Commercial Imagery for the Firefighters

By MAJ Tim Haynie

The introduction of high-resolution commercial imagery and advances in spectral imagery analysis has greatly expanded the military's use of commercial imagery. Although these satellites are under civilian and other government agencies' control, the Army Space Command Spectral Operations Resource Center (SORC) has endeavored to normalize this imagery support by fostering working relationships with the vendors and exploring the utility of new imagery sensors. The recent wild fire imagery support mission was typical of Army Space's role in providing commercial and civil imagery to the warfighters; in this case, firefighters.

Since timeliness of the imagery is critical, the Army Space SORC utilizes existing contracts through the National Imagery and Mapping Agency (NIMA) and coordinates directly with the commercial and civil imagery vendors. This process significantly decreases the time required for electronic dissemination of the raw imagery — from days to hours. This is essential when fighting wildfires, due to the often rapid movement of the fire lines.

Ultimately, the fastest method of receiving data is to control the ground station that takes the information straight from the satellites in orbit. Army Space was receiving data on forest fires from the Defense Satellite Program sensors through the Joint Tactical Ground Station in real time. Had Eagle Vision II, the Army's only direct downlink ground station for commercial imagery, been in proximity of the fires, Army Space could have received satellite imagery over the affected areas in real time as well. Eagle Vision II is able to provide imagery information within two hours of collection.

Since the data is typically unclassified, electronic dissemination over the World Wide Web is the preferred method for getting the imagery from the vendors. For some, this is an automated process programmed for Army Space into the vendors' dissemination architecture. The vendors post the data to a Web site and the SORC pulls the files as needed. At the same time, a copy is also provided to NIMA for posting on the Commercial Satellite Imagery Library for archiving.

However, simply acquiring the imagery is only half the battle, since few are trained to interpret spectral imagery. Few satellite engineers had firefighting in mind when they developed their sensors.

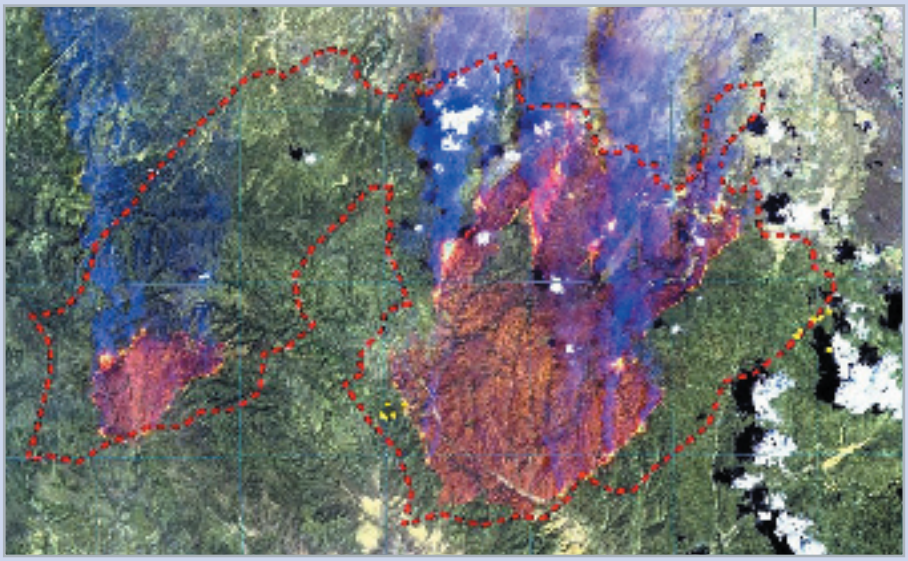
Whether it is identifying charred vegetation on recently burned land, or identifying military equipment parked under camouflaged nets, spectral imagery at the right resolution provides extensive information beyond that of simply locating an object. For fighting fires, spectral imagery analysis can identify different types of vegetation which would enable firefighters to determine speeds at which a fire will consume an area. This assists planners to better identify locations to construct their fire lines. Spectral imagery can also be used for damage assessments and to help the recovery teams prioritize their efforts to protect burned areas from mudslides and to begin the reseeding of other areas.

As the resolution of these sensors increases, so will the tactical utility of the data. Satellite sensors tuned to detect heat or light from the affected areas provide fire data that normally requires extensive planning on behalf of the local agencies, numerous low flying aircraft, and an army of firefighters to monitor the fire lines. The broad area coverage capability of these satellite sensors also enables Army Space to monitor numerous fires simultaneously and report the information.

Supporting the forest firefighters enables Army Space to show how it can provide relevant, timely data to nearly all levels of users. In this case, from the local firefighters who are the first line of defense, the larger government agencies responsible for planning support, to the recovery teams who work to prevent additional damage to the scarred ground.

This is not limited to war fighting and many of the techniques used to support military operations have applications to support relief operations as well. Pivotal to the success of either of these missions is the ability to influence the design and deployment of sensors, unrestricted access to the data, and full integration with the supported organization.

The addition of Army Space Command's information proved a significant Force Enhancer for the firefighting forces, an application directly analogous to the function Army Space's components perform in their support to combatant commands.



This image of the Chediski-Rodeo Fire in Arizona was taken from a LANSAT 7 Satellite on June 21. The red region is the burned area as of the 21st. The red dotted line shows the additional land the fire had consumed as of June 27.

MAJ Tim Haynie is the Officer in Charge of the Spectral Operations Resource Center, the first to hold that position. An Engineer officer, he previously served as the first OIC of Eagle Vision II, the Army's only commercial imagery direct downlink mobile ground station.

Above, SGT Brandi Harris from the Spectral Operations Resource Center and SGT Dennis Shay with the 1st Space Battalion's Joint Tactical Ground Station (JTAGs) study maps that were used by firefighters and the Forestry Service to battle the western wildfires. Left, a JTAGS shelter.