# the Army Space Journal

SPECIAL EDITION

Vol. 2, No 3

A Professional Journal for Army Space Operators

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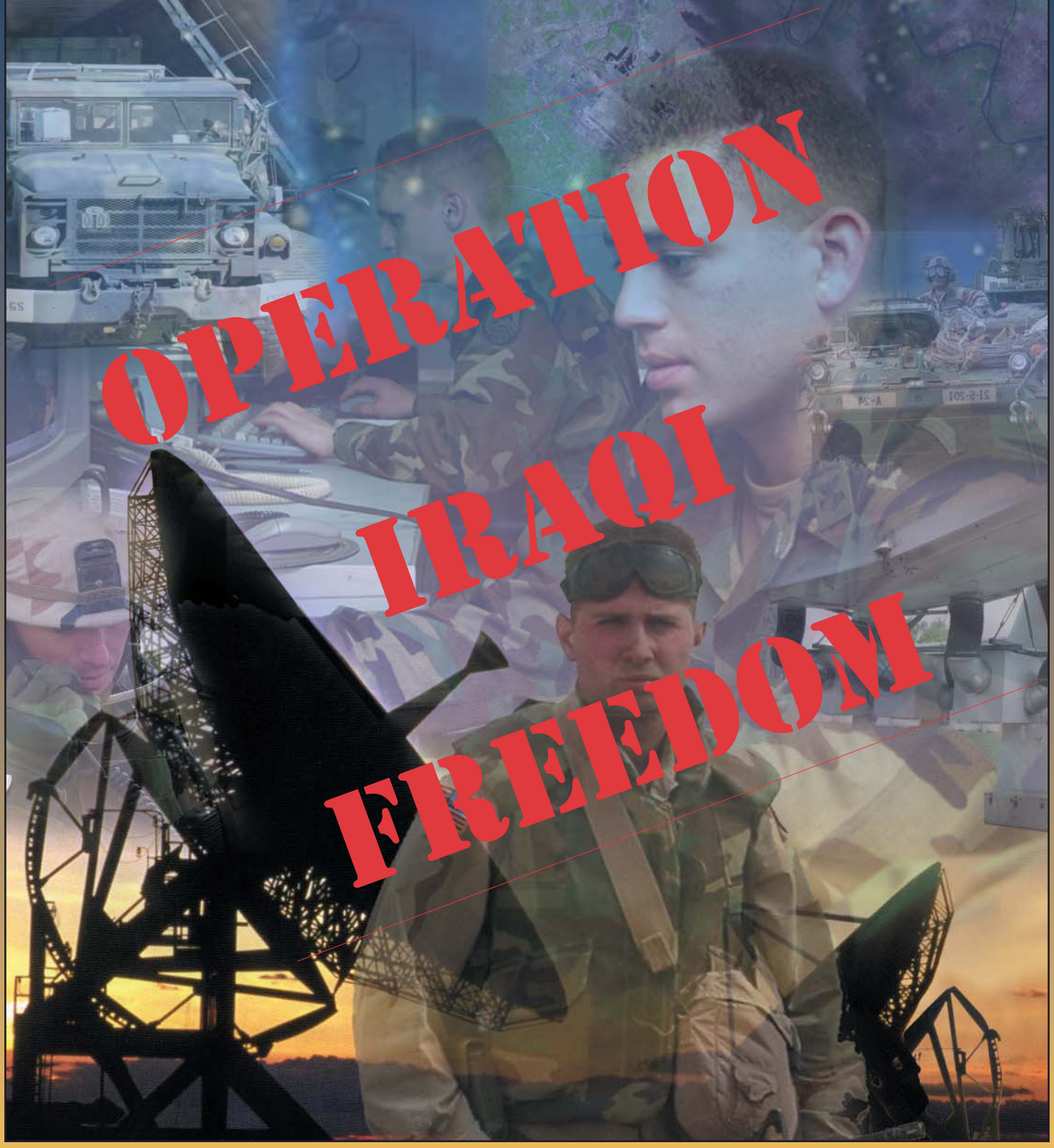

# OPERATION IRAQI FREEDOM

# We want you to know
# This Journal's for you

When I came to the U.S. Army Space community from the big Army, I didn't have a clue. Some would say the managing editor still doesn't, but it took Operation Iraqi Freedom to pry open some pretty stubborn eyes.

Questions circle around the Army about what the Army's doing in Space. Are we astronauts? Do you fly satellites? Do you go to Space? Mostly, it's a blank look on the person's face whom you just told you're a member of U.S. Army Space and Missile Defense Command, a look that seems to ask what in the heck do you do?

So, talk about excitement.

We found the answer. Or part of it.

Listen to MAJ Michael Scheiern, a Marine officer with the 1st Marine Expeditionary Force, who speaks of the importance of Space during the war. His full interview begins on page 18.

"We were given the mission, after seizing the eastern half of Baghdad, of advancing on both Tikrit and Kirkuk. That's where the Space assets kicked in. Between your ARSST (Army Space Support Team), and the TES-Forward section, within 24 hours of receiving that new mission, we had the best imagery possible to execute analysis … The information was detailed and complete, and what we learned from it was enough, in fact, to negate the need for movement towards Kirkuk. The information gave us the flexibility to shape the battlespace … enabling us to best decide how and when to put Marines in harm's way."

That means, to my mind, that a team of Army soldiers were able to tap in to satellites during a war to bring information to Marine leaders to help them make decisions that reduced risk to life and increased the chance of victory. Of course, nobody wants American service members to die and we all want our Nation to win, so anything that furthers those two aims is a great and patriotic thing.

This special edition of the Army Space Journal is chock-full of more information like Scheiern's bottom-line across the full spectrum of what the Army Space community brought to the warfight. To highlight this, take a look at the Tip of the Sphere. We've taken a different approach this time, focusing on personal- and Space-specific vignettes.

A special thanks is owed to all the authors - our FA40s assigned in the field, leaders from the 1st Space Brigade (Provisional), Space operators from the Battle Lab and SMDC staff and researchers from the SMDC Historian Office. This exhaustive look at OIF from a Space perspective would not have happened without their extra effort.

One last point. This is the muddy boots side of Space.

I remember an early discussion at the Defense Information School 25 years ago about communications during a war. The school is the center for teaching Public Affairs Officers and military journalists their trade. We were still typing on manual typewriters, using teletype machines and using film for photographs. The discussion and great debate over the years centered on how instantaneous communications would impact public perception and opinion during a war. Ours in the Public Affairs business has been focused on the burgeoning news phenomena illustrated by 24-hour news coverage.

We never even considered the main point highlighted by this special edition. Instantaneous communication does more than impact public perception, it helps save lives and win battles.

— Managing Editor

## Tip of the 'Sphere'


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Theme — "Space — Focus on Operations"

# the Army Space Journal

**Special Edition: Operation Iraqi Freedom**

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# Operation Iraqi Freedom

LTG Joseph M. Cosumano Jr., Commanding General, United States Army Space & Missile Defense Command

## SMDC Space Professionals Supporting Joint Warfighters

**By LTG Joseph M. Cosumano Jr.**

Operation Iraqi Freedom (OIF) is demonstrating as never before the importance of Space to the Army and Joint Warfighter. Although Operation Desert Storm is often called the first Space war, Space-based resources during OIF were demonstrably more capable, more abundant, and more integrated into all phases of combat operations.

The immense combat capability of the U.S. Army, fighting as part of the Joint and Coalition effort, has been facilitated and enhanced at every step by Space professionals leveraging Space products and services for Joint warfighters. The extraordinary capabilities of the soldiers, civilians, and contractors of the SMDC team have been instrumental to this process.

The lessons of SMDC's support during OIF are still being collected and the history of our contributions is being updated on a daily basis. However, I believe it is important to recap for you at this point some examples where Space assets have helped to create the historical successes achieved in OIF. This process is an iterative one, but we have done much to this point with the conduct of formal OIF Lessons Summits and the rigorous DOTMLPF (doctrine, organization, training, materiel, leadership, personnel, and facilities) analysis of our capabilities, contributions, and areas requiring further work. Detailed action plans will ensure we institutionalize the necessary changes.

I strongly encourage you to review the articles elsewhere in this edition of the Army Space Journal. The firsthand experiences by the Space soldiers who provided the support and were either deployed or remain on the ground in Iraq and elsewhere in the U.S. Central Command (USCENTCOM) theater provide extraordinary insights for all Space professionals.

### Success was Achieved Because of Our People

"The ability to link closely and share intelligence and reconnaissance through an effective command and control structure gave U.S. forces the ability to operate with enormous speed and with unprecedented flexibility," stated General Richard Myers, Chairman of the Joint Chiefs, in April 2003. He went on to observe, "The enemy was decimated and dispersed with incredible speed."

Detailed planning and synchronized execution, facilitated by Space-based systems, occurred to such a degree that enemy forces were literally reduced to ineffectiveness even before they had awareness of being targeted. This success, however, arose not only due to superior technology. Success was achieved because of trained and professional Space soldiers, civilians, and contactors.

Army Space Support Teams (ARSSTs), supporting the Coalition Force Land Component Command (CFLCC), V Corps, I Marine Expeditionary Force (I MEF), and Office of the Coalition Provisional Authority (OCPA), brought Space products, services, and expertise directly to our Joint warfighters. Additional Space-trained soldiers and liaison officers supported the Special Operations Command and other deployed units. Soldiers with the Joint Tactical Ground Stations (JTAGS) provided early warning of enemy missile launch activity in theater. The Regional Satellite Communications Support Centers (RSSC) and the Defense Satellite Communications System Operations Centers (DSCSOC) provided reliable and responsive satellite communications support. Finally, the SMDC Operations Center, working on a 24/7 basis, maintained situational awareness of deployed elements, responded to hundreds of requests for information, and provided the essential reachback system of connectivity with technical and operational professionals. Clearly, it took everybody coming together to make that happen.

### Many Firsts

*"The ability to link closely and share intelligence and reconnaissance through an effective command and control structure gave U.S. forces the ability to operate with enormous speed and with unprecedented flexibility."*

*— General Richard Myers, Chairman of the Joint Chiefs April 2003*

Operation Iraqi Freedom extended to SMDC the extraordinary opportunity to achieve many firsts, most notably the first-ever combat support to Special Operations Forces and a Marine Expeditionary Force, split-based support by an ARSST in combat, and Phase IV (SASO or Security and Stability Operations) support. Additionally, Space Control operations were conducted during combat on a sustained timeframe for the first time during OIF. The Space Support Element Toolset-Light (SSET-L) and Joint Tactical Ground Station (JTAGS) also demonstrated their technical capabilities during combat operations.

**Responsive Support by Multi-skilled, Multi-component ARSSTs**

The 1st Space Battalion and 193rd Space Support Battalion, Colorado National Guard, deployed ARSST soldiers to Southwest Asia to provide Space capabilities to Army and Marine forces. Moving with their maneuver headquarters, these soldiers were at the "tip of the spear," sharing the same dangers and living conditions with their supported units to ensure provision of Space-based products and services.

"The ARSST provided a window into capabilities that we did not even know we had," noted one primary staff officer serving with CFLCC. Equipped with their own SATCOM bandwidth via the SSET-L, the ARSSTs provided division and corps commanders a variety of wideband accessed, Space-based products, and spectral products. The ARSSTs were the on-the-ground Space experts, pulling down imagery and intelligence data, forecasting Space weather impacts on SATCOM, projecting the health of the Global Positioning System (GPS) and other satellite constellations, and providing responsive Space support to their units. Space-based products and services also included assistance in the areas of missile early warning and Blue Force Tracking. The ability to rapidly delivering large data files to the ARSSTs and their supported units was particularly noteworthy since the supported units' limited wideband communications assets were not taxed to provide the support.

The SSET-L, developed in response to an urgent operational need for organic communications capability, was fielded to provide supported Joint and Army units access to wideband SATCOM. The system was rapidly developed and fielded in less than 3 months, providing a robust set of Space applications software together with the networked broadband communications necessary to collaborate with other Space forces and/or reachback to advanced image processing sites in the rear and in CONUS.

The ARSSTs' responsiveness and relevancy in supporting current and planned combat actions have been specifically cited in multiple occasions. In one instance, the 4th Infantry Division (ID) learned the added benefit of ARSSTs when the 4th ID Main, while occupying the Tikrit Presidential Palace, came under enemy fire. Responding quickly, ARSST 14 provided imagery of the palace complex and surrounding area to G-3 staff planners. The Division G-3 tore the military map from the table, slapped down the imagery, and continued planning. The security forces subsequently identified the enemy dispositions, and then planned and executed a successful counterattack, resulting in the elimination of the enemy fighters.

In another instance, a fire support planner with CFLCC provided to ARSST 3 a request for quick turnaround spectral imagery. Within a matter of only a couple of hours, the ARSST supplied imagery that identified possible targets for subsequent non-kinetic attack. The habitual relationship the ARSST had developed with the supported staff officer coupled with their demonstrated

*(See Space Professionals, page 66)*

# Space Impact

## Personal Observations from Operations Iraqi Freedom

**BG Robert P. Lennox, Deputy Commanding General for Operations, United States Army Space & Missile Defense Command**

**By BG Robert P. Lennox**

In June of this year I took up my post in Colorado Springs from a position at Fort Bliss. In my new position here at U.S. Army Space & Missile Defense Command (SMDC), I continue to be amazed at the Space-based capabilities that this command, the Space operations officers, and soldiers bring to warfighters. To support them during Operation Iraqi Freedom (OIF), this command deployed all their existing Space Support Teams and constituted additional teams to meet the demand from the Army, the Marines, combined units, and the Coalition Provisional Authority rebuilding Iraq. One of the command's missile warning units, the Joint Tactical Ground Station, was deployed and put on "permanent TDY" in the area. SPEC-TR, the Spectral Exploitation Cell -Transportable, deployed to Qatar to support Special Operations Command, Central Command with commercial imagery products and spectral analysis. The Space-based Blue Force Tracking Mission Management Center continued playing its important role in tracking friendly forces and feeding that information into the supported command's common operating picture. The SMDC Battle Lab created and built a robust satellite communications package called the Space Support Element Toolset-Light (SSET-L) for all SMDC forces to use. I can say with pride that our capabilities were, and still are, playing a crucial and important role supporting Army, joint, and coalition operations.

I could continue to run down a list of units and capabilities that this command provided to OIF, but I'll leave that to the others who've written articles for this issue. COL Jim Pierson in his article lists some of the "firsts" the command scored. LTC Elizabeth Kuh outlines Space support to stability operations at the CPA. Other authors have gone into depth on the extent and nature of their support to their units.

Over the past several months we've been developing and digesting our lessons learned from OIF and from Operation Enduring Freedom. Our goal as we work on these lessons is to continue to do those things that we do well and improve on those that we don't, to keep Space operations relevant, supportive, and complementary to military operations and the role other branches and functional areas play in those operations. One lesson came through loud and clear: military leaders don't know what they don't know and it's only through the actions of hard-charging Space professionals that the leaders discover Space-based capabilities and how to employ them in military operations. We Space professionals must continue "selling" our services, educating senior leaders, peers, and subordinates on how Space operations enables and enhances military operations, and integrating ourselves on the supported staffs. Only through those efforts will those Space-based assets and products make their impact on military operations. Only through those efforts will Space operations become a normal part of military operations.

I would like to switch for a moment from Space support during OIF to mention an important operation that I benefited from while I was the deputy commanding general at Fort Bliss. It's not a Space-centric mission, but a people-centric one. Foremost is the importance of a post-wide team that focuses not only getting the troops and equipment deployed, but also taking care of the families left behind. The Army does the first very well, but we often let the latter essential task slide. When the 507th Maintenance Company was attacked, I was in the middle of my own deployment to OIF. As you know, some of the unit's soldiers were killed, and some were taken prisoner. The importance of family readiness immediately became blindingly evident.

The family readiness groups for that company and battalion went into action providing support and liaison for the families. The post support staffs, led by the

***One lesson came through loud and clear: military leaders don't know what they don't know and it's only through the actions of hard-charging Space professionals that the leaders discover Space-based capabilities and how to employ them in military operations. We Space professionals must continue "selling" our services, educating senior leaders, peers, and subordinates on how Space operations enables and enhances military operations, and integrating ourselves on the supported staffs.***

**Below, members of Army Space Support Teams 13 and 14 prepare to deploy in support of Operation Iraqi Freedom last April.**

Chief of Staff, dove in to interface with the families at Fort Bliss and with the bigger Army that was providing support to families not located on Fort Bliss. Because we all shared the tragedy and pain, it may have made it a little easier for the families. What might the results have been if the post and the unit hadn't had a good family support structure? It reinforced for me that not all of the heroes were deployed overseas. We were fortunate to have a selfless team of volunteers ready to respond when needed. This is one mission, one essential task that is important to every unit in the military.

In summary, all of us, at SMDC and in other Army units, should feel great pride in our collective contributions to the success of Operation Iraqi Freedom, whether deployed to the "front lines of freedom" in Iraq and Afghanistan or at home. The contributions of Space operations to our successes in the Middle East can be attributed to the foundations laid over the years by Space professionals assigned to this command and throughout the Department of Defense. I encourage all of you to continue that work as we prepare our Army to meet the challenges of the next battle in the Global War on Terrorism.

# The View From (Army) Space ...

*"The security and well being of the United States, its allies and friends depend on the nation's ability to operate in space."*
*— U.S. Space Commission Report, 11 Jan 02*

**By COL James R. Pierson**

Summer is traditionally a time of transition. And this past summer has been no different for the Force Development Integration Center (FDIC). On Aug 18, I assumed the duties as Director, FDIC. Succeeding COL Glen Collins will be a challenge but certainly one that I'm looking forward to.

After three years as the Director, FDIC, COL Collins has been instrumental in the maturation of the Space Operations career field and many of the outstanding successes that the Army Space Operations career field has enjoyed. Since March 2003, COL Collins has been a vital part of the Office of Reconstruction and Humanitarian Aid (ORHA) during Operation Iraqi Freedom (OIF) Phase IV operations. The Army and Joint Space community will miss COL Collin's leadership and vision. We bid him a fond farewell with gratitude for a job well done!

During the past year, I have served as the Army Space G-3 and the Army Space and Missile Defense Command (SMDC) Deputy Chief of Staff for Operations and Plans. My previous Space-related assignments include duty with the Army Space Program Office (ASPO), U.S. Space Command/J-5, and SMDC Liaison Officer to Training and Doctrine Command. As director of FDIC, I intend to build upon the solid foundation that has been laid throughout the entire Space Operations career field. We face challenges — continuing to conduct combat operations in Afghanistan and Iraq, fielding a ground-based midcourse missile defense system and working towards a transformed Force, just to name a few.

As you can see from the theme of this Army Space Journal, "Space — Focus on Operations," OIF is front and center. We have introduced various perspectives from Space warriors — leaders who are redefining excellence across the spectrum of operations.

Demonstrated firsts, such as Space support in Phase IV, and Space support to a Marine Expeditionary Force (I MEF), Division (4th ID) and to our Special Operations Forces (SOF) are just some of the highlights you will read about in the coming pages. In addition, we have also begun to add articles from warfighters who benefited from our Space capabilities and Forces (e.g., LTG William S. Wallace, Commander V Corps and XXX, I MEF). The ability to share our successes with other Space professionals is important to our continuing development. Equally as critical is our collective ability to identify the right "Lessons" from our experiences in order to draw out the DOTMLP-F implications that we must "Learn." Too often, lessons learned get overcome by tomorrow's priorities — resulting in a failure to fully learn and validate these lessons. We cannot allow this to happen. We must gain the necessary and relevant insights from our most recent combat experiences in order to change in the right direction and — at the tempo required.

We want to make this publication, the Army Space Journal, a hallmark for Space professionals. This must begin with intellectually challenging articles. It should continue with rigorous debate about the assumptions, concepts and conclusions reached in each article. After all, "steel sharpens steel." In this context, it is imperative that you, the reader, let us know what you want to hear about and what you think about the published articles. We're pleased to enclose in this issue two letters from readers. We hope that's just the beginning of dialog with our readers. The more we hear from you, the better we'll be. It is your Journal!

One concept not written about in this Journal, that I will put on the table, is the Joint Space Forces Coordinating Authority (JFSCA). Designated by the Joint Force Commander, per JP 3-14, the JFSCA is a key focal point for theater Space Operations. How does the Army best organize to support the JFSCA, assuming it is another Service (e.g., the Coalition Force Air Component Commander (CFACC))? Can the organization performing JFSCA duties change as the campaign shifts phases? Is the

## Fifth Class
## Space Operations Officer Qualification Course

**Back Row (left to right): CPT (P) Mike York, COL Bill Boik, Maj. Kyler Barnes, USAF, Capt. Brad Phillips, USMC, MAJ Greg Glover, SSG Kipp Wilson, CPT (P) Dave Robinson, LTC Max Corneau, MAJ Gary Curry, LTC Greg Palka, LTC Brent Kremer**

**Front Row (left to right): LTC Dan Fox, CPT Angie Tofflemeyer, MAJ Annette Merfalen, CPT Bo Taylor, BG Robert Lennox - DCG for Operations, MAJ Rich Lewis, LTC Rob King, MAJ Frank Wright, CPT Bo Stolarcek**

Army the best organization to perform JFSCA duties during Phase IV?

