast computational speeds that may be able to support tactical military operations. Fractals have long

been recognized for their capability to distinguish manmade targets in nature, but their required processing time made them impractical for near-real-time military requirements.

### MERIT Criteria

MERIT funding is awarded on a competitive basis each year. The funds are defense-wide research, development, test and evaluation.<sup>2</sup> Funds in this category are used for "Advanced technology development which is used to demonstrate the general military utility or cost reduction potential of technology when applied to different types of military equipment or techniques," for valid military requirements.

In addition to restrictions placed on MERIT dollars by the DoD FMR, there are a few other criteria that all MERIT projects must meet in order to be considered for funding:

- Improvement of national space reconnaissance contributions to tactical operations.
- Joint Services' application (i.e., the technology proposed must have some use to more than one Service).
- Near-term (one to two years') employment of project results.

### Summary

With the recent removal of security constraints on the uses of national space data, the opportunities are greater than ever before to exploit NRO data in new and innovative ways. MERIT's role is to help open those doors of opportunity by improving weapon system performance and ultimately benefiting those in harm's way. MERIT can improve your program's use of national space data or introduce the use of national data into your program for the first time.

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### ENDNOTES

1. A pixel is a picture element, the smallest element into which an electronic image can be encapsulated.

2. DoD Financial Management Regulation 7000.14-R, Chapter 5, Research Category 6.3a.

## HOW TO SUBMIT A MERIT PROPOSAL

**M**ERIT proposal submitters must be U.S. government personnel, have at least a SECRET clearance, and be prepared to present a briefing on their proposal to the MERIT Working Group. Each briefing will be presented in Washington, D.C., during the summer of the year the proposal is submitted. The MERIT Working Group consists of representatives from the Services, National Security Agency, Defense Intelligence Agency, Joint Staff, National Imagery and Mapping Agency, and U.S. Special Operations Command.

Proposals for the FY 98 cycle are due in May 1997. They must be submitted to the Defense Support Project Office (DSPO) through sponsorship by a MERIT Working Group member. The MERIT Working Group will review the proposals and make recommendations for funding to the Deputy Director, DSPO by September 1997. Dissemination of funding documents should follow in November or December.

To receive a copy of the preparatory instructions, please call or fax anyone on the Points of Contact (POC) list. If you wish to be included on the addressee list for future MERIT announcements, please fax or E-mail your electronic plain language message address or fax number to the DSPO POC.

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