We will have many challenges/opportunities over the coming months. These include the development of integrated Blue Force Tracking Mission Management Centers, integrating spectral imagery throughout the Force, defining how Space support should be provided to SOF and examining the feasibility of integrating Space support teams with information operations support teams and the Army Air and Missile Defense Command in support of our future Army warfighting organizations.

To enhance communication throughout the FA40 community, we are exploring ways to bring all FA40s together on a quarterly basis. The intent will be to enhance cross talk and continue advancing on our learning curve. A key and pertinent example of learning from our FA40s is this very issue of the Journal, in which _____ established and in the field FA40s have contributed articles detailing their experiences as Space operators during Operation Iraqi Freedom. Our goal of normalizing Space is immeasurably closer thanks to the considerable accomplishments of this bunch of hard working Space officers, who were in harm's way just as much as any infantry soldier. They worked to save lives and win battles, using Space. And to think, just a few short months ago, some of them were, like the officers pictured above in the current FA40 class, in the schoolhouse. Phenomenal advances have been achieved, not quite at light speed, but….

More to follow …

In closing, I look forward to working with and meeting you — the Space Operations professionals — over the coming months.

## Letters to the Editor

The Army Space Journal arrived with the mail yesterday, and I was finally able to spend a few minutes with it this morning. What greeted me opposite the table of contents was an article on Bob Hope. A lot was written about Mr. Hope following his death, but that one page was the most poignant use of ink I've seen. It would seem out of place in a "Space Journal", but was exactly where it should be - communicating to soldiers. Incredibly well written - one of those articles that exudes passion and character. Thanks for including it!!

COL Teddy Bitner
U.S. Army (Retired)

I picked up a copy of the Army Space Journal at the Space & Missile Defense Conference at the VBC in Huntsville. It was the first time I saw one. Very informative publication and great piece on Bob Hope by the managing editor in the front cover. Please add me to your distribution list.

Greg Heath
SMDC-RM-P, G-8

# Space —

## Focus on Operations

References for this issue center around, but are not limited to, Joint and Army publications such as Joint Publication 3-14, Joint Doctrine for Space Operations, 9 August 2002; TRADOC PAM 525-66, Force Operating Capabilities, 30 January 2003; TRADOC PAM 525-3-14, Concept for Space Operations in Support of the Objective Force; and TRADOC PAM 525-3-90, Objective Force Maneuver Units of Action, 1 November 2002.

Previous issues have concentrated on Army Space operations. The Winter/Spring 2003 edition, "The Role of Space in Army Transformation" and the Summer 2003 edition "The Army's Future in Space" led us to the point where we tell the world of our Army's vitally important role in Space operations.

Recent operations within Iraq now lead us to examine the immediate lessons and craft a course toward relevant discussion. Army Space support to Operation Iraqi Freedom (OIF) demonstrated within the following articles reveal the importance of those operations throughout the strategic, operational, and tactical levels of war.

In addition to OIF contributions, Space operational changes as a result of the FY 03 Unified Command Plan (UCP) are vast and complex. The stand-up of Northern Command (NORTHCOM) and the ongoing merger of the U.S. Space Command (USSPACECOM) into the U.S. Strategic Command (USSTRATCOM) identified operational and technical challenges, as well as opportunities, that are the theme of this issue. Addressing those challenges and opportunities within this forum allow a comprehensive look at this focus from a "mud-to-Space" perspective.

These references provide relevance as the Army continues transformation from Legacy Force, through Interim Force, and toward Objective Force. We use these publications, and others, as touchstones and as a way to articulate our Army's "Space chronicle" to the world.

Beginning with broad-area review, an operational Space study must first begin with the challenges that face our transforming Army. Topics of discussion within all of the combat development areas of Doctrine, Organizations, Training, Materiel, Personnel and Facilities provide the necessary dialogue toward which this issue's Space operational focus is geared. We want to highlight that the Army's operational Space mission is not only relevant to the Army, but also required for the Department of Defense in total if we are to achieve the Objective Force's operational concept success. The Objective Force concept may fail if our current operational Space planning and future execution is fundamentally flawed.

To tell our "Space chronicle," the Army cannot go it alone. Teaming within the Army Major Subordinate Commands, within the Department of Defense, and throughout the civil Space community requires a near-wholesale change of culture within our Army if we are to meet our operational Space requirements. A current example of this dilemma is noted throughout the recent, and fundamental, changes within the UCP. Coupled to rapidly-shifting and newly-created materiel acquisition policy changes, it's easy to see that our Army confronts not only a tremendous challenge to carefully craft our Space operations focus, but also faces a remarkable opportunity at the same time. This issue's theme is to tell that story to the Army and, therefore, to the world.

An example of this challenge/opportunity paradox is present within the newly created Office of Homeland Security. This office is tasked with three primary missions: prevent terrorist attacks within the United States, reduce America's vulnerability to terrorism, and minimize the damage from potential attacks and natural disasters.

There are several challenges/opportunities within the realm of Military Assistance to Civil Authorities (MACA) to provide Army Space support for pre-event, post-event, counter-terrorism and/or environmental operations. It is imperative that Army Space operations maintain a significant role with the civil authorities to provide on-site, dynamic and relevant Space operational support to any crisis. This is one Space support mission that cannot be accomplished from a fixed, static facility and without "boots on the ground" at the point of operations. The very nature of MACA, and the inherent Space operational support opportunities, tie-in nicely to the Army's ability to provide on-site Space support. And while this "skill set" for Army Space MACA may seem at first limited to one combatant command (NORTHCOM), it is actually well suited to outside the cotinental U.S. operations under the title of humanitarian assistance for all combatant commands. There are many examples where our military's assistance is key to the stability of a given situation and where that assistance is put to the test. A term that perhaps best describes the nature of this test is "para-political." Space operations, by necessity, play a major role in the para-political aspects of tremendously complex stability operations. Possibly, the best recent example remains our ongoing military operations within Bosnia. That said, it's easy to see how the concept of Army Space support to civil authorities during homeland operations equals humanitarian assistance outside the continental United States. And, therefore, a relevant Space operations mission for current and future Army Space forces is military assistance to civil authorities/humanitarian assistance.

Addressing those relevant missions for current and future Space operations and tying their key points to approved and/or conceptual doctrine allows our Army the ability to set the conditions necessary toward securing Objective Force success. Objective Force success ensures the Army meets and exceeds required contributions toward the Joint fight. Winning the Joint fight is what our nation expects us to do.

Overall, the intent of this issue is to tell the Army's story about what we are doing, what we should be doing, and what we need to do within Space operations across the board. Authors have used their research toward crafting timely, accurate, and relevant articles in order to present this Space operations focus. To apply now-common terminology within our national press corps current media operations, our "embedded reporters" of this issue provide the best of their experience and judgment to present now, "Space — Focus on Operations."

# Before the War

## Military Officials predict value of Space in Operation Iraqi Freedom

The following is an adapted, excerpted transcript of a Department of Defense briefing on Space support to warfighters, given just a few days before the start of Operation Iraqi Freedom. MG Judd Blaisdell, director of Space Operations and Integration for the Air Force, and COL Steven Fox, Director of Army Space Support, gave the briefing. A question and answer period for attending press followed.

**Blaisdell:** Good morning, ladies and gentlemen. You have a great opportunity today, a great opportunity to see how our Space forces make a difference in the fight. And that's what I'm going to spend a few minutes with you on today. I run Space Ops for the Air Force, so let's get right to it.

Ladies and gentlemen, Space truly is a worldwide mission. We've got 33,600 folks spread in 21 different locations here in the United States, and 15 places around the world. So you're dealing with a real synergistic effect here. It's not just the continental United States.

Let's talk a little bit about the advantages. And I've given them to you here somewhat up front. I'm going to go through each of them and give you really what Space does for air, land and sea. It's a force multiplier. We're the number-one Space-faring nation. And here is an opportunity to not only move from day-to-day operations but to continue to make a difference in any battle that we enter. Air, land and sea is used to working together and has for many, many conflicts. Space over time now has — since Desert Shield, Desert Storm, which was really the coming-out portion of that — has really made a difference. And you see it today in Operation Enduring Freedom in Afghanistan. So an opportunity here to really make a difference. We'll talk a little bit about that.

(A historical overview of the military's Space accomplishment followed. The transcript below takes up with the current era. Blaisdell's comments were accompanied by a slide show.)

What I've shown you here is imagery. Here is an an al Qaeda camp. We've got Serbian garrisons. At the bottom left, we have Iraqi buildup of one of their missile sites. Ladies and gentlemen, these images are not only the products of military satellites, but also that of a number of commercial satellites available They can get you down to one meter or better. The commercial opportunity at imagery is important, and the responsibility for its contracting rests with the National Imagery and Mapping Agency.

Civilian imagery as well as military imagery gives us that look at the battlefield that's so necessary.

The high ground. Here is the importance of weather for all services. You would no more go into a battle in any region of the world without weather information than a number of the other capabilities I've shown you. For the Army, obviously, they want to know moisture and soil content. They don't want their tanks bogged down. The Navy needs to know winds and sea state; if you're in a cold climate, iceberg opportunities. But those carriers point into the wind and you need to know all of that type of information. Obviously, the Air Force, we're not going to do refueling operations in thunder storms. So, very, very important. Contrails, for example. What's the temperature in the air? We don't want to show flight contrails of our aircraft coming in. So very, very important opportunity here, the Defense Meteorological Satellite Program that we have up there.

Ladies and gentlemen, nobody comes close to us. Your air and Space forces are extremely dominant. We control the high ground. Air, land and sea is better because Space forces are there, and we're getting better and better at it every single day. It's — a machine-to- machine interface that we're driving to. But as I've shown you here — and soon Colonel Fox will give you the Army side of it — it's a good thing that the United

States has the Space capabilities that it does. And I pity the enemy.

COL Fox.

Fox:: Good morning, everyone. Appreciate the opportunity. I'm Colonel Steven Fox. I'm the director of the Army Space Program Office, but I'm also the project manager for the Tactical Exploitation of National Capabilities, often referred to as TENCAP.

Today Space enables virtually everything we do, from detection of missiles immediately upon launch, so we can prepare to intercept them, or to deal with the effects, if necessary. We use long-haul communications for command and control, and we collect data for analysis. And we also use Space for dissemination of intelligence capabilities.

We use GPS for other Space-based systems to locate targets, and as you heard before, we use them to guide our weapons. We can also keep track of supplies, and we use them for logistics operations. Recently we're using the Army track system, as an example of that, and of course we use Space-based systems for our navigation.

The Army really considers themselves the largest user of Space capabilities. And most recently, our Afghanistan involvement highlights how much we do rely on Space. One of the systems, the Tactical Exploitation System, combined some of what we call TENCAP capabilities into one single multi-intelligence capability where we're allowed to merge many different pieces of information together. We saw it for the first time in real world operations during this Afghanistan operation.

We also fielded a new system called Grenadier BRAT, which is what we call a Blue Force Tracking device. This allows us to keep track of our soldiers who are way beyond line of sight of normal communications. It's important, as you will understand, in the modern battlefield with all the different actions that are going on and how vital it can be.

We also fielded the Joint Tactical Ground System, often referred to as JTAGS. This is a system that we use in concert with some of the sensors that you just heard about. It allows us to disseminate missile data warning very quickly to the soldiers so they can take the appropriate action.

We also deployed for the first time Army support teams, which were well received.

But primarily, the bottom line is Space ensured that we had an uneven playing field in favor of the United States and our allies. Space is fundamental to the way Americans are going to fight.. And the true meaning of air and Space is shrinking the time it takes for the attack chain, and we're changing it to an instantaneous attack chain.

**Question from the press: Can I just ask one quick thing, while you're on keeping track of soldiers. They carry a small transmitter, right?**

Fox: That's correct.

**Q: And it communicates with a satellite?**
Fox: Correct.

**Q: How big is it?**
Fox: It depends on the version, but we have various sizes in various platforms. Whether they're on aircraft there's one version based on air-worthiness requirements, and then there's man-packable versions.

**Q: And do they carry it in a pack or on a belt?**
Fox: Yes, to both. They can — it depends on the version that we have available. One of the essential tasks that were identified by the Army Chief of Staff was to enable situation understanding — what we call "off the ramp." What this requires is a situational awareness and an understanding — the instant we are alerted at home station — that we're going to be deployed. We then continuously build a knowledge base through the deployment process so that when we conduct early entry operations, whether they're in a hostile or permissive environment, we understand what the situation is. Space-based capabilities are the key enablers that allow us to do this. The Space environmental monitoring of weather that you've heard about — plus mapping and terrain analysis — brings us up-to-date information so that we can understand the terrain and the climate of a distant land before we ever arrive in fact.

Additionally, if you combine this with intelligence support from our National Imagery and Signals Intelligence Systems, it allows us to bring to the warfighter these capabilities that provide increased detail and information of enemy activities, and to support our intelligence preparation of the battlespace. The uses, in essence, help protect the soldiers and making them more effective.

If you amplify the situational awareness along with the greater standoff, the more rapid, accurate warning, increased accuracy and weapons to ensure communications of increased military effectiveness, we have increased the lethality and the survivability of our soldiers on the battlefield.

**Q: I have a question for each of you. You talked about what would happen to communications in military operations without Space. Could you describe what threats exist to Space capabilities? I know this is part of the Space-control thing, but is there anybody out there that has the capability, I don't know, like an Electro Magnetic Pulse or something, to sort of shut all that down?**

**And for the Colonel, could you address what we heard a great deal about during Afghanistan, of soldiers buying off-the-shelf satellite communications devices to bring with them; why they did that; if you encourage that or if that's something that you think you've taken care of, that they don't need to do that anymore?**

Blaisdell: Okay, great. I think your question was, are there any threats out there against some of our communications systems and what not. There are a number of threats. And there's always an opportunity for an enemy to perhaps jam a satellite or try to blind it in some way. As to the specifics of that, you know, we're getting down into the weeds in the tactical side of that; I'd prefer not to do that. But that's why you need the Space situational awareness. As I was telling you, you need to be able to understand whether you had a problem with your satellite out of natural occurrences or whether or not somebody was intentionally trying to mess with your satellite. And so we'll be into trying to detect that.

**Q: How often do you see that ever? I mean people messing with your satellite.**

Blaisdell: Let me try to demonstrate this. I'll use an example

***The Army really considers themselves the largest user of Space capabilities. And most recently, our Afghanistan involvement highlights how much we do rely on Space. One of the systems, the Tactical Exploitation System, combined some of what we call TENCAP capabilities into one single multi-intelligence capability where we're allowed to merge many different pieces of information together. We saw it for the first time in real world operations during this Afghanistan operation.***

that General Estes used when he was head of Space Command.

Most of your communications satellites are out there a long ways. They're out in geosynchronous orbit, about 22,300 miles. Don't hold me down to the exact mile, but pretty close. It moves as the Earth moves. So we're geostationary.

Within that belt, there is an opportunity for countries to lease slots. The country of Tonga did that and the country of Indonesia did that. And there was, many years past, an incident between the two countries where you had one country ask the other country to turn off its satellite and quit engaging in activity that would affect the country. The country refused, and so the other one jammed their transmission. This did not include the United States. We had nothing to do with any of that. But you can see in the world of commerce, that we have instances where one country and another country may disagree and try to take action.

**Q: These were commercial satellites?**

Blaisdell: Yes, they were. And so the ability of other countries to perhaps try to disrupt at times is there.

**Q: I presume that our satellites are resistant to Tonga's jamming?**

Blaisdell: Some of our satellites may be resistant. Others may not be. But —

**Q: Can you say whether the Iraqis — whether that's within the capability of the Iraqis?**

Blaisdell: I knew you were going to go there (chuckles) — first of all — the briefings that you get — Space-wise, ground-rule- wise — are the tremendous advantages of Space. I want to try to avoid any tactical-type questions in terms of what we might do in Iraq, if I can. But I'm sure one country or another would try to…

**Q: I mean, if Indonesia is capable of jamming a satellite, is it fair to assume that Iraq also would be?**

Blaisdell: The capability of countries to attempt — to attempt — to jam — like you're out there 22,300 miles and the link — you know, they could possibly attempt it.

Fox: I owe an answer here on the GPS receiver aspect. I have heard reports that soldiers have bought what we call off- the-shelf GPS receivers. I believe there's really two reasons for this. And it's kind of like your favorite cell phone — everybody's got a favorite brand of cell phone. I believe that soldiers that are used to a commercial product like to have it and they use it. That's one aspect.

The second aspect of it is, is that — and I used to work for the GPS Program Office earlier in my career — is that when we build our military GPS receivers, we build them to counter threats, and in that process of doing that, the size increases slightly in order to accommodate some of the issues associated with threats. And so if you're a soldier, and you're trying to keep as light as possible, you might grab your personal device prior to taking the true device that has been issued to the squad or to the platoon or to whatever level.

**Q: Isn't that — don't you discourage that?**

Fox: Oh, I believe it's discouraged. But my point is, it's like soldiers also buy cots when they go overseas; they buy themselves a new mattress also. I mean, it's just

*(Before the War, page 58)*

# I Corps Perspective

## FA40s and Space Assets Critical to Operational Success

Although I Corps, one of the Army's largest commands, did not participate in Operation Iraqi Freedom, its soldiers have used lessons from the conflict in recent key exercises such as Ulchi Focus Lens in Korea. I Corps commander, LTG Edward Soriano, spoke to ASJ about implementing Space assets, in present and future operations.

**For the last few years, I Corps has had a Space Operations Officer (FA 40) as part of your staff. How does I Corps integrate space capabilities into its operations during exercises like the Corps Warfighter and UFL?**

Our individual FA40 isn't buried in some other staff section with Space as an additional duty. His job is "all space, all the time" for us. At the Corps level he is the Subject Matter Expert who interjects space effects and capabilities into every aspect of the Corps fight. For example, during the I Corps Warfighter last fall we operated in a location with decades old maps. The FA 40 obtained current imagery of our AO that showed us what had changed over the years from what we had. Roads that had been abandoned and bridges that had been moved where of critical importance to my supply and civil affairs sections in addition to my operators. Because he used commercial imagery we could share this not only with our allies but with humanitarian organizations as well.

**What is your assessment of the SATCOM support available to operational and tactical commanders?**

In the larger picture, the speed of our maneuver forces combined with our increased operational tempo will require the capability to communicate over greater distances and on the move. More and more, we will have to rely on SATCOM to meet our dynamic battle command and communication needs. We must have the ability to exploit our adversary's weaknesses and vulnerabilities (similar to what our ground forces did in OIF). This means that we must be prepared to attack deep and in a rapid manner. SATCOM is absolutely essential to command, control and communicate over vast distances. We may find that our tactical units are spread across increasingly larger distances - distances that negate the ability to communicate via terrestrial means.

Systems coming online in the future will be heavily taxed with demands from all command levels. The ability to push products to the front will be a huge challenge for a Corps commander. What is done in days at a Corps headquarters may take a maneuver Brigade commander less than an hour to execute. The ability to transmit a map with operational information must be quick otherwise it is useless in battle and wastes soldiers' time. Hundreds of mega bits of information that now take hours to download may be fine at the Corps HQ but my subordinate commands can't afford that delay.

**How are space-based systems integrated and synchronized into the I Corps targeting process?**

Clearly, the targeting process relies heavily on space-based communications and surveillance and reconnaissance. Our ability to reachback to higher headquarters and home station is absolutely vital to our ability to See First and Understand First. Reachback cannot be fully achieved without SATCOM. The increasing use of commercial (multi-spectral and hyper-spectral) imagery along with our use of national systems is providing the warfighter with innovative means to visualize the battlefield. Reducing sensor-to-shooter timelines, especially for time sensitive targets like SCUDs, is especially important to the I Corps team. Space is essential to compressing these timelines and being able to rapidly strike targets of opportunity. Synchronizing our battlefield systems across extended battlefield distances and complex terrain requires SATCOM. Down the road, we see the

**LTG Edward Soriano, Commanding General, I Corps, hands out three-star coins to deserving soldiers after a successful field exercise.**
***Photo reprinted courtesy I Corps***

emergence of a space-based radar capability as a critical enabler to our dynamic targeting process.

**Blue-force situational awareness, a key contributor to our success in OIF, is enhanced through a common relevant operating picture (CROP). How would you characterize the role of space systems in maintaining blue-force situational awareness within I Corps?**

The ability to understand and know the locations of our friendly forces is a critical enabler to battlefield success. Besides the obvious benefit of reducing fratricide, blue-force situational awareness allows for an increased operational tempo and the ability to make decisions faster. Over time, this compressed decision cycle significantly impacts our adversary's warfighting ability and allows us to retain the initiative. We must work hard on integrating and synchronizing the many varied types of blue-force tracking systems that are currently being used. The upcoming Joint Blue Force Situational Awareness ACTD should make major strides in this area. Similar to battle command and communications, blue-force situational awareness will likely heavily rely on satellite communications vice terrestrial communications. As we increase our reliance on space systems and capabilities, we must also ensure that these capabilities are protected and their use is assured. Finally, this situational awareness must be extended, not only to our maneuver forces, but also to our logistical operations.

**How do you see the role of space shaping future operations?**

As we move from Today's Force to our Future Force, space-based capabilities will play an increasingly important role across the spectrum of operations. As space-based capabilities proliferate, U.S. forces will face adversaries that also have greater access to these products and services. It will be critically important that our Armed Forces maintain our superiority in space as well as on land and sea and in the air. As we try to minimize our footprint forward, reachback to centers of excellence will play a much larger role. Land warfare will continue to remain at the forefront of military operations but our ability to integrate and shape emerging space capabilities will be critical to our future successes.

During the first Gulf War we saw some space capabilities on the battlefield such as GPS, but today we are even more heavily dependent on space. We route a tremendous amount of information from the front lines back to higher headquarters. Everything from battle plans to supply requests to e-mail. Without space, we could not have our precision-guided munitions hit a building with such accuracy while protecting cultural treasures next to it.

We are moving to the point where the ability to control "threat" systems will become as important a decision as launching a massive strike on a battle front. The ability to limit what the enemy is able to see or hear is just as important on the ground as it is in space.

Space-based Intelligence, Surveillance and Reconnaissance will be the principal "eyes and ears" of commanders. This is especially true of those times early on in an operation. Our forces will succeed with that 24/7 all-weather view of the battlefield. .

The Army has always been a team and will continue to be one into the future. Our very young "space forces" are an important part of the team today and must continue to bring the joint, national and commercial space capabilities to our Army of tomorrow.

# Warfighter's Perspective

## Question & Answer session with the 1st Marine Expeditionary Force

Army Space Support Teams worked side-by-side with the warfighters in Operation Iraqi Freedom. Teams deployed with V Corps and the 1st Marine Expeditionary Force.

LTG William Wallace, distant relative of the William Wallace freedom fighter of Scottish and "Braveheart" fame, was V Corps commander and commander of all Army forces during OIF until mid-June. Wallace is positive about the technologies that assisted in the most recent conflict. He commented to reporters in late summer that "today's leaders are very very comfortable with technologies… prevalent in our society; they in fact thrive in that environment."

However, "despite the vast technology available to the U.S. military," Wallace said, "lessons learned from the war in Iraq include a need for officers to understand the challenges of communications and command and control over long distances." (ARNEWS, Sept. 2)

ASJ will interview LTG Wallace for a closer look at Space support to V Corps for a future issue.

On the Marine side of the story … ARRST 5 deployed in support of the 1st MEF. The team practiced split-based Space support operations, half with the forward command element of combat fame and half with the rear detachment headquartered in Kuwait. The team leader, MAJ Daniel Cockerham, moved with the forward element as it fought its way to Baghdad. Both contingents of the ARRST were integrated thoroughly with their Marine brethren, and experienced the same hardships and fears as did any grunt, be he Army or Marine. Theater Ballistic Missiles threatened, artillery shook the ground, and combat swirled around the lead element in a definitely non-linear on-going battle. Space-based products and abilities assisted the Marines in their critical mission.

ASJ's MAJ Laura Kenney talked with MAJ Michael Scheiern, an Intelligence, Surveillance and Reconnaissance officer in the G2 section of the 1st Marine Expeditionary Force. Scheiern worked first hand with ARRST 5 during Operation Iraqi Freedom and answered the following questions regarding Space contributions.

**Q: 1st MEF received the support of an Army Space Support Team during OIF. How did 1st MEF integrate these resources into its operations and did these Space experts contribute to your success?**

A: Well, there was the division into forward and rear detachments, then, individual people were settled either with our Intelligence Operations, or working TBM warning with our Operations office.

I'd have to say the biggest contribution overall was their serving as a bridge of interoperability between V Corps and ourselves.

Our guys and the Army infantry were approaching Baghdad taking two different routes. Of course we needed to know what the Iraqi forces along those boundaries were doing. The Space support ensured that our two forces could synchronize a common operating picture of enemy activity, as well as communications. This helped us shape our forces so that the enemy couldn't flank either of us.

**Q: OIF was conducted at a pace and over distances that we have not seen before. What is your assessment of the SATCOM support available to operational and tactical commanders?**

A: Wideband commo was a vast improvement over what was available to us in Operation Desert Storm. The equipment your guys brought with them was invaluable, as there was great competition for communications resources. The ARRST came well equipped, a real boon for the gaining command.

Narrow band commo — insufficient to satisfy user demand. I believe finally someone very high up the chain had to allocate those resources.

**Q: How did Space-based systems contribute to**

U.S. Marine Corps Photo

U.S. Army Photo

**Left, Senior leaders of the 1st Marine Expeditionary Force (I MEF); below, members of Army Space Support Team 5, who provided Space support to the I MEF.**

**the 1st MEF targeting process?**

A: Terrain analysis and Space-based imagery were definitely helpful.

**Q: Situational awareness is enhanced through an accurate Common Operational Picture or Common Tactical Picture, how would you characterize the role of Space systems in maintaining situation awareness?**

A: Blue Force Tracking was terrific. Not only did it save lives, but it allowed for an instant messaging capability that was leveraged extensively. It enhanced our communication abilities, making time sensitive communications, such as synchronization of air and ground supporting fires, possible. When you can 'talk' to someone without a time lapse, it increased situational awareness exponentially.

**Q: Much has been said about OIF being the first conflict in which Space systems played a key role. What do you foresee as the role or relationship between Space-based systems and tactical operations in the future?**

A: I completely and strongly disagree that OIF is the first key Space conflict. Space played a very large role in ODS. It's a question of quality versus quantity. The piece that Space played in ODS — national imagery and targeting — was not readily visible to the tactical force. That doesn't mean it didn't have value, it did, immensely.

We are where we are today in considerable part due to what was learned in Desert Storm. Space is an incremental ability, learned over time and through investment in training and technology. We stand on the shoulders of giants.

That said, the role of Space for the future of the warfight? Limitless, especially when it's being used, as it was so well in this conflict, by the tactical commanders. I'd say that's the greatest advance, that Space is out of its stovepipe of just targeting for air campaigns, and now covers expansive distances, usable through integrating Space and ongoing ground tactical operations.

**Q: We like to believe that Space helped save lives and win battles. Do you know of any particular event that supports that concept?**

A: Well, again, Blue Force Tracking is an obvious example, helping to prevent fratricide. But a more specific example would be… We were given the mission, after seizing the eastern half of Baghdad, of advancing on both Tikrit and Kirkuk. That had not been part of the original mission planning. As such, we didn't have information on the routes to either, as we'd been focused on enemy ops in Baghdad. That's where the Space assets kicked in. Between your ARRST team, and the Tactical Event System-Forward (TES-Forward) section, within 24 hours of receiving that new mission, we had the best imagery possible to execute analysis. The information was detailed and complete, and what we learned from it was enough, in fact, to negate the need for movement towards Kirkuk. The information gave us the flexibility to shape the battlespace — we wouldn't have had that without SATCOM and TES-Forward. Those two systems worked together, enabling us to best decide how and when to put Marines in harm's way.

With our ongoing ops in Baghdad, it would have been difficult to build situational awareness of another area simultaneously with combat operations. But with Space support, we had the data when we needed it.

**Q: Could you name one specific aspect of what Space brought to the Warfight as either the most innovative or most useful?**

*(Warfighter's Perspective, page 67)*

# 1st Space Brigade (Provisional)

## Brigade Operations During War

LTC Scott Parks is the 1st Space Brigade (Provisional) Executive Officer. His previous assignments include Space Based Infrared System (SBIRS) Requirements Officer, USSPACECOM; and Chief of Logistics, HQs SFOR/IFOR. His operational deployments include Operation Restore Hope (Somalia) and Operation Joint Endeavor (Bosnia). During Operation Iraqi Freedom he was the 1st Space Brigade (Provisional) S3.

**By LTC Scott Parks**

The 1st Space Brigade was provisionally activated on April 10, 2003, just prior to President Bush's pronouncement of the completion of major military operations in Iraq. However, prior to its provisional activation the Brigade had been performing Brigade command and control functions in support of preparations for war. Brigade personnel and capabilities from the 1st Space Battalion had deployed into theater as early as August 2002. By the completion of major military operations the Brigade had deployed five Army Space Support Teams (ARSSTs) (four active component teams, under 1st Space Battalion and one multi-component team under 193rd Space Battalion, Colorado Army National Guard), three rotations of personnel to the Test and Evaluation Detachment (two from 1st Space Battalion, and one from the 193rd Space Battalion), several Joint Tactical Air Ground Station (JTAGS) rotations, and numerous individual augmentees to Central Command and Special Operations Command. The brigade's support of its deployed forces followed those of a traditional brigade — Planning and Administra-tion/ Logistics.

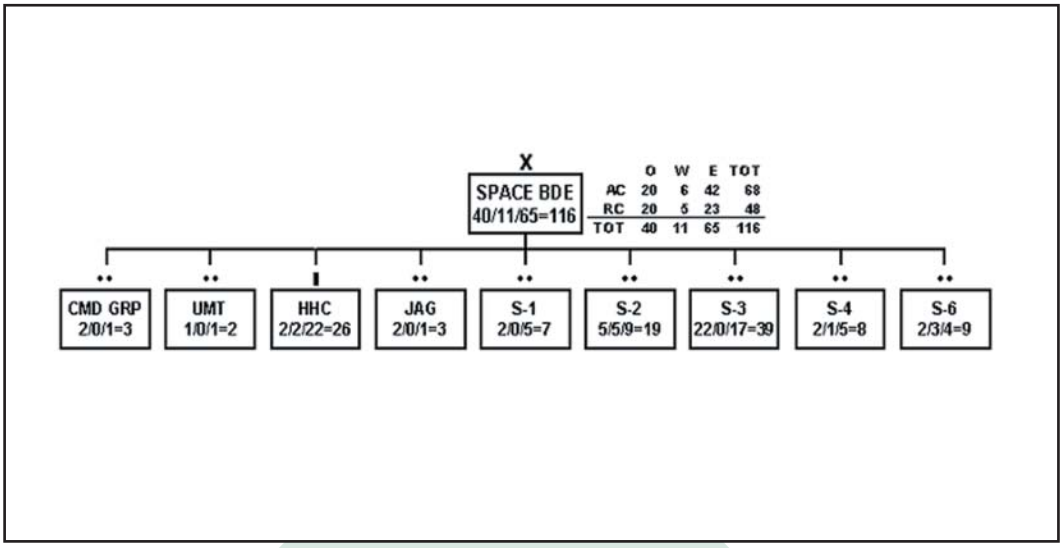
The Brigade's planning support focused primarily on preparation of forces for operations. Initially, this was not significantly challenging given that early Space force requirements had been identified in the deliberate planning process and thoroughly exercised. However, as the plan for post hostilities evolved and the associated Space Forces requirements were reevaluated, demand for Space Forces outstripped the organic capabilities of the Brigade. This forced the command to look for other sources of personnel. The Brigade staff, in coordination with the G-Staff, battle-rostered two ARSSTs and one Test and Evaluation Detachment, from across the Brigade and SMDC Staffs. The battle rostering effort included soldiers from the SMDC-Battle Lab, A, B, C and D Companies, 1st Satellite Control Battalion, Force Development Integration Center (FDIC) and the Space and Missile Defense Command Operations Center (SMDCOC). Personnel were gathered from geographically dispersed locations and provided training by 1st Space Battalion — augmented by contractors — under a compressed time schedule. Although not an optimal solution, the battle-rostered teams provided effective Space support to the warfighters.

Another major planning effort involved the rapid integration of a new ARSST tool, Space Support Element Toolset Light (SSET-Light), into ARSST operations. The Brigade S3 worked closely with the subordinate Battalions, G3, G6 and the SMDC-Battle Lab to determine requirements, CONOPS and a deployment scheme which supported operations. The system proved to be an exceptionally useful tool allowing transfer of large data files without taxing the supported unit's bandwidth. It also provided supported units additional NIPRNET bandwidth for administrative and morale purposes, when it was not being used for mission support.

Numerous logistics and administrative challenges were encountered in supporting our deployed Space forces.

One of the initial obstacles involved the shipment of replacement items to address equipment failures and routine resupply of ARSST specific materials not available in the standard Army supply system. Unlike short duration exercises or deployments to locations with robust logistic infrastructures — to include access to commercial vendors — OEF, and to a greater extent OIF, required in-depth logistics coordination. Shipments of outsized equipment and items requiring rapid delivery was not as simple as sending the items via FEDEX or DHL. For obvious reasons commercial shipment to Baghdad or Tikrit was not an option.

**Figure 1**
**Space Brigade organizational design**




Commercial shipment of supplies and equipment to Qatar, for example, is simple enough but moving it forward from there would require a command representative to transship the material to military transport. SMDC personnel operating in Qatar could perform this task, but this would take them away from their primary duties of supporting the warfighter. Utilization of the military transport and resupply system was the only viable solution. Our traditional dependence upon commercial transportation resulted in a steep learning curve when we were required to utilize the military transportation system to move our material to our deployed elements in early post-hostilities Iraq.

Another logistics challenge involved the lack of ARSST organic lift and mobility. All ARSST equipment, for four of the teams, was moved via shipping containers. Though not atypical of small support slice elements mode of operation, it did result in one team's equipment being left in Kuwait while the personnel moved forward. The team coordinated shipment of this equipment to their operations area, but it was a painful process. This lack of lift also contributed to the lack of mobility in the team's operational area and subsequently also affected their efforts for normal daily supply and administrative actions.

Under its provisional and pre-provisional status, the Brigade coordinated its support with a staff of no more than eight military, two Department of the Army civilians, and one contractor. This lean organization demanded close matrix support and coordination from both the higher G-Staff and our subordinate S-Staffs.

The future of the Brigade's support to operations and exercises hinges on the approval of the Force Design Update (FDU) and subsequent Modified Table of Organization and Equipment (MTOE), currently under review. The proposed structure for the Brigade make it a more self-sufficient organization capable of providing support in new ways — which are intended to allow responsiveness via reachback to the Home Station Operations Center (HSOC) and forward via a deployable Operations Center. Under the proposed operational organization, the Brigade Staff swells to 68 active component soldiers and 48 reserve component soldiers (Figure 1 above).

Nested within this structure is Army Space Forces Command Operations Center (ASFCOC). The ASFCOC is a sub-element within the Brigade S3. It is designed to provide in-theater planning, coordination, and integration of Army Space Forces and Space control operations. The ASFCOC deploys into the theater of operations in support of the Army Forces commander or, if designated, the Joint Forces Land Component Commander, or Joint Forces Air Component Commander ensuring that Army Space operations are properly coordinated and integrated with those of joint and multinational forces. If directed to, the ASFCOC would provide joint C4I and coordination for all the service's Space Forces in theater.

One of the ASFCOC's primary missions will be to provide Army Space control planning and coordination support to the Joint Force Space Operating Authority (JFSOA). The Brigade Commander supported by his ASFCOC would also exercise authority as the Army Space Coordinating Authority. As such, the ASFCOC would likely be co-located with the JFSOA, or could be designated JFSOA, for that matter.

The ASFCOC could further support elements of the Joint war fight by placing FA40 LNOs with elements that require Space support, but are not generally provided an ARSST (i.e. Combined Joint Special Operations Task Force, 32nd AAMDC, etc). The LNOs could facilitate integration and provide exper-

*(Brigade Operations , page 71)*

# Space Support Cell

## Riding Space in the Iron Horse Division

LTC Eric Henderson is the Current Operations Chief for SMDC-Colorado Springs. He has commanded at the company and battery level three times. His military Space experience includes tours as an orbital analyst, both Deputy Chief and Chief of the Space Operations Branch, Cheyenne Mountain Air Station; Army Space Support Team Leader, ARSCC Commander; SMDC LNO to the Combined Arms Center, FT Leavenworth KS, and Space Support Element lead for the 4th Infantry Division.

**By LTC Eric Henderson**

U.S. Army Space and Missile Defense Command is no stranger to providing Space support to the warfighter. However, in Operation Iraqi Freedom, the command was challenged by injecting Space at the Division level, something it normally provides at a Corps, Task Force, or Theater level. The 4th Infantry Division asked for and subsequently received an Army Space Support Team. This was the first time an Army Division requested and received this type of Space support in the very harsh and austere Iraqi environment.

The Space support cell deployed into theater via U.S. Air Force lift on Friday, April 18, 2003. After road marching to Camp New Jersey, the team initially linked up with the Division Rear on Sunday, April 20, 2003. Coincidently, the same day the Division Main deployed north into Iraq. Two days later the Army Space Support Cell integrated into a tactical convoy and made its way north, a two-and-a-half day road march with the 1st Battalion, 68th Armor.

After arriving at the Division Main site, the Space support cell quickly set up and within hours established connectivity with the SMDC Operations Center, Colorado Springs, Colo. In doing so, immediately the team began to leverage Space systems for the Iron Horse Division. The Space products and services provided fall into five Space Force Elements: Positioning, Navigation, and Timing; Intelligence, Surveillance, and Reconnaissance; Space Weather; Satellite Communications; and Theater Missile warning.

Immediately, the Iron Horse Division Main learned of the added value of the Army Space cell's abilities when the Tikrit Presidential Palace Complex was attacked by a series of mortar explosions, rocket propelled grenades, and small arms fire. Though only set up for hours, the Space support cell promptly provided imagery of the complex and surrounding area. Using this product, security forces quickly planned a reaction operation. The result was the destruction of a residual terrorist group and capture of its leaders in the early morning's light. While the attacks became less frequent as the local population sensed the strength and security of the Division, this situation serves as a very concrete example of the expedient force application of the Space support cell at a division level.

While numerous requests for imagery were readily met by the Space cell's abilities, on several occasions the cell leveraged other Army Space Support assets in the theater. Other Army Space Support Teams were called upon to meet the needs of the division. Utilizing the SSET-Light — a Space support system developed by the Command's Battle Lab — imagery was supplied by the Combined Forces Land Component Command's Space Support Team in Doha, Kuwait, the V Corps Space Support Team in Baghdad, and the Spectral Operations Resource Center (SORC) in Colorado Springs, Colo. Specifically, these products, pulled through the pipe, cut to a CD, put onto a slide, sent via an internal secure medium net through the division planners, made their way into the hands of brigade, battalion, and even company leaders, as the 4th Infantry systematically and thoroughly destroyed groups of resistance. These Space products enabled combat units to see first, understand first, act first, and finish decisively. The end result was the complete and utter destruction of numerous anti-American groups and units.

The 4th Infantry Division's Space cell posted the standard Space products on their host unit's "Dashboard." In this digitized division, leaders and subordinates had the ability to see daily Space updates and empowering information. The integration of Space at every opportunity and decision point facilitated planning and operations throughout the command's area of responsibility. Of particular note was the Space cell production of Space imagery used in the planning of negotiations. Space awareness and its impact on the battlefield allowed planners to anticipate the adversary's movements and positions in the Bacaba region. Leveraging reachback to the SORC, the Space cell

***Immediately, the Iron Horse Division Main learned of the added value of the Army Space cell's abilities when the Tikrit Presidential Palace Complex was attacked by a series of mortar explosions, rocket propelled grenades, and small arms fire. Though only set up for hours, the Space support cell promptly provided imagery of the complex and surrounding area.***

provided updated products to the 4th Infantry Division Assault and tactical command post even as it moved to confront the Mujahedin-e Khalq (MEK), a force of more than 10,000. When confronted with the overwhelming evidence (including Space products) and the show of the division's resolve, the adversary surrendered without hostile activity or prolonged negotiation.

The division experienced a series of satellite communications challenges as the digitized division sought to communicate effectively. Frequency management became a priority after the Space support cell assisted the division G-6, and determined the impact and sources of units "self-jamming." Further assistance isolated problems with the Division's Global Positioning System-dependent SMART T and SCAMP terminals. Having verified all satellite operability, the Space operations officers sought assistance with the equipment's soft and hardware experts via the SMDC Colorado Springs G6 shop. Within 24 hours ten of the twelve assigned SMART T(s) and seven of eight SCAMP(s) were fully mission capable.

In conclusion, it isn't a question of whether a Space cell is needed at the division level; rather, it is a question of how robust a Space cell is required. Army Space and Missile Defense Command continues to leverage and integrate Space into every level of operations. The 4th Infantry Division's Iron Horse Team has defeated the enemy, provided security to the people of Iraq, and stabilized the Northern Iraqi Region. "Bringing Space to the WARFIGHTER" isn't a slogan in Tikrit, Iraq … it is the normalization and operational implementation of an awesome combat multiplier.

**Top, U.S. soldiers in Iraq make their way to one of many buildings that were converted into U.S. operational facilities; Bottom, l-r, CPT Tim Tubergon, LTC Eric Henderson and MAJ Sandy Yanna, members of Army Space Support Team 14 take a moment to relax during their recent deployment to Iraq.** *U.S. Army Photos*

# Space Support Element Toolset, etc ...

## Rapid Prototyping Support to Army Space Forces

LTC Jeff Souder serves as the Chief, Experiments Division of the Space and Missile Defense Battle Lab in Colorado Springs, Colo. His professional experience includes over 18 years as an Army Signal Corps and Acquisition Corps officer. During this time, he has held assignments as Program Manager for the Army Space Exploitation and Demonstration Program, Assistant Product Manager, Tri-Band Satellite Systems, and Chief, Modeling and Simulations Branch, Directorate of Combat Developments, Fort Gordon, Ga. LTC Souder earned his MS degree in Computer Science from the Florida Institute of Technology and his MA Degree in National Security and Strategic Studies from the Naval War College. He may be reached at 719-554 (DSN 692)-4169 or at Jeff.Souder@arspace.army.mil

**By LTC Jeffrey Souder**

The American buildup of military forces in Southwest Asia, leading up to Operation Iraqi Freedom (OIF), provided U.S. Army Space and Missile Defense Command (SMDC) soldiers the opportunity to satisfy a Special Operations Command Central Command (SOCCENT) Request For Forces. This request, forwarded via U.S. Strategic Command, requested the deployment of Space personnel and equipment in direct support to deployed Special Forces units supporting both Operation Enduring Freedom (OEF) and OIF. This SOCCENT request for forces (received Nov. 21, 2002) resulted in Space and Missile Defense Battle Lab's "Project Alpha," a rapidly-prototyped initial build of five Space Support Element Toolset-Light (SSET-L) suites of equipment for deployed special forces units, the SMDC Operations Center (SMDCOC), the Spectral Operations Resource Center (SORC)-Rear and SORC-Forward. The timeline from receipt of the SOCCENT request to the initial fielding of an SSET-L was less than three months.

Immediately following the deployment of personnel and Project Alpha equipment in accordance with the SOCCENT request for forces, the Space and Missile Defense Battle Lab began efforts on "Project Bravo" and "Project Charlie," the build of another seven SSET-L equipment suites, which were fielded with seven deployed and deploying Army Space Support Teams (ARSST).

In all, 12 SSET-L suites were fielded within extremely limited wartime timelines and along tight fiscal constraints. The direct result was the very successful design, build, testing, training, deployment, and sustainment of multiple suites of rapidly-prototyped equipment sets that provided immediate capabilities to operational Space, information operations (IO), and missile defense related combat requirements.

Collectively, over a six-month period (December 2002 - May 2003), Army Space Command, and the Space and Missile Defense Battle Lab (SMDBL) deployed the largest and most capable Space force in our Army's history. These forces included the deployment of six ARSSTs, personnel to two Joint Space Support Teams, two Materiel Training and Fielding Teams, 12 rapidly-prototyped Space equipment suites, a SORC-Rear and -Forward, an element co-located with the U.S. Air Force's Eagle Vision 1 ground station, the first ever tactically mobile ground-based laser weapon system (ZEUS) and one JTAGS Team. These forces supported combat locations in two theaters while supporting SOCCENT, CENTCOM and two services (Army, Marines). They were committed to two major operations, OIF and OEF, at four levels (Army, Joint, Combined, Coalition) and were integrated at four echelons (Division, Corps, Joint Task Force, Combined Forces Land Component Command). In the continental U.S., a combat-oriented SMDCOC conducted home station operations center tasks supporting deployed forces. This operation collectively provided unprecedented Space support to United States tactical forces engaged in the global war on terrorism.

This article, in particular, provides a detailed look at U.S. Army Space and Missile Defense Battle Lab's rapid-prototyping of SSET-L equipment suites and its support to the Army and Joint Space Warfighters in OEF and OIF.

### The Equipment

The design of the SSET-L equipment suite was based upon lessons learned during the past three years of Space and Missile Defese Battle Lab experimentation and demonstration, after action reports from ARSSTs, and emerging Army, Space and strategic doctrine. The SSET-Ls were built primarily using Commercial Off-The-Shelf and Government Off-The-Shelf technologies (hardware, software and communications). Each SSET-L consisted of two Space Operations System (SOS) workstations, one Communications Suite and one satellite antenna dish

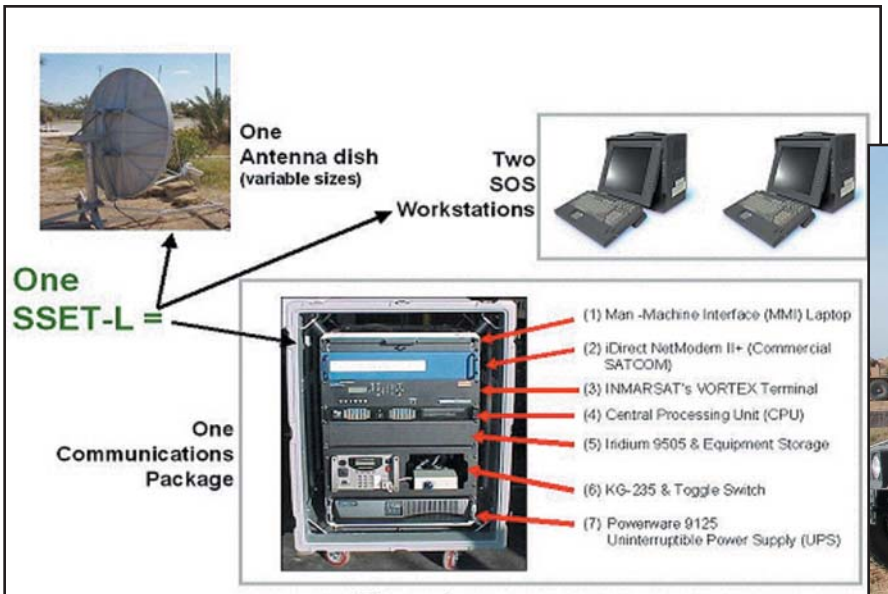



Figure 1

Figure 2

(varying sizes were provided). Figure 1 provides photos and a summary of SSET-L components.

Each SOS workstation included various software applications to include:

- SBMCS (Space Battle Management Core System) — Space order of battle data, GPS navigational accuracy calculating and other Space-specified data
- BattleScape Standard — used for Battlespace situational awareness
- W3 (Wireless Web-based Warfighter) — various reachback applications
- AWarE (Advanced Warfare Environment) — receipt and display of missile warning and air defense situational awareness
- Falcon View — 2D and 3D visualization and simulations
- BRITE (Broadcast Remote Intelligence Technology Experiment) — near-real-time reachback to collateral National Imagery
- PDS-M (Processing Display System-Migration) — display tactical ballistic missile warning
- STRED (Standard Tactical Receive Equipment Display) — used for display of national intelligence
- Edge Viewer — situational awareness
- ELT 3500 (Electronic Light Table) — imagery file format conversion
- MS Office 2000 — used for various reports (Word, Powerpoint, Excel)

Each SSET-L suite of communications hardware suite included:

- Commercial Satellite Communications Terminal, an I-Direct NetModem II+, which provided up to 900 Kbps uplink and 2.0 Mbps downlink data rates (secure, up to SECRET), with connectivity to the NIPRNET, the worldwide Web and various databases
- INMARSAT Terminal, a Vortex Terminal which provided multiplexing of up to 128 kbps (secure up to SECRET), and used for voice, data, and facsimile
- Iridium model 9505 mobile satellite service phone (voice with encryption, secure up to SECRET)
- Man Machine Interface Laptop, used to configure SSET-L components
- UPS (Uninterrupted Power Supply) with voltage conditioning
- KG-235 providing data encryption for both I-Direct and INMARSAT satellite services

ARSST 14, attached to the 4th Infantry Division, had a HMMWV-mounted version of the SSET-L. Figure 2 (above) provides a picture of ARSST 14.

**The Space Warfighters**

Deployed Army Space forces in support of OIF included five SSET-L equipped ARSSTs, one SSET-L equipped SORC-Forward Team, an SSET-L and operator co-located with the Eagle Vision 1 direct satellite downlink station and two SSET-L equipped Joint Space Support Teams. Support directly related to OEF included an SSET-L equipped ARSST that provided direct support to the Combined Joint Task Force-180 in Afghanistan. In the continental United States, SSET-L capabilities enabled the SORC-Rear and the SMDCOC. Figure 3 (page 67) depicts the systems architecture for the SSET-L equipped forces.

**The Missions and Tasks Supported**

Of the four Space mission areas (Space Force Enhancement, Space Control, Space Support and Space Force Application), the SSET-Ls provided the ARSST and Joint Space Support Teams capabilities primarily in support of Space Force Enhancement. To a lesser extent, these teams supported Space control, IO and Missile Defense/Missile Warning. This support included, but was

*(See Rapid Prototyping, page 65)*

# SMDC Commander awards returning deployed soldiers

By DJ Montoya

PETERSON Air Force Base, Colo. — A ceremony honoring 64 members of the U.S. Army Space and Missile Defense Command who have returned from duty in Operations Enduring Freedom and Iraqi Freedom was conducted at the SMDC-Colorado Springs building on Peterson Air Force Base Aug. 22.

As part of a welcome home tribute, LTG Joseph M. Cosumano Jr., commanding general of SMDC, awarded seven soldiers of the command with a total of 11 awards ranging from the Bronze Star Medal to the U.S. Marine Corps Certificate of Commendation.

"Operations Enduring Freedom and Iraqi Freedom are about protecting our way of life," said Cosumano addressing an audience of soldiers, civilian co-workers and family members.

"We are here today to honor those who have been a part of this global war on terrorism and to properly acknowledge the wonderful contributions that soldiers, family members, Department of the Army civilians, and contractors have made to these operations, making it happen for this command, this Army, and this nation in their own special way."

Cosumano said SMDC continues to live up to its motto "First in Space" by listing a number of firsts achieved in OIF where Space-based capabilities were brought to the warfighter. They include: first time an Army Space unit provided support to the 1st Marine Expeditionary Force in combat; first ever split-based operations between rear and forward command posts by an Army Space unit; first time support in a Joint Special Operations Task Force by an Army Space unit; and first time sustained Space control operations were conducted in combat by an Army Space unit.

Concerning Space control, Cosumano said, "This command, with only a few hundred soldiers, really has the unique capability — that no other service has — to ensure we can control the high ground."

In addition, Cosumano stated that the Joint Tactical Ground Stations in Europe and Qatar provided battle Space characterization to the war effort for the first time.

After making his remarks, Cosumano presented awards.

Receiving the Bronze Star was MAJ Daniel Cockerham, member of Army Space Support Team 5, for support to the 1st Marine Expeditionary Force during Operation Iraqi Freedom.

CPT Robert Barrett and 1LT Angela Johnson, both members of ARSST 5, received the Joint Service Commendation Medal in support of their actions in OIF.

The Army Commendation Medal was awarded to LTC Jeff Souder, MAJ Greg Glover and MAJ T.I. Weintraub, all from the Space and Missile Defense Battle Lab Space Support Element Toolset - Light Fielding Team.

SPC Joshua Foye, a member of ARSST 5 with the 1MEF was presented with the Joint Service Achievement Medal for his actions in OIF.

The USMC Certificate of Commendation was presented to Cockerham, Barrett, Johnson and Foye for their contributions to OIF.

Cosumano then personally acknowledged eight additional soldiers for their contributions in support of OEF and OIF with coins.

These soldiers previously received their awards from their supported units in the field: MAJ Andrew Weate, V Corps ARSST 1, Bronze Star Medal, OIF; CPT Bo Taylor, Combined Force Land Component Commander ARSST 3, Joint Service Commendation Medal, OIF; 1LT Shawn Price, CJTF-180 ARSST 2, Joint Service Commendation Medal, OEF; SSG Kipp Wilson, CFLCC ARSST 3, Joint Service Commendation Medal, OIF; SGT Samuel Huseby, CJTF-180 ARSST 2, Joint Service Commendation Medal, OEF and, Joint Service Achievement Medal, OIF, CFLCC ARSST 3; SGT Eugene Justice, CJTF-180 ARSST 2, Joint Service Commendation Medal, OEF; 1LT Mathew Rapp and SSG Jessica Adams, V Corps ARSST 1, Army Commendation Medal, OIF.

Two additional groups of soldiers came forward to receive coins and personal thanks from the Commanding General. These were soldiers who have returned most recently from deployments, and are awaiting the processing of their awards.

Afterward, a reporter asked the Commanding General to summarize what all the awards and acknowledgments in the day's ceremony meant.

Cosumano replied, "If you were to ask the soldiers and me as the commander, we were just doing our jobs. We don't expect anything other than the support of our families and the nation — and we certainly have that."

Donald Montoya is a Public Affairs Specialist at Army Space & Missile Defense Command in Colorado Springs, Colo. Previously, he spent 25 years at White Sands Missile Range, N.M., serving as chief of Command Information. He served as an authority on missile range historical footage providing assistance to various independent production outfits such as PBS, BBC, The History Channel and The Discovery Channel.

**MAJ Daniel Cockerham OIC of ARSST Team 5 receives the Bronze Star from LTG Joseph M. Cosumano, Jr., Commanding General, U.S. Army Space and Missile Defense Command for his teams support of the 1st Marine Expeditionary Force in Iraqi during Operation Iraqi Freedom (OIF). SGT Brandi Hariis, right, watches as SGT Fabienne Van Cappel receives a coin from Cosumano for her service during OIF. MAJ Andrew Weate, CPT Bo Taylor, 1LT Shawn Price, and SSG Kipp Wilson are recognized for their service during Operation Enduring Freedom at an awards ceremony recognizing soldiers who served in support of the war campaigns.**
*Photos by Dennis Plummer*

# Vignettes from the field — Space soldiers share their Operation Iraqi Freedom stories

By MAJ Laura Kenney

Whether their most memorable moment was a Theater Ballistic Missile flying overhead, or another such being exploded by a Patriot missile only meters away from their site, or the look on the faces of Iraqi citizens as they celebrated their liberation from Saddam Hussein — Space soldiers who've returned from serving overseas in support of Operation Iraqi Freedom agree that the overall experience was one they wouldn't want to have missed.

"We did a good thing. I'd say 90 percent of the people over there are rejoicing in their liberation. The other 10 percent are desperate, and those are the ones who fired rocket propelled grenades and artillery at us where we were located at the Presidential complex in Tikrit. But that's Saddam's hometown, and you'd expect some loyalty. Still, most of the citizens were happy we were there. It's somewhat frustrating that what gets reported in the civilian news seems to only be the negative, but what we saw was mostly positive," said LTC Eric Henderson, who led Army Space Support Team 14.

Henderson returned stateside June 20, but the other members of his team are still in Iraq, supporting the 4th Infantry Division out of Fort Carson, Colo.

A soldier who was deployed far forward with the 1st Marine Expeditionary Force, SPC Josh Foye, ARRST 5, agreed.

"Even the day after hostilities really commenced, the people we saw in a village right across the border from Kuwait were happy we were there. I wanted to deploy, and am really proud to be part of helping free the Iraqi people."

Foye's most memorable moment of his deployment (his team served in theater from November to June) came the day hostilities began in earnest.

"It was totally wild. I'd just come off shift, and was in my tent talking to the Marines rooming with us. I commented on how surprised I was that, so far, Saddam had not retaliated against all the stuff we were throwing at him. I stepped outside the tent, and a SEERSUCKER TBM flew overhead. It blew my mind, just watching it fly over."

That same missile, on the receiving end, also provided that "most memorable moment" for his teammates in the rear at Camp Commando in Kuwait. They call it the "Big Boom."

"It was aimed right at us. Thankfully, a Patriot missile took it down, about 500 meters away. When we heard the explosion, everybody in camp just kind of froze. Then the yelling started to take cover, and we all got in the bunkers and into MOPP (Mission Oriented Protective Posture)," said CPT Bob Barrett, team leader for the rear detachment of the split-based Space support operation.

Not all memories revolve around the immediate combat.

1LT Angela Johnson, also of ARRST 5, had the opportunity, after the main thrust of combat was over, to accompany Combat Camera on a photographic mission.

"The people of the village we visited, on a humanitarian relief mission, were very glad to see us. They all vied to get their pictures taken with us. The women told me I could be an Iraqi woman, since my skin and hair were the same color as theirs. The funniest part of our trip revolved around the village children. I had had my nametapes printed in Arabic, and had one sewn on the back of my hat. All day, children were following me around town, chanting 'Johnson, Johnson.' I think they were thrilled to actually know my name."

Iraqi children also created an indelible impression for Henderson.

"The little ones just break your heart. The poverty and the aftermath of living under such a brutal system — you have to really hope that their lives get better. I hope we catch Saddam, and then show him captured to the people — they need to see that," said Henderson.

SSG Gregory Brandsted of the 193rd Space Support Battalion, Colorado National Guard, served in Oman. Although he missed his family and children, he at least had a degree of familial support most soldiers miss. His brother, SSG Kent Bransted, is in the same unit, and both were deployed to the same location.

"We were over there for six months. As the older brother, (by two years) of course I looked after him," said the senior Brandsted, laughing. "We both wanted to be there. I'd been mobilized with the 193rd after Sept. 11, 2001, and had the opportunity last year to be released from active duty. But I volunteered to stay on, despite considerable financial losses due to the difference in pay, because I knew this was coming. It

*"We were working in a unique joint environment, supporting the Coalition Forces Land Component Command ... there was a lot of knowledge about Space benefits there, and we brought the practical side to it, helping things mesh."*

**— ARRST 3 team leader, MAJ Chauncy Nash**

(Iraqi Freedom) needed to be done, and I'm very proud that my brother and I were part of it. But I am definitely — now that it's mostly over and I've done my part — looking forward to becoming a civilian again."

Other experiences round out the contrasts between the harshness of combat and the mingled joy and pathos of observing Iraqi children.

"We were working in a unique joint environment, supporting the Coalition Forces Land Component Command," said ARRST 3 team leader, MAJ Chauncy Nash. "Our living conditions were pretty good, nothing to complain about, and we definitely feel our contributions were valued. There was a lot of knowledge about Space benefits there, and we brought the practical side to it, helping things mesh."

Operations Officer for ARRST 3, CPT Bo Taylor, had the unique experience of observing first hand some of the oil fires started by Saddam's forces.

"Nothing could have prepared me for the sight of those burning oil wells. Up to the point of actually getting to the location, I just couldn't imagine what they would actually look like. Flames rose to about 300 feet in the air, visible for miles. On this particular day, the temperature was at least 100 degrees outside but even that seemed cool compared to the heat of the flame. On several occasions we would seek cover behind a vehicle to shield us from the heat wave. The roar of the flame sounded like a freight train. Watching the guys who put it out was amazing. I went back to base speckled with a fine mist of crude oil, but very glad I'd been able to see it," said Taylor.

Speaking of joint operations, Foye got a kick out of working with Marines.

"It was probably easier than trying to work with Air Force or Navy. We have a lot more in common with the Marines, both of us (Army and Marines) being what you could call grunts. All kidding aside, they were great. On the professional side, they didn't seem to know what to do with us at first, but once we showed them what we could do as far as Space benefits, they loved us. And then personally … well, at first there were a lot of Army jokes, but once they realized my Marine jokes were 10 times better, they laid off. I pulled guard duty with them, shared MREs (Meals, Ready to Eat) and tents with them… It was a good experience, working joint," said Foye.

James Dunlap, a civilian contractor who is also a staff sergeant in the 193rd Space Support Bn., worked joint as well, spending three weeks in Iraq in his contractor role, training-up members of the Joint Special Operation Task Force North on new equipment.

"As MAJ Nash said, there's already a significant knowledge base out there about what Space can do for the warfighter. My job was to show them how their equipment could produce imagery products that they use in their missions. It helped put a new emphasis on Space."

Henderson commented on the recurrent theme of Space support to the warfighter.

"It's not just a T-shirt slogan — Space support to the warfighter. To me, if you're wearing a helmet and a flak jacket for a real reason, you're a warfighter. Our soldiers were there in harm's way, in the "trenches," wearing those flak jackets and helmets, getting shot at too. My team, or any Space soldier, is as much the warfighter as any other soldier. Our military kicked butt over there, and Space was a big part of that fight."

Many Space soldiers remain in theater, still part of the ongoing turbulent situation. For those who've come home, new memories are in the making.

Nash's most memorable moment came as they deplaned on American soil.

"My 5-year-old daughter TaNia saw me coming down the hallway, and she ran right past the checkpoint, yelling 'Daddy, Daddy.' Airport personnel started to stop her, but, realizing that this was about soldiers returning home from Iraq, they ended up letting her run straight through. Right into my arms."

"That's my best memory. But I'm glad of all the others too."

MAJ Laura Kenney is a mobilized Reservist serving in the Army Space and Missile Defense Command's Colorado Springs Public Affairs Office in support of Operation Enduring Freedom. She served five years Active Duty as an enlisted journalist with Air Defense Command in Germany. As a commissioned Reserve officer, she performed Public Affairs duties in the Gulf War theater, and served as deputy public affairs officer for the American sector in Kosovo in 2001.

# Space and Missile Defense Command contributions and lessons from Operation Iraqi Freedom

By Dr. Lewis Bernstein and Roy McCullough

Military commanders in the first Gulf War (1990-1991) often referred to it as the first "Space War" because it was the first time Space-based capabilities were used to support an army during a conflict. More than a decade later, the success of Operation Iraqi Freedom underscores the remarkable progress made by the U.S. military in the integration of Space and missile defense technologies with military training, equipment and operations. This article will examine the employment of Space and missile defense technologies during Operation Iraqi Freedom and the contributions made by the U.S. Army Space and Missile Defense Command (SMDC) to the successful resolution of the conflict.

This study begins with a summary of Operation Iraqi Freedom to provide the necessary historical context. This is followed by a description of SMDC contributions to Operation Iraqi Freedom and a preliminary attempt to derive lessons from the conflict relevant to SMDC and to Army Space support. The article concludes with a brief discussion of the implications of these lessons for SMDC and the Army. Additional information, including more specific and technical details concerning SMDC-related lessons from Iraqi Freedom, is provided in a series of Appendices that are excerpted here, but are posted in entirety at www.smdc.army.mil/.

Any attempt to identify lessons at such an early date should be regarded as tentative and treated with appropriate caution. This brief study represents an initial survey and analysis only, and there remain a number of issues that merit further examination. Given the recent nature of the events, the authors did not have access to certain key materials such as after action reports, situation reports, oral history interviews, etc. Once these materials become available, a more comprehensive review and analysis of the contributions made by Space-based support and missile defense systems in Operation Iraqi Freedom will be both necessary and desirable.

## Operation Iraqi Freedom, March 18 - May 1, 2003

Low-intensity air operations had been taking place in the skies over Iraq since the 1991 cease-fire brought an end to Operation Desert Storm. Consequently, it's perhaps inaccurate or somewhat arbitrary to single out March 18, 2003, the first day of Operation Iraqi Freedom, as the day that marked the beginning of a new state of hostilities with Saddam Hussein's Iraq. A similar problem is encountered when one attempts to single out a specific day as marking the clear triumph of the Coalition forces and the end of hostilities with Hussein's regime. Although Hussein's government ceased functioning on or about April 11, no formal surrender took place and resistance continued after the collapse of the regime. The President of the United States declared victory May 1, and it was from this date that the mission of the Coalition forces broadened to include the restoration of public order and associated post-conflict nation-building efforts. As of this writing (June 2003), however, small-scale combat operations were continuing alongside the Coalition's transition and nation-building efforts.

**During action in Iraq, the 911-brevity code for the mini-transmitter worked successfully. On two occasions, the Space-based Blue Force Tracking (BFT) Mission Management Center (MMC) responded to 911 emergency brevity codes in the manner approved and rehearsed with Special Operations Forces. SMDC provided significant support and situational awareness for these Special Operations Forces commanders. Since the tactics, techniques and procedures (TTP) worked, Special Forces units should have a higher level of confidence in the capability and be more willing to exercise and rehearse using the 911 emergency brevity code before infiltrating territory where secure covert communications are essential to completing their mission and to their survival. Related to this was the use of the Space-based BFT MMC. During the fighting, the MMC used a new TTP to keep SOF operating with secure BFT devices. As the air war began, the BFT data was moved to give the SOF greater visibility to the air forces. This TTP worked successfully as there were no fratricide incidents and did not compromise the SOF operational security requirements.**

— Dr. Lewis Bernstein and Roy McCulloug

Ground fighting began on March 19, and from the beginning, the campaign centered on the advance to Baghdad undertaken by elements of U.S. Army V Corps and the 1st Marine Expeditionary Force (I MEF). In a briefing March 22, the Deputy Director of Operations at the U.S. Central Command in Qatar, BG Vincent Brooks, outlined the initial successes of Coalition Forces, stating that in these first days of the conflict, their "direct and aggressive" action had disrupted the enemy's "key command, control, communications, integrated air defense and ballistic missile" capabilities. Special Operations Forces (SOFs) had destroyed Iraqi military outposts, seized southern Iraqi oil terminals before they could be sabotaged and destroyed, and were engaged in a search for ballistic missiles and weapons of mass destruction. At the same time, Coalition Naval Forces destroyed the Iraqi navy and ensured that the southern waterways remained open and maritime lanes remained clear of mines.

As the campaign unfolded, it became clear that Coalition Forces were able to proceed largely at will throughout Iraq, seizing territory and taking prisoners. The Iraqi military did not offer a coordinated defense. Nevertheless, the Iraqis did enjoy limited success when they engaged in asymmetrical warfare and employed a combination of heavily armed irregulars and regular troops against the Coalition Forces. These tactics forced American commanders to use portions of the 101st Airborne Division (Air Assault) and a brigade of the 82nd Airborne Division to guard the lines of communication and re-supply between the advancing troops and the rear areas in southern Iraq.

As March faded into April, Army and Marine units converged on Baghdad. A long and bitter urban battle was expected for control of the Iraqi capital, and it was feared that given the size and layout of the city, such a battle could easily draw in the entire force. Instead of a protracted battle inside the city, however, V Corps and I MEF engaged and defeated the defending Republican Guard units outside the city. This provided Coalition forces with what was essentially an unopposed entry into Baghdad. Although some Iraqi formations did elect to stand and fight, the disruption of Iraqi command and control systems made them unable to mount a sustained and organized defense. The Iraqi defenders around Baghdad thus found themselves forced to fight in a series of uncoordinated and individual battles rather than as part of a single orchestrated defensive engagement.

Although the main focus of the Coalition offensive was the lightning-quick march on Baghdad, operations in other parts of the country made valuable contributions to the overall military effort. Special Operations Forces

***"We talk about Desert Storm being the first 'Space war,' but I'd call [Operation Iraqi Freedom] the first real Space war — where we have truly integrated 'Space' throughout the battlespace, in ways we've never been able to do before . . . Our whole intent was to bring an integrated effect to the battlespace . . . It's not Space for Space's sake; it's Space integrated with everything else to produce effects in the kill chain."***

***— Col. (BG-Select) Larry D. James, commander of the 50th Space Wing at Schriever Air Force Base, Colo.***

seized several air bases in the western desert region of Iraq, while the 173rd Airborne Brigade occupied strategic locations within the Kurdish areas of northern Iraq. The speed of the Coalition advance on Baghdad and the effectiveness of Coalition air strikes on command and control targets made it impossible for the Iraqi army to contest these operations.

By April 11, organized resistance in and around Baghdad had ended, enabling the Coalition to redirect its forces to pursue the remnants of the Iraqi army and to begin the move on Tikrit. It is still unclear why the Iraqi military collapsed with such dramatic suddenness. The Commander of V Corps, LTG William Wallace, offered one explanation for Baghdad's rapid fall, citing the simultaneous attacks in the east, north and west, the speed of the attacks, and the placing of the 82nd Airborne Division under his operational control allowing V Corps to advance while maintaining control over those areas that had already been liberated.

As organized resistance ended, the Coalition was able to concentrate on capturing the "most wanted" among the Iraqi leadership and eliminating the last remnants of resistance. In addition, Coalition Forces began conducting humanitarian relief operations in areas under their control. In the north and west, Special Operations Forces continued to play an important role in expanding secure zones and maintaining public order. The end of Operation Iraqi Freedom was not neat and clean — there was no formal surrender of the Iraqi government, just a dramatic and subsequently chaotic collapse. In the immediate aftermath, many members of the Iraqi senior leadership remained at large and pockets of resistance persisted throughout the country. Peacekeeping and nation building activities began even as small-scale combat operations continued.

## SMDC & Operation Iraqi Freedom: Contributions and Lessons

(The current discussion of SMDC contributions and Army Space lessons derived from Operation Iraqi Freedom is organized around the force enhancement capabilities and objectives identified in JP 3-14 and TRADOC PAM 525-3-14 (e.g. Communications; Position, Velocity, Navigation and Timing [PVNT]; Weather, Terrain and Environmental Monitoring; Intelligence, Surveillance and Reconnaissance (ISR); and Missile Warning).

### Satellite Communications

Secure satellite communications (SATCOM) are a first order priority for today's Army and they played a particularly significant role in the battlefield environment of Operation Iraqi Freedom, enhancing situational awareness and responsiveness throughout the chain of command. Commenting on the importance of satellite communications to the military effort, LTG David D. McKiernan, commander, Coalition Forces Land Component Command (CFLCC) stated that,

*(Continued on page 36)*

# Comparison of Operation Desert Storm (1991) and Operation Iraqi Freedom (2003) from a Space Perspective

Following the Iraqi invasion of Kuwait in August 1990, the United States launched the largest military operation since Vietnam. More than 500,000 U.S. troops arrived in Saudi Arabia to protect the interests of the United States and its allies in the Persian Gulf region. Operations Desert Shield and Desert Storm provided a testing ground for the Army's Space-based technologies. Desert Storm has been called the "first Space war" because every aspect of military operations depended, to some extent, on support from Space-based systems. The Army used these systems for position/navigation, weather, communications, imagery and tactical early missile attack warning. The assistance rendered was invaluable and the new technology changed the way the Army fought. The conflict was a watershed event and after the war, the Army viewed Space as an integral part of any attempt to achieve firepower and information dominance on the battlefield of the future. Space became the Army's new "high ground." After the Gulf War, the challenge for the Army was to normalize Space and missile defense and make the tools they would bring to the fight an integral part of the planning process. An historical comparison of Operation Desert Storm and Operation Iraqi Freedom shows the distance the Army has traveled in normalizing Space and missile defense and incorporating these capabilities into its operations.

In the 1990-1991 Gulf War, soldiers from the Army Space Institute, Army Space and Army Space Program Office deployed as individuals or as members of ad hoc task forces, with little formalized training. In Iraqi Freedom, Army Space had an established force structure consisting of the 1st Satellite Control (SATCON) Battalion, the 1st Space Battalion and a Colorado National Guard unit, the 193rd Space Battalion. These units control the satellite links for tactical and strategic warfighter communications networks, and support Army, Joint and Coalition warfighters worldwide through the Army Space Support Teams (ARSSTs) and the Joint Tactical Ground Station (JTAGS) systems.

Before and during Desert Storm the Army Space Institute worked to integrate Space-based systems across the spectrum. Since then, there has been significant progress through Training and Doctrine Command (TRADOC) and the SMDC Force Development and Integration Center (FDIC), among others, as well as progress in the Joint arena. This has included creating a new Military Occupational Specialty (MOS), Functional Area 40, and integrating Space-based systems into training and exercises and into Army and Joint doctrine.

For position and navigation capabilities, in 1990, the Army owned only 500 demonstration Small Light Weight Global Positioning Satellite (GPS) Receivers. There were problems in getting them out to the tactical units because there were too few available. The Army Space Institute began a crash-training program in their use. By 2003, there was real-time global position, navigation and timing capabilities embedded within the tactical units. This was supplemented by new applications for precision strike and Space-based Blue Force Tracking.

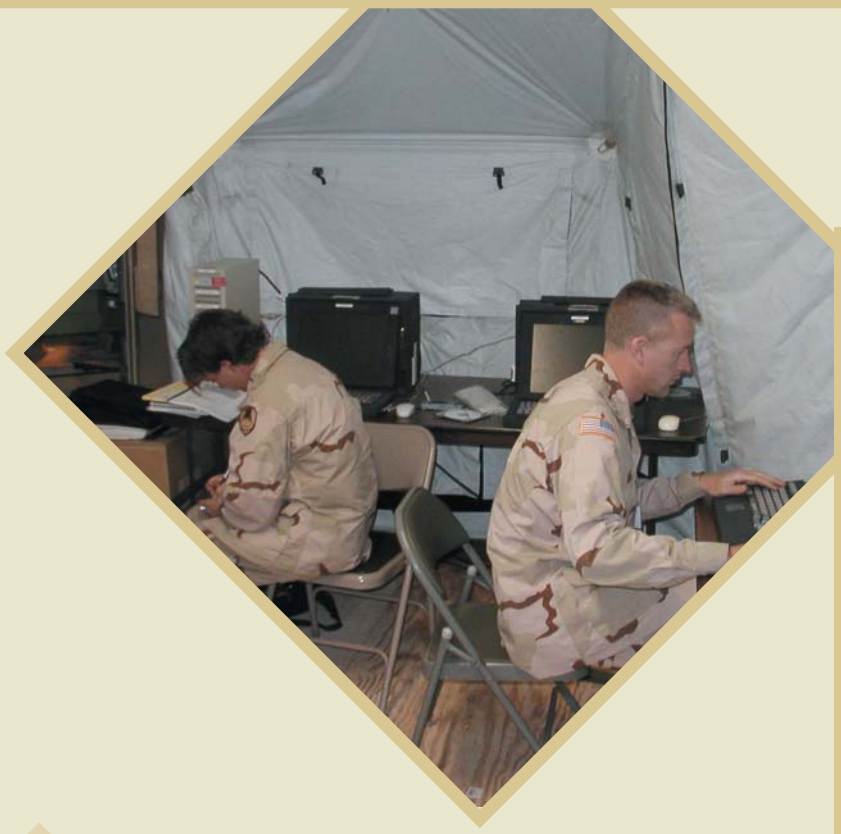
Missile warning was revealed to be a particularly difficult problem in Desert Storm. In order to warn against Iraqi Scud missile attacks, a new Tactical Event Reporting System (TERS) had to be assembled in an ad hoc manner. Based in the United States, it pushed data to the troops in theater and could be unreliable. Due to the deficiencies of this system, the Army developed the JTAGS, which deploys with the troops. It pulls data from satellites with a direct downlink and processes and distributes it in theater. It supports active defense, passive defense and attack operations.

In Desert Storm, the military long-haul communications system was supplemented by using commercial systems. The demand for bandwidth exceeded the supply and called for better planning and asset integration. By 2003, communications had improved, resulting in reliable on-demand communications and reduced in-theater footprint for communications assets.

Weather forecasting also improved between 1991 and 2003. In Desert Storm, the Defense Meteorological Satellite Program (DMSP) system was augmented by

*(See Comparisons, page 69)*

# OPERATIONS IRAQI/ENDURING FREEDOM



**Clockwise from top left, members of the Test and Evaluation unit in front of a B1 bomber in Iraq; USAF MSgt Richard Burch of the Spectral Operations Resource Center (SORC) works on equipment; MAJ Daniel Cockerham of ARSST 5 receives a haircut from a Marine with the 1st Marine Expeditionary Force; Secretary of State, Colin Powell and President George W. Bush visit the troops at Central Command; SGT Sabrina Bannister of ARSST Team 5 gets assitance lifting a box of supplies from an Iraqi citizen; one of many satellite dishes used to send and receive information during Operations Iraqi and Enduring Freedom; MAJ Tim Haynie and SGT Brandi Harris from the SORC busy at work; center, SGT Brandi Harris and SGT Stacy Sorsdal pose with Secretary of Defense Donald Rumsfeld.**

*U.S. Army Photos*

# Tip of the 'Sphere'

***Secure satellite communications (SATCOM) are a first order priority for today's Army and they played a particularly significant role in the battlefield environment of Operation Iraqi Freedom, enhancing situational awareness and responsiveness throughout the chain of command.***

"The technology advances in our military today . . . allowed me to talk via tactical satellite communications and other means across a battle space of hundreds of miles . . . where commanders can plot out where they're at and what decisions they need to do next; and all of that put together in a joint construct. It allowed us to make decisions and then execute those decisions faster than any opponent."

While speaking with reporters during a video teleconference (VTC) at the Pentagon, the commander of the 3rd Infantry Division, MG Buford Blount, provided a more detailed demonstration of the importance of tactical satellite communications (TACSAT):

"Our TACSAT communications," said Blount, "which was a new system for us, enabled us to talk over extreme distances." "In Al Najaf," continued Blount, "over one day we had the division [spread] over a 230-kilometer front . . . attacking and fighting [in] basically two separate fights. We were able to command and control that, divert resources, set priorities, be able to talk to each commander, be able to see where his forces [were] and what was happening on the battlefield [and we were able to] do all that while we were moving. A tremendous capability, a tremendous success for the Army."

Satellite communications enabled OIF commanders to see first, understand first, act first, and finish decisively. The 1st Satellite Control Battalion, along with the Space and Missile Defense Command Operations Center, played critical roles in supporting satellite communications and ensuring information flows to ground units from the moment they first entered the theater.

· 1st Satellite Control Battalion

Defense Satellite Communication System (DCSC) satellites provide NIPR/SIPRNet connectivity, voice and video teleconference capability to the Combatant Commanders of CENTCOM, V Corps, 3rd Infantry Division, 1st Marine Expeditionary Force, Special Operations Command and other deployed forces utilizing the DSCS satellite fleet. The two primary DSCS Operations Centers supporting Operation Iraqi Freedom are manned by B and C Companies of the 1st Satellite Control (SATCON) Battalion. B Company, based at Fort Meade, Md., supported 46 terminals with 17 tactical communications missions. C Company, based in Landstuhl, Germany, supported 96 terminals with 35 tactical missions. Each of these companies supports multiple ships afloat through DSCS payload and network control. These missions allow combatant commanders to maneuver their units without worrying about a break in communications. Without 1st SATCON Battalion's support, the warfighter's ability to pass data and establish command and control links back to the United States would be greatly degraded.

The After Action Reports (AARs) from the field also highlight the extreme importance of the Ground Mission Force Controller to the commander on the ground. The 335th Theater Signal Command (Forward), for example, singled out one SGT Benjamin Singleton, a member of C Company, 1st SATCON Battalion, for his extraordinary

efforts in coordinating with the Defense Information Systems Agency (DISA) for a tactical satellite team to swap out equipment damaged during hostile fire. After the problem was identified, he contacted the correct personnel at DISA and facilitated an authorized outage and satellite power reconfiguration to allow this team to replace the damaged equipment and re-establish their multi-thread communications quickly, enhancing the 3rd Infantry Division's ability to continue into battle. In addition, according to the DISA Europe SATCOM manager, B Company has repeatedly assisted deployed soldiers with technical expertise and troubleshooting procedures. This has ensured the tactical network has experienced minimum downtime and that the combatant commanders have received the vital communications support required for effective command and control.

### · Space and Missile Defense Command Operations Center

The Space and Missile Defense Command Operations Center (SMDCOC) also made substantial contributions to the success of Operation Iraqi Freedom. SMDCOC served as a single point of contact supporting Space-related and command and control efforts. The SMDCOC maintained an operational support database on the SIPRNET accessible to all Army Space operators. As a result, the SMDCOC served as a "one-stop-shop" of sorts for the Army Space operators, allowing them to submit requests for information (RFI), query previous RFIs, link to key Space sites and to receive intelligence updates. During the operation, the SMDCOC received scores of RFIs that were routed to deployed units. For example, SMDCOC received several RFIs for imagery that were routed to the Spectral Operations Resource Center (SORC). Some of these requests were not sufficiently detailed for the SORC to provide the desired product. In these cases, the SMDCOC was also responsible for contacting the appropriate personnel on the originating end to obtain the proper information. RFI imagery requests made by Special Forces elements to Army Space Support Teams (ARSSTs) were also processed by the SMDCOC. The SMDCOC ensured that the unit received the information and was able to properly use it in accomplishing its mission.

In addition, the SMDCOC facilitated the transfer of information to and from deployed personnel concerning the purchase and fielding of mission essential equipment. ARSST 1 alerted the SMDCOC of a problem through the RFI system. The SMDCOC contacted the G-4 and Brigade, obtained the needed information, and relayed it forward to ARSST 1, solving the problem. Similarly, in responding to a request from ARSST 5, the SMDCOC contacted the Mission Management Center to obtain information about its commercial Blue Force Tracking (BFT) devices. The SMDCOC enabled the transfer of information and helped the unit accomplish their mission. During Operation Iraqi Freedom, the SMDCOC was manned 24 hours a day, seven days a week, with satellite operators and JTAGS crewmen.

Operation Iraqi Freedom continued the recent trend, seen in the last three years of operations and exercises, of exploiting increasing quantities of spectral imagery data in shorter time periods. Although SPECTR created 30 Measurement and Signature Intelligence annotated graphics using spectral analysis techniques, more could have been accomplished if additional data had been available or if that data had been received in time to be of operational use. Approximately half of the spectral data collected was not available to meet operational deadlines. In order to realize spectral data's full potential, sufficient quantities of it must be available in time to support the increasingly rapid tempo of combat operations. To this end, Army Space and Missile Defense Command must forcefully advocate placing spectral sensors on Space and airborne platforms. Additionally, Army Space should look for ways to shorten the time needed to get data to a spectral exploitation cell. As the Force Development and Integration Center (FDIC) continues its participation in the National Security Space Architect's Integrated Spectral Architecture development, it will influence both the placing of sensors and the process of supporting information dissemination. It is necessary for the FDIC to continue to support developing additional spectral sensors for Space and airborne platforms.

— Dr. Lewis Bernstein and Roy McCullough

· Space Support Element Toolset - Light

The Space Directorate of the Space and Missile Defense Battle Lab made significant contributions to Operation Iraqi Freedom. Building on lessons learned from Joint exercise Millennium Challenge 02, the Battle Lab designed and built the Space Support Element Toolset - Light (SSET-L). As of this writing, seven operational SSET-L packages have been deployed to Army and Joint Space Support Teams and forces providing support to Operation Iraqi Freedom.

The SSET-L has two basic capabilities. The first capability is a collection of Space operations software installed on an advanced Windows-based hardware platform. This provides the Space Operations Officer and Army Space Support Teams the operational tools necessary to provide the primary staff with Space-based information and products such as satellite overflight data and GPS navigational accuracy support. The second SSET-L capability is an integrated communications package consisting of commercial broadband satellite communications, multiplexed INMARSAT voice and data lines, and Iridium satellite telephones. Most prominent is the SSET-Ls broadband satellite communication technology that enables networking all deployed SSET-Ls with each other and with the SMDCOC and the SORC in Colorado Springs. This network provides connectivity between ARSPACE image production nodes and forward deployed Space Forces. The result has been the ability of Army and Joint Space Forces to drastically reduce the turnaround time from image collection to product receipt. Examples of operational support products enabled by this network are mentioned in the discussions of the SORC and ARSSTs.

**Position, Velocity, Navigation and Timing (PVNT)**

The GPS system once again proved its effectiveness in Operation Iraqi Freedom, contributing to all aspects of PVNT and supporting all the services. Perhaps one of the most

significant and valuable uses of GPS was in the Space-based Blue Force Tracking System (SB-BFT), a system that can be credited for the campaign's great success in avoiding incidents of fratricide.

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

The Army Space-based Blue Force Tracking Mission Management Center (SB-BFT MMC) worked closely with elements of the SOF by monitoring aircraft and ground forces faced with emergency or "in extremis" situations and alerting SOF command and control nodes of the situation. The SB-BFT MMC also worked closely with the Coalition Forces Land Component Commander (CFLCC) by providing Near Real Time Blue Force Tracking data to the V Corps commander for the portion of his Apache Helicopter force equipped with the Grenadier BRAT (beyond line-of-sight reporting and tracking) system. In Operation Iraqi Freedom, the SB-BFT MMC provided support for 400 Grenadier BRAT and 2,500 miniature transmitters. The SB-BFT MMC also provided direct BFT support to other government agencies during the conflict.

BFT received high praise from those in the field. MAJ Mark Flicker, CJSOTF-W Space Officer, pointed out that with Blue Force Tracking "the big concern for micro-management was not even an issue. It provided a great situational awareness tool for assisting in deconfliction and I attribute no SOF Blue-on-Blue casualties in a good part to the Blue Force Tracking."

The Blue Force Tracker also proved popular with the Marines. The 5.1 MB download capability proved particularly useful. Real-time information transfer and satellite imagery was mission critical on several occasions. In addition, the Blue Force Tracking system was considered to be "very responsive" because of its instant messaging capability. Most of the commanders agreed that the pace of battle during Operation Iraqi Freedom required a device similar to Blue Force Tracker. At times, units found themselves unable to maintain VHF communications over distances because of an inability to establish retransmission sites. In the absence of communications, Blue Force Tracking provided units with responsive message traffic. Tanks and LAR used it in the absence of radios. At times, Blue Force Tracking provided the only means of communication among widely dispersed units.

The system was also considered very reliable for providing friendly situation reports.

### · The Army Space Support Teams

The ARSSTs provided critical PVNT support to units and assisted unit navigation by providing GPS accuracy predictions. In a flat, featureless desert environment prone to blinding sandstorms, the lack of distinguishing landmarks and sandstorm-related loss of visibility severely limited navigation and position determinations. Under these conditions, GPS navigation was indispensable and the GPS accuracy predictions provided by the ARSSTs to supported units were integrated into the ATO cycle to support precision fires and deep operations. In addition, the ARSSTs provided GPS jamming capabilities to supported units.

## WEATHER, TERRAIN AND ENVIRONMENTAL MONITORING

### · Spectral Operations Resource Center

The SMDC Spectral Operations Resource Center Forward (SORC Fwd) provided imagery support to Operation Iraqi Freedom, 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 air-drop 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 image maps were also created to support ordinary mission planning. The standard image maps were derived from high and medium resolution

commercial imagery. Using the spectral imagery provided by the SORC and the ARSSTs working together, planners identified potential enemy positions. SORC (Fwd) also created a variety of spectrally derived products to assist units with the mobile missile-hunting mission. After reviewing the imagery products, planners were able to reposition logistics staging areas to fit their needs better and avoid potential flood areas. The SORC mission during Operation Iraqi Freedom provides an excellent example of the variety and depth of products that can be produced using commercial/spectral imagery. This mission package also provides an excellent example of cooperative teaming between the SORC and the ARSSTs forward deployed in support of Coalition Forces.

## Intelligence, Surveillance, and Reconnaissance (ISR)

One of the most important warfighting advantages provided by Space-based assets is in the ISR realm. Space-based ISR capabilities often provide the first "eyes on target" in support of terrestrial military operations. In Operation Iraqi Freedom, SMDC personnel and organizations, and particularly the ARSSTs, made significant contributions in the realm of ISR.

### · Army Space Support Teams

The ARSSTs were an integral part of the military effort. In conjunction with the SORC, 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 geographic 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 the other. This influenced the targeting process and enabled ground force commanders to identify areas of change and to concentrate their forces on potential enemy hide sites. ARSSTs also used satellite overflight modeling software tools to determine which commercial Space-based sensors were able to view areas of change. The ARSST then tasked a commercial imagery collection mission through the Army Space SORC. In the period following the initial preparation of this report, an ARRST used image comparison capabilities to identify mass gravesites in the Baghdad area.

ARSST imagery capabilities could also provide critical support in a fast-moving tactical situation. When the 4th Infantry Division occupied the Tikrit presidential palace it came under fire from mortars, rocket-propelled grenades (RPGs), and small arms. ARSST 14 provided the commander with imagery of the palace complex and the surrounding area. Based upon these current images, the enemy positions were identified and successfully counterattacked.

Using SPOT satellite overflights and Satellites Advance Notice Charts, the ARSSTs were able to provide satellite overflight times and potential friendly force vulnerability windows to its supported units. The ARSST assigned to the 1st MEF provided the Marine engineers with imagery of bridging and river crossing sites.

· Army Space Command G-2

Army Space G-2 provided support to Army Space Forces and other Army Space elements in dynamic Iraqi intelligence assessments; mobile Tactical Ballistic Missile targeting, Intelligence Preparation of the Battlefield support; training in intelligence, conventional threat, and terrorist threat support for force protection; and responding to requests for intelligence information reach back support. The G-2 section also prepared twice-daily intelligence updates on the general military situation and Army Space's specific mission areas, as well as daily intelligence summaries (DISUMs) keyed to Army Space priority intelligence requirements. After they were presented to the SMDC command group, the briefings were posted to the Army Space homepage for easy access by deployed elements. The DISUMs were transmitted to deployed elements and FA40s daily.

**Lessons derived from the recent conflict are not limited to those of battlefield systems and equipment. When submitted to the stress of a crisis, shortcomings and areas of improvement become evident in organizational structures and processes as well. During Iraqi Freedom, for example, Army Space noted that the Space and Missile Defense Command Army Defense Element (ADE), a 3-man team whose normal responsibility is to support the North American AeroSpace Defense Command/ Northern Command J-5-P planning efforts, was tasked with tracking Patriot movements, missile firings, and maintenance status. A result of these new responsibilities, ADE planning support to J-5-P was virtually nonexistent. Efforts are currently under-way to increase the number of personnel supporting the ADE to include, for the short term, relying on National Guard or Reserve support.**

— Dr. Lewis Bernstein and Roy McCullough

· Eagle Vision System

A key element in establishing and maintaining information and decision superiority is timely access to theater imagery. Accurate and timely imagery is the cornerstone of successful operational planning and execution and Operation Iraqi Freedom confirmed the importance of having an in-theater commercial imagery direct downlink capability to move commercial imagery more effectively to meet operational deadlines. The process of obtaining imagery from commercial vendors through the National Imagery and Mapping Agency's (NIMA's) Commercial Satellite Imagery Library (CSIL), however, can involve a lengthy process that degrades imagery timeliness and utility.

The new Eagle Vision system, deployed to the United Arab Emirates in support of Operation Iraqi Freedom, is an in-theater direct downlink of commercial satellite imagery. Using Eagle Vision proved appreciably faster than getting imagery from commercial vendors through the NIMA CSIL. The Spectral Exploitation Cell-Transportable (SPECTR) could receive imagery from Eagle Vision I in about 12 hours, on average, from the time the image was collected. In contrast, it required an average of 24 hours, from collection to receipt, for SPECTR to receive imagery from CSIL.

## Missile Warning

In addition to Space-based force enhancement capabilities that provided critical communications, imagery, navigational and meteorological support to field commanders, SMDC organizations, personnel and technology also made significant contributions to the missile warning and missile defense mission in Operation Iraqi Freedom. There are a number of SMDC-related components that together constitute the missile warning and defense system. These include Joint Tactical Ground Stations (JTAGS) and the Patriot missile batteries.

· The Joint Tactical Ground Stations

JTAGS, the transportable, in-theater element of the U.S. Strategic Command's Theater Event System (TES), provided Central Command (CENTCOM) with the capability to receive and process in-theater, direct downlinked data from the Defense Support Program (DSP) sensors to broadcast alerting information on tactical ballistic missile

launches and other infrared events of interest in the theater. The JTAGS can process data from up to three satellites and supports each of the four operational elements of Theater Missile Defense — active defense, passive defense, attack operations and battle management/command, control, communications, computers and intelligence (BM/C4I). During Operation Iraqi Freedom, a redundant missile warning and alert capability was provided by having a JTAGS located with both CENTCOM and European Command (EUCOM).

In addition, all infrared events processed by JTAGS supported the Battlespace Characterization mission area for the theater. In one case, JTAGS operators provided early warning of hostile aircraft approaching a Predator surveillance mission. As a result of the warning provided by JTAGS, the mission was diverted to avoid potential loss of the vehicle. This maintained the Predator's mission secrecy, safeguarded critical equipment and preserved the gathered intelligence. The JTAGS also played a key role in the Coalition plan to seize the southern oil fields in the first stages of Operation Iraqi Freedom. By monitoring the infrared signatures from the oil fields, JTAGS provided critical information to the maneuver commanders regarding the timing and employment of operational units.

### · The Patriot Missile Batteries

The cornerstone of the Coalition missile defense system was formed by the Patriot missile batteries manned by both U.S. and Kuwaiti soldiers. The total number of Patriots fired in response to a real or perceived threat is unclear. One report estimates that approximately 20 PAC-2s were fired during Operation Iraqi Freedom. Most firings were probably of the Patriot Guidance Enhanced Missile (GEM) and GEM-Plus variants with only a small number of firings involving the improved PAC-3s. The missiles fired by the Iraqis were the Ababil-100s and the al-Samoud-2s. These missiles have a shorter range, are slower and are therefore easier to intercept. Some accounts suggest that it was not necessary to use the modern PAC-3s to intercept these slow-moving missiles.

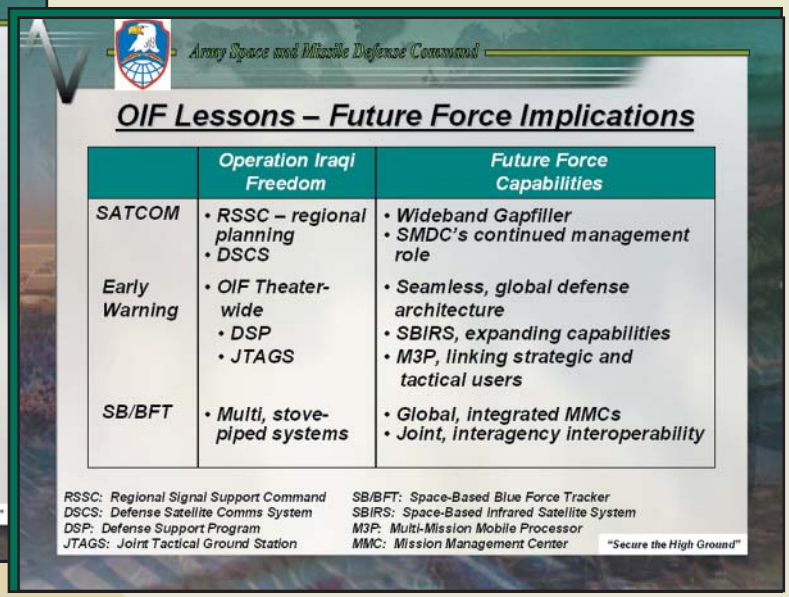
In Operation Iraqi Freedom, the Iraqis launched approximately 20 ballistic missiles at U.S. forces. Every one of the ballistic missiles was either intercepted or declared out of bounds and not engaged once it was determined that its predicted impact area rendered it harmless. It is premature to arrive at any firm conclusions regarding Patriot effectiveness during the one-month conflict, but it can be noted that the Program Executive Office for Air, Space and Missile Defense (PEO-ASMD) judged that preliminary results indicate that the Patriot demonstrated excellent effectiveness during Iraqi Freedom.

The most important lesson to be derived regarding the Patriot missile system in Operation Iraqi Freedom, however, is perhaps not so much related to the technical performance of the missile itself, but the process by which the missile was developed and fielded. The Patriot represents the culmination of decades of conceptualization, experimentation, testing and, more recently, operational deployment.

### · Joint Land Attack Cruise Missile Defense Elevated Netted Sensor System

Another example of such a program is the Joint Land Attack Cruise Missile Defense Elevated Netted Sensor System (JLENS). JLENS is not yet operational and was not deployed in Operation Iraqi Freedom. This is unfortunate, as the only Iraqi missiles that succeeded in evading the Patriot batteries, were two Chinese-made CSSC-3 (Seersucker) cruise missiles. These incidents serve to highlight the danger posed by cruise missile proliferation and the need to develop an effective TMD approach to the cruise missile threat.

Although JLENS was not deployed for Iraqi Freedom, the Army did initiate a Rapid Aerostat Initial Deployment (RAID) to support U.S. Central Command activities during Operation Enduring Freedom. With a 15-meter diameter, the tethered RAID aerostat was a smaller version of the JLENS platform, operating at an altitude of 1,000 feet and with a coverage footprint extending for several kilometers. In Afghanistan, the RAID aerostat is not performing the mission assigned to JLENS, that of early warning missile launch detection, but it is supporting the secondary missions of area surveillance and force protection against small arms, mortar and rocket attacks. Although considerably smaller than the JLENS platform, and performing missions secondary to those of missile detection and early warning, the RAID experience in Afghanistan represents a valuable learning opportunity that should be useful to future tactical users of the JLENS.




## Conclusion

The success of Operation Iraqi Freedom depended heavily on improved support and force enhancement capabilities provided by Space-based assets. The Army that fought in Operation Iraqi Freedom was truly a Space-enabled Force. Secure, Space-based communications made long-distance, real-time cooperation and conferencing possible and gave tactical commanders an increased degree of command and control over their units. The Space-based GPS system demonstrated its effectiveness in Operation Iraqi Freedom by providing accurate PVNT support and by supporting the highly successful Space-based Blue Force Tracking System (SB-BFT). Accurate and timely satellite-derived weather, terrain and environmental monitoring data made invaluable contributions to operational planning efforts. ISR capabilities are significantly enhanced and multiplied by using satellite-derived data, and the retrieval and dissemination of missile warning and launch data provided an extra layer of protection for Coalition troops operating in the theater.

Space capabilities have been integrated into operations at all levels and now represent an indispensable component of the warfighting package. Although there are and always will be refinements and improvements to Space support capabilities, it is now possible to suggest that after a process lasting more than a decade, Space has been "normalized." The current dynamic international situation suggests that there will be increasing demands placed on our military forces as they undertake missions ranging across the full spectrum of military operations. As ever-smaller forces are given ever-greater responsibilities, it is inevitable that there will be an increasing demand for, and reliance upon, Space-based force enhancement capabilities.

The U.S. Army Space and Missile Defense Command deployed over 100 soldiers in support of Operation Iraqi Freedom, with most deploying from the 1st Space Brigade and its subordinate battalions as members of Army Space Support Teams. The significant contributions of these soldiers to Operation Iraqi Freedom, contributions that dramatically improved the warfighting capabilities of the Coalition forces, ensure that SMDC and Army Space will remain at the forefront as the Army moves farther along down the road of transformation.

Lewis Bernstein is a Senior Historian in the SMDC Historical Office. Previously, he worked in the Combined Arms Center History Office at Fort Leavenworth where he was involved in creating a digital archive and engaged in research on Army training and experimental units. Before joining the government, he was a professor of history at Brigham Young University and Boise State University where he taught Chinese and Japanese history. He has also been a Fulbright fellow.

Roy McCullough is a Historian with Science Applications International Corporation providing support to the U.S. Army Space and Missile Defense Command Historical Office. Prior to joining SAIC, he served as Historian with the U.S. Army Construction Engineering Research Laboratory and the National Park Service, where his work focused on the historical evaluation of Cold War era missile sites and space launch complexes. He is a doctoral candidate at the University of

1. Cited in William B. Scott and Craig Covault, "High Ground Over Iraq," Aviation Week & Space Technology (8 June 2003).
2. March 22, 2003, USCENTCOM Release Number: 03-03-44.
3. Steven Komarov, "General Recounts Key Moments in Baghdad's Fall," USA Today, 14 April 2003:
4. Given the dynamic nature of the situation on the ground, it is important to emphasize that this study was initially prepared in June 2003.
5. Speech of 23 April 2003?
6. Cited in Neil Baumgardner, "Army Considering How to Expand Satellite Communications Capabilities," Defense Daily (July 23, 2003).
7. Excerpt from Field Report, Marine Corps Systems Command Liaison Team, Central Iraq, 20 April to 25 April 2003.
8. SPECTR could have received imagery from Eagle Vision I at an even faster rate if they were co-located. To ensure the capability is not degraded, SMDC should move Eagle Vision II to Colorado Springs and upgrade its reception to receive signals from more commercial satellites. Taking this step would guarantee the Army's access to a commercial direct downlink capability until a system with similar capability is fielded.
9. Several 'friendly fire' incidents involving the Patriot are being investigated. The specifics of these incidents and more technical details concerning Patriot performance and problems can be found in the accompanying appendix.

# Spectral Operations Resource Center

## Spectral Imaging from Kuwait

MSgt Richard Burch currently serves as the Non Commissioned Officer in charge of the SMDC-Colorado Springs Spectral Operations Resource Operations Center. He is an active duty Air Force 9S100, Technical Applications Specialist, assigned to the 544th Information Operations Group, Peterson Air Force Base, Colo. Over the past 19 years he has gained experience in the design, operation, and analysis in the full spectrum of MASINT sensors and detectors, including seismic, atmospheric, infrared, multispectral and hyperspectral.

**By MSgt Richard Burch, USAF**

"We're going where…to do what?" Was my initial response to Mr Bo Dunaway's (Chief, SMDC-Colorado Springs, Remote Sensing Branch) phone call forewarning MAJ Tim Haynie and I of our impending deployment to Baghdad to support the Office of Reconstruction and Humanitarian Assistance (ORHA). I can honestly admit my skepticism was at an all-time high. We had just spent three months attached to Combined Forced Special Component Command (CFSOCC) in Qatar, exploiting commercial spectral imagery to assist in the targeting and destruction of Iraq's military infrastructure and now Bo wanted us to use the same tools to "Reconstruct and Assist" … right. After several hooahs (which I've come to learn mean anything but NO) were exchanged, MAJ Haynie and I began the task of preparing the SPEC-Tr team for success. LTC Elizabeth Kuh (ORHA Space Operations Officer) was a huge help in the initial planning stages of getting the Spectral Exploitation Cell-Transportable (SPEC-Tr) on the road to Baghdad. She was on site and knew the mission requirements and logistic support constraints we could expect upon arrival. She wanted the team to be light, non intrusive and able to provide high impact spectral and commercial imagery support…oh, and be there by Friday.

Having the best trained and most experienced team of "Spectral Renegades" on the planet, sitting right next to me, made planning simplistic. MAJ Haynie would run operations and provide top cover, SGT Brandi Harris would be the topographic and commercial imagery production specialist, SPC Brian Marsh would get the spectral exploitation systems installed and keep them running, and I would provide spectral/MASINT expertise as needed. Since we would have to deploy without support from the Eagle Vision 1 commercial imagery downlink, we would need to rely on reachback support to the Spectral Operations Resource Center providing new commercial imagery and fall back support on any large or analysis-intensive projects that require their "heavy lifting" capabilities. The one piece of equipment that enabled us to make this idea a reality, was the Space Support Element Toolset-Light (SSET-L), providing us the capability to move huge spectral data files and products to/from the SORC and forward deployed ARSSTs in minutes.

Once on the ground in Baghdad, we were fortunate to be collocated with ARSST 13. They had been on the ground for almost a month, knew the standard operating procedures, and were already supplying ORHA with a myriad of Space support products and topographic and commercial imagery support requirements. This was my first experience working with an ARSST and I have to say these guys were truly impressive to watch, never turning a request away and dead-set on producing each and every product to standard. Honestly, there was not an office in the ORHA palace that didn't have an ARSST 13 product on the wall. The SPEC-Tr team fit seamlessly into their already well-functioning operation. We began taking on the commercial/spectral imagery requests, providing image maps and pushing requests for imagery support to the SORC. It became apparent early on that there was a niche for high-resolution commercial imagery, providing ORHA ministries with "eyes-on" planning capabilities without having to leave the palace. Security teams could plan routes for transporting high level personnel or money deliveries without ever having to expose themselves to possible dangers. High-resolution imagery played an important roll in the early planning stages of reconstruction and the time had come to prove how spectral science could help answer the mail.

The marshlands of southern Iraq had once been one of the largest pristine marshlands on the planet, an unspoiled habitat for thousands of unique animals

**SORC Imagery was used to detect soil disturbances that led to the discovery of mass graves. Top left, skeletal remains of a Shiite are resurrected at a mass grave site near the town of Hillah; below, a chilling look at the multitudes of bodies that were unearthed.** *Photos by MAJ Tim Haynie*

and a source of livelihood for the surrounding Shia population. During the 1980s, the Iraqi regime devised a plan to control, with the intent to displace, the Shia populace in southern Iraq. To accomplish this, Saddam Hussein ordered the marshes be drained, idea being if the Shia's livelihood was removed they would in turn leave. The marshes were drained, but the Shia remained in place, the only outcome of the operation being the destruction a delicate ecosystem. The ORHA Ministry of Interior requested a spectral study of the areas to determine how much damage had been done. SGT Harris requested archival spectral imagery over the area from the SORC to coincide with the dates before and after the draining operations. The Landsat Thematic Mapper imagery over the entirety of southern Iraq was mosaiced together, spectrally normalized, and change detection algorithms were applied. The resulting product was passed on to the Ministry and was considered an invaluable asset for future plans to restore the marshlands to their previous state. This would not be the last time spectral analysis would help the Iraqi people overcome the damage of the former regime.

The most chilling discovery since the fall of the former Iraqi regime is the evidence found throughout the countryside of mass graves. These testaments of the cruelty and brutality of Saddam Hussein's government are being discovered almost daily, some supposedly containing political prisoners, some military prisoners of war from Kuwait and Iran and some containing men, women and children from the Shia and Kurdish cleansing of the late 1980s and early 1990s. The International Forensic Centre of Excellence for the Investigation of Genocide (INFORCE), appointed by ORHA to investigate several known mass graves, approached us for assistance in locating and identifying mass grave locations throughout the country. Through several site surveys of the mass grave sites and hours of in-depth spectral analysis, it was determined that there was nothing we could do to detect, identify or locate mass graves. It was discovered, however, through our analysis, that we could detect soil disturbances related to the initial digging in the area of the mass graves. There is a high abundance of gypsum throughout Iraq and, using the known spectral characteristics of this mineral, we can show to a high degree of certainty that there has been a disturbance of the soils in and around an area. Using unclassified commercial spectral imagery over the area from the same time frame as the incident and comparing the analysis results to the same area before the incident — we can pinpoint the time frame that the known locations was installed. This information can be used as evidence in a war crimes tribunal to prove dates and locations of possible genocidal crimes.

The spectral and commercial imagery support to ORHA is ongoing, with SORC liaisons forward deployed to Baghdad and with future deployments of spectral analysts and geologists to support the mass grave surveys. There is no way I could have ever imagined I would have been a integral part of this history-making event, and I would, given the chance, volunteer in a second to go back…this time though, I'll know what to do … and where I'm going.

# Products Plus ...

## Space Support to Post Hostilities and Stability and Support Operations

LTC Elizabeth Kuh was assigned to U.S. Army Space Command in July 1996 where she worked in the G2 section until 1999. She has been at U.S. Army Space and Missile Defense Command in the Current Operations Section since September 2002. She is currently deployed as part of Operation Iraqi Freedom and is attached to the Coalition Provisional Authority.

**By LTC Elizabeth Kuh**

The entire staff chuckled as the new "kid on the block" was introduced at the staff meeting as the Space Operations Officer. The bewildered look in everyone's eyes made it clear that no one in the room could imagine what role Space would possibly play in supporting the Office of Reconstruction and Humanitarian Assistance (ORHA) mission. After all, the organization was rebuilding the country of Iraq — not destroying it. The "war" would be over and ORHA was the initial post-hostilities support structure, not a warfighting organization.

As so often happens, there was a significant lack of knowledge and understanding of Space force enhancement roles and missions. As Space operations officers, our greatest challenge is to educate and demonstrate to the organizations we support, exactly what we bring to the table throughout the full spectrum of warfare — from predeployment, to post-hostilities, and through redeployment. That morning at my first ORHA staff meeting, the gauntlet had been thrown down; education was on!

Initially, I was an FA40 in the role of Space liaison officer to ORHA and (eventually) Army Space Support Team (ARSST) 13, deployed to Baghdad, Iraq, in support of Operation Iraqi Freedom, Phase IV (post-hostilities) and the Interim Civil Authority. As the first FA40 and Army Space Support Team to deploy with a Joint, coalition, combined, interagency organization, significant challenges were identified immediately during our very condensed predeployment crisis action-planning phase. Outside of anticipating support requirements, the most significant challenge was that of releasability and classification of Space products. The team knew the demand — for image products in particular — would be significant. We also knew that those image products would be shared in a combined, coalition environment. It was obvious there was little if any use for classified image products in support of this mission. In actuality, the request for image products far exceeded expectations. Had the team not been able to provide unclassified imagery products, our impact on this mission would have been minimal rather than exceptional.

Limited distribution issues were a concern as well, but to a much lesser extent, as the majority of our requests came from governmental agencies. On that same note, if the organization that a team is supporting has a Foreign Disclosure Officer, they must get to know that individual. If the organization does not have a Foreign Disclosure Officer, the team chief or the FA40 should find a way to reach back to one. Foreign Disclosure Officers are a tremendous source of advice and can be a great ally.

A brief discussion of the types of products provided in support of this mission is in order. Through this discussion, I will highlight a few key points on resourcing and partnering for this mission. Once in Baghdad, the ORHA team conducted a quick assessment of requirements and redundant capabilities that met those requirements. Our intent was to create efficiencies by building a partnership with other agencies that were in the business of providing infrastructure information to the various ministries and reconstruction teams associated with ORHA. The team established one such partnership with the Army Corps of Engineers that in concert with the Defense Intelligence Agency, developed an extensive infrastructure database, which was transportable into the mapping program ArcView. A simple conversion from Excel spreadsheets to shape files created overlays that were then imported onto maps. These mapping products were absolutely invaluable to the ministries because rather than having to send multiple teams out to scour the city/countryside for facilities (i.e. banks, jails, radio towers, etc.), we developed infrastructure products that provided locations and status of those facilities. The products saved ORHA hundreds of man-hours and thousands of dollars, and allowed the ministries to begin reconstruction and refurbishment projects much earlier than anticipated. Image map reconnaissance also kept teams off the roads, enhancing the employment of force

protection.

It became apparent very quickly that the need for raster graphic (mapping) products was going to be just as extensive as the demand for image products. Understanding that this capability is inherent to Topographic (Topo) Engineering teams, we initiated a request through Combined Forces Land Component Command for a Topographic team. The request asked that this team be under the operational control of ORHA and augmented to our Space support cell. The 30th Engineer Battalion agreed to this arrangement and a team from the 175th Topographic Company was deployed from Camp Arifjan, Kuwait, to Baghdad. This partnership proved extremely beneficial. Our Space cell became the one stop shop for all mapping requirements. The ARSST 13 officers conducted requirements management, passing the Geospatial Information System (GIS) (mapping) requirements to the Topo Team Platoon Leader/ NCOIC and delegating production of image requirements to the ARSST. This construct greatly facilitated timely production of mapping/image requirements and should be explored as a possible permanent relationship between ARSSTs and Topo teams.

There were also a number of requests for more complex spectral image and change detection projects. The addition of SPEC-TR to our cell provided the necessary production capability for these special Spectral Imagery projects. The SPEC-TR team deployed to Baghdad as a follow-on mission. Its original support requirement was to Combined Forces Special Operations Component Command in Doha, Qatar. While deployed to Qatar, SPEC-TR passed imagery requirements to, and received imagery products directly from Eagle Vision I (EV I). This arrangement provided the team with up to 15 new scenes per day of unclassified commercial imagery. This partnership proved, beyond a shadow of a doubt, the value of the Eagle Vision vans and their impact on production of timely, relevant, unclassified image products. When the SPEC-TR team arrived in Baghdad and the tie to EV I was severed, the team often waited for weeks for new imagery scenes and change detection projects using reachback. To some degree, because the personnel in the Spectral Operations Resource Center (SORC) are not immersed in the same environment as deployed teams (24/7 operations), it appeared that the sense of urgency needed to provide timely products was lacking at times.

The last but certainly not least of the partnerships that the team developed was with the National Imagery and Mapping Agency (NIMA) representative from the National Intelligence Support Team (NIST). We shared information and softcopy products, discussed different requirements, and established a division of labor. The team passed all requests for new collects through the NIMA representative and, in general, established an excellent working relationship. Again, all image products that came through the Space support cell were requested at the unclassified level, significantly decreasing the redundancy of products created by the NIMA representative and products created by the ARSST.

Other Space force enhancement missions played a minor yet important role in this deployment. After researching Blue Force Tracking systems, the team recommended ORHA purchase the Vistar system, an unclassified tracking box, provided by a company whose Web site was accessible on a standard unclassified laptop/desktop computer. Again, we did not have to worry about coalition issues with the Blue Force Tracking boxes and all of our satellite offices and force protection agencies could access the Web site and tracking program through the NIPRNET. Accounts were established for any office that needed access to the tracking program. The accounts were password protected for security.

The ease and reliability of this system facilitated maxi-

*(See Products Plus , page 71)*

# Unprecedented

## Space-based Information in Operation Iraqi Freedom

LTC Max Corneau is a mobilized reservist supporting the Amry Strategic Space Information Operations Element. He served 16 years on active duty as a special electronic mission aircraft pilot and SIGINT officer. He served throughout the world in five Aerial Exploitation battalions and was the Army's first Aviation officer to be instructor qualified on the E-8C JSTARS aircraft. He served in a direct support role to Operation Iraqi Freedom and flew combat surveillance missions in Operations Noble Anvil and Desert Storm.

**By LTC Max Corneau**

Combat Operation Iraqi Freedom (OIF) was characterized by an unprecedented reliance on Space-based information systems. U.S. forces relied heavily on Space-based communications, as did the Iraqi regime and regional governments who had a stake in the outcome. In all cases, combatant forces leveraged commercial Space systems to further their individual objectives. In addition, global media organizations dispatched and assembled to cover the war were equipped with a variety of Space-based voice, data, and live video systems capable of broadcasting to a worldwide audience as events unfolded. In all these use cases, coalition, Iraqi regime, contiguous governments, and media operations depended on Space-based information to meet their objectives.

This article describes information activities and kinetic "information" targeting in OIF, followed by a look at recent state and non-state sponsored attacks against Space systems. Finally, within the context of Department of Defense Space Directives and the Army Space Policy, the article seeks to highlight the implications of our nation's increasing reliance on Space information through all phases of conflict.

Before beginning, a review of current Space policy is in order. According to the April 2003 Army Space Policy: "Space dominance and the full exploitation of space-based systems are vital to achieving the precision, information superiority and battle command capabilities essential for executing the responsive, full spectrum, distributed operations envisioned for Land Force units." The policy statement continues that future information flow to military decision makers will approach near-real-time as commercial and military uses of Space accelerate. To support its objectives, the Space Policy further states: "The Army must promote a federated and distributed information network of sensors and communication devices among Commercial, Military, and National Space-Based Capabilities as part of the Global Information Grid." Keep this in mind as you read the following.

### Space-Based Information in OIF

*U.S. Forces*

During OIF, U.S. forces relied heavily on Space-based communications. According to Air Force Secretary James Roche, in an address to the 19th Annual National Space Symposium in Colorado Springs, Colo. in April 2003, there was insufficient bandwidth to support signals among ships, troops, commanders, and aircraft. Roche said, "We consumed an awful lot of bandwidth. We rent as much bandwidth as we can get our hands on and we're trying to become more efficient." Echoing Roche's sentiments, LTG Peter Cuviello, the Army's Chief Information Officer highlighted the extraordinary amount of commercial communications used in OIF. "About 80 percent of our capability over there (southwest Asia) was commercial satellite. When U.S. troops go back to home station, they don't have that capability."

One example of U.S. use of commercial systems can be seen in its $36 million annual contract with Iridium Satellite, LLC to deliver unlimited minutes to 20,000 users. According to Iridium, Department of Defense (DoD) traffic increased threefold in the months prior to OIF. The federal government owns its own Iridium ground station. Iridium usage by the DoD is part of a methodical plan to provide mobile, global communications to select forces.

DoD use of commercial systems is fraught with risks when not managed properly, from tactical, technical, and operational views. In April 2003, U.S. Central Command (CENTCOM) banned the use of more than 500 Thuraya phones in use by its combatant forces and accompanying embedded media. Thuraya is a telecommunications company based in the United Arab Emirates. The handheld, dual-mode phones apply global positioning system (GPS) technology and are considered a security risk by

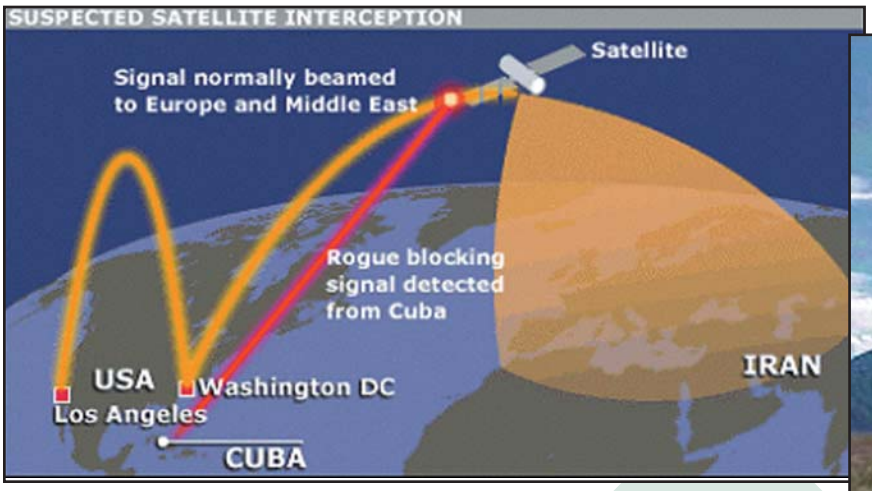



Figure 1 Global Nature of Interference (courtesy BBC)

The $7,500 Swap Meet UHF Jammer

U.S. officials. GPS data gathered by the Thuraya system is downloaded at the company headquarters in the United Arab Emirates and could be made available to third parties since this station is not under U.S. control.

*Global Media*

OIF was also characterized by the most robust and pervasive near-real-time battlefield reporting in history. Reporters embedded with U.S. forces used satellite technology to provide global minute-by-minute reports as battles were joined. The restriction on Thuraya phones adversely affected some reporters, but the journalist's kitbag usually consisted of a variety of information tools. Generally, the largest unit in use by reporters in Iraq was the INMARSAT M-4 Communicator. This 10-pound, $8,000 unit provided 48 photos per hour. The SwiftLink system, riding an INMARSAT link provided the majority of video coverage across a 128 KBpS link.

In stark contrast to the coverage provided by U.S. embedded reporters, the Al Jazeera satellite TV network provided global images of captive and killed U.S. servicemembers, as well as civilian casualties. And who can ever forget the images of "Baghdad Bob" Mohammed Said al-Sahaf exhorting Jihadists and martyrs to fight the American infidels, as he called them, in any way possible. Recall that Baghdad Bob's press conferences usually originated from Iraq's state owned satellite TV channel, the Iraqi Satellite Channel.

*Kinetic Information Targets*

U.S. CENTCOM's OIF target list included command and control targets. One of these intended targets was the group of buildings in Baghdad housing the Baghdad satellite communications, according to a CNN report filed on March 26 after Coalition Tomahawk missiles struck the facility. According to the report, which cited CENTCOM officials, the March 26 Tomahawk strike was aimed at eliminating the system used by the regime to communicate with troops and the Iraqi people. The day before the Tomahawk attack, Iraqi television aired footage of five U.S. prisoners of war that included four dead U.S. soldiers lying crumpled and bloodstained in a makeshift morgue. The Iraqi footage was very powerful — aired by several Arab satellite media outlets, it was not generally carried by U.S. media sources. Clearly, the Iraqi regime intended to use its satellite communications capabilities for military command and control, as well as propaganda to the world. The regime's Ministry of Information was struck successfully a second time on March 31 in a continuing effort to reduce the Hussein regime's command and control capabilities.

*Looking Back and Forth*

We hope that a clear picture is emerging that shows U.S. forces relying heavily on commercial Space information. In addition to combatant use of Space systems, global media rely on Space information systems to report on war and newsworthy conflict. Finally, we see in OIF that the Iraqi regime relied on Space information to command and control its forces, as well as communicate its message to the rest of the world. This reliance fostered the importance given to its systems by U.S. forces.

**Space Information Warfare Past and Present**

Geostationary orbit (22,300 miles high over the equator) is no longer a safe place. This haven for communication satellites orbiting over a fixed point on the Earth's surface is filled with hackers, crackers, jammers, pirates, and angry people. Let's chronologically examine some recent Space information operations whose perpetrators and targets span the globe.

*Indonesia and Tonga*

*(See Unprecedented , page 63)*

# 1st Satellite Control Batallion

## Silent Support to the Warfighter

LTC Mearen Bethea currently serves as the Commander, 1st Satellite Control Battalion. She is a signal officer with 19 years of communications and automation experience. Previous assignment, she served as the Customer Service Branch Chief, US CENTRAL COMMAND, MacDill, AFB in support of the entire CENTCOM and Coalition Forces in the effort to win the first part of the Global War on Terrorism (GWOT).

CW2 Garth Hahn serves as the Operations Officer for HHC, 1st Satellite Control Battalion. He served two tours in Kosovo performing voice and data switching and wide-area network management. During his 12-year tenure as an enlisted satellite systems operator-maintainer, he held various staff and operations positions in tactical and strategic satellite stations. He also serves as unit reporter.

**By LTC Mearen Bethea and CW2 Garth Hahn**

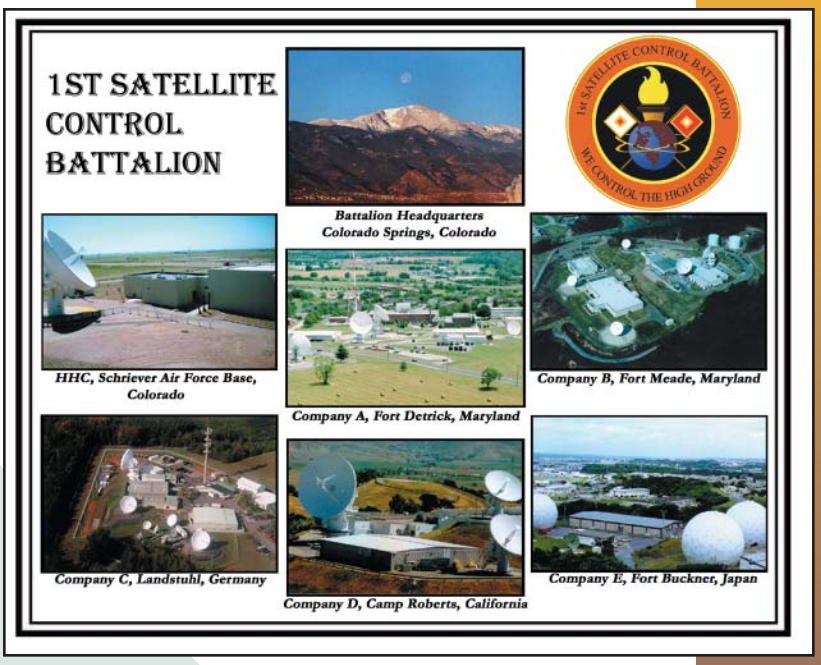
The Senior Network Controller (SNC), SGT Jeremy Phillips, saw the alarm appear on the Defense Satellite Communication System Automated Spectrum Analyzer (DASA) at the same time as the Ground Mobile Forces Network Controller (GNC), SPC Jerry Dotseth, saw the light come on the Frequency Modulator Orderwire (FMOW). Dotseth answered the call on the push-to-talk phone of the FMOW. Mission C099-03, terminal E92 was ready to access the satellite from its location in the Iraqi desert. While in communication with the AN/TSC-85B, Dotseth directed power level adjustments until the terminal's actual power met the predicted power levels, verified proper frequency and took a current weather report. Once satisfied with the access, the GNC proceeded to do the same functions with the other terminals of the mission in accordance with the Satellite Access Authorization (SAA). This textbook access of a small hub-spoke configuration ensured critical communications within theater, and would not be possible without the worldwide network of DSCS Operations Centers (DSCSOC) belonging to the 1st Satellite Control Battalion.

The battalion has five DSCSOCs located throughout the world, each charged with maintaining Frequency Division Multiple Access (FDMA) links, Electronic Counter Counter Measures (ECCM) networks and various sub-networks as well as monitoring satellite health functions and performing satellite payload for the entire DSCS constellation. The primary MOS for the soldiers in the battalion is the "31S" Satellite Communications Systems Operator-Maintainer MOS with the "1C" additional skill identifier for Satellite Systems Network Coordinator. These soldiers spend almost a year in school at Fort Gordon getting trained in MOS 31S and the 1C ASI, and then proceed to one of the six companies in the battalion. The soldiers received plenty of hands-on work with GMF missions as the number of missions out of Southwest Asia tripled from December 2002 to April 2003.

The 1st Satellite Control Battalion comprises six companies: A Company at Fort Detrick, Md., controls the West Atlantic DSCS satellite; B Company at Fort Meade, Md., Controls the East Atlantic DSCS satellite; C Company in Landstuhl, Germany controls the Indian Ocean DSCS Satellites; D Company at Camp Roberts, Calif., controls the East Pacific DSCS satellite; and E Company in Okinawa, Japan controls the West Pacific DSCS satellite. Headquarters and Headquarters Company, located in Colorado Springs, Colorado has a contingency mission in support of U.S. Northern Command and U.S. Strategic Command, as well as administrative support for the battalion staff. This collection of geographically dispersed Operation Centers provides critical control of the DSCS satellite fleet, and enables U.S. military and government communications around the world and around the clock with this 24-hour, seven-days-a-week mission controlling the DSCS system.

All companies in the battalion played an important role in supporting the war, but C Company in Landstuhl, Germany and B Company, at Fort George G. Meade, Maryland, faced the brunt of the Operation Enduring Freedom (OEF) and Operation Iraqi Freedom (OIF) workload. They are the primary controllers for the DSCS satellites supporting the Southwest Asia region of the world. This means they continually monitor the networks and the satellite to ensure maximum support for the users, and in this case, the users are the warfighters prosecuting Operation Iraqi Freedom. These geographically dispersed Operation Centers provided critical control of the DSCS satellite fleet in the Indian Ocean area, and enabled U.S. military and government communica-

***This collection of geographically dispersed Operation Centers provides critical control of the DSCS satellite fleet, and enables U.S. military and government communications around the world and around the clock with this 24-hour, seven-days-a-week mission controlling the DSCS system.***




tions in support of Operation Iraqi Freedom.

To provide high levels of support to all users, positive control is key. Many users operate over the DSCS constellation, which requires strict control of power and bandwidth. Positive control is the means by which the DSCSOCs ensure enough power and bandwidth for users across the joint spectrum. During OIF, positive control became a critical issue with mobile communications and the challenges associated with communication between theaters while under fire. Access to the DSCS satellite by mobile terminals requires simultaneous voice communications to ensure the terminal is using its allocated amount of power and bandwidth. To overcome the difficulties some terminals had with their Frequency Modulation Orderwire, terminals used other satellite and ground systems to talk to the GMF Controller during access. The International Maritime satellite system or INMARSAT, and the Iridium satellite system played key roles in satellite accesses during the OIF conflict. Confusion is part of a battle, but the personnel in the DSCSOC facilities were able to mitigate the access communication problems with these alternative methods, enabling satellites terminals to continue the mission while maintaining that important positive control.

In the midst of the ground fighting, the DSCSOC at Fort Meade got a call from the Third Infantry Division requesting de-access of the satellite due to the end of that terminal's mission. The unit came under fire a short time later and called the DSCSOC to request a re-access of the satellite to support the commander with critical satellite communications during this hostile action. The GMF Network Controller, Dotseth, quickly coordinated through the Senior DSCS Controller, SSG Frank Kimberlin and the Operations NCO, with the Defense Information Systems Agency, Europe to regain access for this GMF terminal. This is usually a multi-week process of submitting requests through the Regional Space Support Centers (RSSC) and the Defense Information System Agency (DISA), but some initiative and fast coordination on the part of the Fort Meade soldiers allowed the crew to re-access the satellite and reestablish communications for their commander. SFC Martin Chaffee, the DISA Europe Satellite Communications Manager, stated "These soldiers' technical expertise, quick thinking, and professionalism returned terminal E92 to their tactical network in record time." This effort was crucial to the warfighting effort, and is indicative of the way the Bravo Company soldiers supported the Third Infantry Division and other warfighters involved in Operation Iraqi Freedom. Although their participation was great, the Landstuhl DSCSOC also played a role supporting OIF.

The Charlie Company DSCSOC in Landstuhl, Germany also supported the troops in Iraq with DSCS network control. After a harrowing battle, the 335th Theater Signal Command (FWD) had battle damage of an important satellite terminal. The antenna feedhorn was damaged, and the terminal needed to make repairs to continue the mission. The GMF Network Controller, SGT Benjamin Singleton, coordinated with DISA, RSSC Europe, and the Theater Communication Control Center Forward, to enable an outage for the terminal to replace the battle damaged equipment and quickly re-enter the network.

Besides the ground mobile forces (GMF), other mobile users were supported through the DSCSOC. Charlie Company in Landstuhl, Germany worked closely with the USS Nimitz as they accessed and used the satellite from the Southwest Asia region.

*(See Silent Support, page 68)*

# Space Force Enhancement

## Army Space Support Teams in OIF

MAJ David Hotop is a Reservist, mobilized for Operation Enduring Freedom. He currently serves as commander, Army Space Support Company, 1st Space Battalion. Prior to command, he served as Team Leader for Army Space Support Team 5 and 7. His former active duty service included tours as the Brigade S2 for the 3 Brigade, 4th ID and S2, Engineer Brigade, 2 ID. Prior to attending the Intelligence Officer Transition Course , he served as an infantry officer in the 6th ID Light.

**By MAJ Dave Hotop**

It was late September 2002 and the soldiers from 1st Space Battalion, Army Space Support Teams (ARSST) 1, 3 & 5 had just completed certification training when the company received the warning order for Internal Look. The order called for three ARSSTs to support the exercise. This was not the first time Space and Missile Defense Command-Colorado Springs (formerly Army Space Command) would have three ARSSTs deployed for one exercise, but it was one of many in a string of slightly different firsts.

The Army Space Support Company (ARSSC) already had two teams committed to the Global War on Terror (GWOT). Sending three more teams to Kuwait in late October and early November meant the ARSSC was 100 percent committed. At this point there was a general realization that a presidential decision to use military force to oust Saddam Hussein would require more Space teams to sustain the effort long-term.

As the requests for Space Teams to support Internal Look grew, to a number somewhere in the neighborhood of seventeen, the staff worked tirelessly to develop solutions to meet all the requirements. What was the backup? Soldiers from 193rd Space Support Battalion of the Colorado National Guard who had been mobilized after the terrorist attacks of Sept. 11, 2001, extended while others were called to active duty to form another ARSST. This helped, yet it was not enough to meet the anticipated missions. Soldiers from across the command volunteered, and with requirements finalized, started training. At this juncture, I will explain the ARSST mission and composition. In latter sections I will discuss training, team certification, and support to combat operations.

### The ARSST

ARSSTs are rapidly deployable teams that provide Space Force Enhancement support and Space Control awareness primarily at the Corps level. Regardless of the echelon, the teams deploy and integrate into the supported unit staff. The ARSSTs single focus is to provide relevant, timely Space-based products and support that enhance the ability of the warfighter to dominate the battle space and engage the enemy decisively.

ARSST leaders continuously seek areas that require relevant Space support and opportunities to educate the supported unit staff. The five Space Force Enhancement (SFE) areas defined in JP 3-14 are: 1) Satellite Communication (SATCOM), 2) Missile Early Warning (EW), 3) Environmental Monitoring, 4) Intelligence Surveillance and Reconnaissance (ISR), and 5) Position, Navigation, Velocity, and Timing (P/N/V/T). With some study of the SFE areas it doesn't take long for most to realize that there are prime actors (e.g., G2 and G6) who leverage Space-based systems across each of the SFE areas. So, the question that often comes up is how are Space support teams unique? In every SFE except P/N/V/T other staff sections perform the primary functions. Where there is apparent "overlap" in any of these areas — for example with the G6 for SATCOM — the ARSST augments and brings sufficient knowledge, capability, and reach support adding significant value. The ARSST also works closely with the staff to provide Space control awareness that supports maneuver unit operations.

An ARSST has three officers and three enlisted soldiers. The team conducts a mission analysis and uses factors of METT-T to integrate with and adapt to the supported units battle rhythm. With that said, for 24/7 operations, teams typically split into two 12-hour shifts. The team leader and the team NCOIC float but also have some overlap with each shift.

The Team Leader is a Major, Functional Area (FA) 40 Space Operations Officer, responsible for integrating Space products and Space control at the operational and

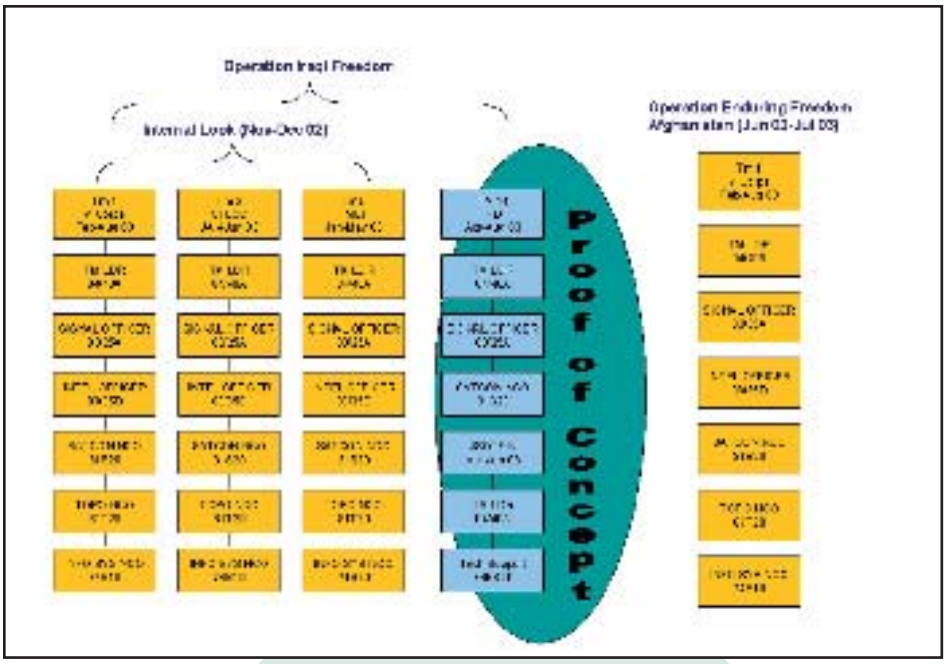



Figure 1

tactical level of war for the supported unit. The deputy team leader is a Captain and runs team operations. This officer is responsible for team collective training, manages production, and monitors Space and situational awareness of the team. The third officer is responsible for Space intelligence and insures full threat integration and counter Space threat assessment updates with the supported unit's intelligence section. While this is the current organization, the 1st Space Battalion is scheduled to transition to a Modified Table of Organization & Equipment (MTO&E) Oct 16. With this MTO&E there are some changes to team structure.

The one significant change for ARSST personnel is the conversion of the intelligence officer to an enlisted intelligence analyst. This intelligence analyst is a 96B30. The intelligence analyst is the senior enlisted soldier and, as such, the team NCOIC. In addition to primary MOS duties, the team NCOIC executes team administration, logistics, and individual training. The teams' truly unique character comes from the synergistic effect derived from the natural blending of the remaining enlisted soldiers skills combined with Space expertise realized through intense training.

The remaining three-team members bring the following skills and knowledge from their MOS. A Satellite Control NCO (31S1C) understands SATCOM, the space environment and orbital mechanics. The Topographic NCO understands mapping, charting, and geodesy as it relates to imagery production and spectral imagery capabilities. The teams leverage spectral products through the Spectral Operations Resource Center at SMDC-Colorado Springs and rely heavily on their topographic analyst for this capability. Last is the Automation NCO (74B) who is responsible for all technical support to include system accreditation for the Space Support Platform, wideband communications system, and general automation equipment support and administration.

## Training & Certification Program

Each ARSST relies on reach support provided by a portable wideband communications system. The system provides independent bandwidth and communications to a state of the art operations center at SMDC-Colorado Springs Headquarters. Except for this reach capability, once deployed, teams operate under the operational control or as an attached element to their supported unit. For this reason, teams sustain their training through a rigorous certification program based on a tiered, four level approach. Each of the levels progress through individual and collective skills, culminating in an external evaluation of team tasks found in the draft mission training plan for ARSST operations.

The evaluation is a three-day scenario driven, hands-on event designed to stress the team in a realistic environment. The team is issued an Operations Plan to study and start preparing for Space support operations. On the first day of the exercise, the team is issued a fragmentary order with requirements to provide capability briefings, develop Satellite Reconnaissance Advance Notice (SATRAN) or over-fly reports, GPS navigation accuracy graphs, and a number of imagery products typically produced to support assessments for supported units. Throughout the three-day event, the team is evaluated on each task and the results are recorded on the training and evaluation outline. At the final AAR, the team is given a completed evaluation package for further use in training.

Now that you know what an ARSST is, what an ARSST does, and how an ARSST trains, I'll review the support provided by those elements to Operation Iraqi Freedom (OIF). The deployment of three ARSSTs

*(See Force Enhancement, page 70)*

# JTAGS Early Missile Warning in Theater

## Tactical Ballistic Missile Early Warning in the Middle East

CPT Charles D. Nesloney is an active duty Air Defense Officer serving as the Commander of 2nd Space Company (Formerly Theater Missile Warning Company). He previously served on the SMDC-Colorado Springs G-3 Plans staff as the Army Air and Missile Defense Liaison to the North American Aerospace Defense Command (NORAD) and the Continental United States NORAD Region in support of Operation Noble Eagle.

**By CPT Charles Nesloney**

Since the onset of Desert Storm, the missile threat in the Middle East has been of great concern to the peace and stabilization of the area. The proliferation of tactical ballistic missiles (TBMs), with increased distances and improved warhead lethality has brought about the need for a system to provide early warning. As many people saw on CNN, Iraq used TBMs as a terrorist weapon against both military and geopolitical targets. We also saw Chechnya use over 200 short range TBMs in their conflicts with Russia. An in-theater early warning dissemination system was clearly needed for the protection and survivability of U.S. Forces and allies. The Joint Tactical Ground Station (JTAGS) is the system that has answered that call.

As operations began in Afghanistan and the instability in the Central Command area of operations increased, it was determined that there was the need for a dedicated JTAGS unit in the Middle East. Led by a Chief Warrant Officer 2, a JTAGS section was deployed to the Persian Gulf area to establish that direct link to the warfighters in the CENTCOM area of responsibility. In this time period, over 800 "events," including TBM warnings and bombings, were reported. The lessons from Desert Storm, the uncertainty of what missiles might be fired, and the build up of forces for the impending operations in Iraq, increased the responsibilities of tactical ballistic missile early warning. This responsibility did not rest solely on the JTAGS section in the CENTCOM area. Due to the history of Iraqi TBM attacks against Israel and the fact that Israel is in the European Command Theater, the JTAGS section in Germany also provided early warning support to that region. Additionally, if needed, the JTAGS section in Pacific Command could also provide support to the CENTCOM area of responsibility. Operation Iraqi Freedom was truly a test for the entire JTAGS community, not just one unit.

The mission of JTAGS is to provide the 24/7 continued, assured, in-theater tactical ballistic missile early warning. This continued assured early warning enables the warfighter to have a direct link to information that aids in the engagement of a TBM, force protection, or go after the shooter. JTAGS supports all Theater Missile Defense pillars (attack operations, active defense, passive defense, and battle management/command, control, computers, and intelligence (BMC4I). These pillars allow our operators to understand the importance of their mission and the affects of their early warning.

Theater Ballistic Missile Warning must keep pace by exploiting technological innovations such as sensor data fusion and information correlation. This and future early warning concepts must incorporate the potential for the fusing of Space based infrared (IR) data with data from other surface, air and Space-based sensors. The goal is to provide TBMW information using standard data and voice dissemination systems, which are common throughout the theaters and Shared Early Warning partner countries. Integration of Enhanced Early Warning and Joint Range Extension will facilitate JTAGS ability to support data fusion and near real-time information transfer to support passive, active and defense activities. These enhancements will reduce force vulnerability, enhance force survivability, help eliminate threats before a launch and increase the battle space.

Currently, in order to provide the early warning, JTAGS processes data from the Defense Satellite Program to determine launch points, vectors, and predicted impact points. This warning is provide across a variety of data networks: IBS subsystems are IBS-Interactive (IBS-I), commonly called Tactical Information Broadcast Service (TIBS), and IBS-Simplex (IBS-S), commonly called Tactical Receive Equipment and Related Applications (TRAP) Data Dissemination System (TDDS). JTIDS networks exchange Tactical Digital Information Link (TADIL) J series (Link 16) messages. In addition to data transmissions, JTAGS provides redundancy through voice

Members of the Theater Missile Warning Company train on loading and unloading their equipment on a C-5 airplane. Photo by Sharon L. Hartman

early warning. Detecting tactical ballistic missiles is the primary mission focus. This early warning ability was facilitated with JTAGS units being re-stationed into the EUCOM and PACOM theaters. Although these elements could monitor all the necessary areas, it left the CENTCOM Theater without a dedicated unit.

Many of the lessons taken from Operation Iraqi Freedom are currently being used to determine how to best modify our procedures and improve our ability to provide that continued assured early warning. As the planning and eventual operations continued to mature, the JTAGS sections relied on the in-theater Space Operations Officers to provide continual current situational awareness. This process was not normal to either the Space Operations Officers or the JTAGS sections. MAJ Richard Lewis, the FA40 at the CENTCOM Combined Force Air Component Command, (CFACC) ensured that our JTAGS section received mission intelligence, current situational awareness and worked any issues that the JTAGS section needed help with. Additional means of acquiring situational awareness came through the 32nd Army Air and Missile Defense Command (AAMDC), Army Space Support Teams and the Army Central Headquarters in Qatar. JTAGS also reached back to the SMDC Operations Center to help keep up with the progression of hostilities. The information availability was not the concern; rather the amount of information from a variety of sources became an issue. One of the lessons we are looking at is the feasibility of deploying a 1st Space Battalion or Theater Missile Warning Company C2 element, collocated with the CENTCOM operations center in order to maintain current situational awareness, disseminate information to the JTAGS section and facilitate coordination and control.

Due to the manning requirements needed to provide the necessary 24/7 TBM early warning, personnel from the JTAGS sections at Ft. Bliss and Colorado Springs were used to man this section. Additionally, the U.S. Navy provided personnel to complete the manning requirements. A majority, if not all, of the CONUS based JTAGS qualified soldiers have already completed one tour in CENTCOM and are beginning to do another 6 month hitch. The strains that are common with these deployments are not only felt in the unit, but also the soldiers and sailors' families. Because this is a new location, work is in progress to facilitate a permanent presence in the CENTCOM Theater. This would allow the company to have better assignment predictability and continue to enhance our mission areas by having soldier and leader stability.

Currently the doctrine used by JTAGS/M3P is designed by U.S. Strategic Command, with input from all the Combatant Commanders, AFSPC, NORAD, and SMDC-Colorado Springs. As the Army representative for Space operations to the unified commands in each theater SMDC-Colorado Springs is more focused on joint doctrine and TTP environment today and for the future. SMDC-Colorado Springs has the flexibility to work directly with Combatant Commanders when defining and designing Space doctrine to support their early warning requirements. JTAGS is now under an approved Space Battalion MTOE and all JTAGS/M3P individual and collective training and doctrinal documents under development reflect those changes using an SMDC proponent and specific system code and numbering scheme. JTAGS/M3P shelters are COTS/CLS systems supporting space missions, and as such the software and hardware are in a continual cycle of change. USSTRATCOM and SMDC-Colorado Springs, as the Army Space Component to USSTRATCOM, ensures these needed changes to mission and doctrine occur within the shortest amount of time to support the Combatant Commander needs in each theater.

Since the inception of JTAGS, the Theater Missile Warning Company has provided the ability to sustain quality, qualified JTAGS operators in each of our sections through the operations of our schoolhouse. The section currently based at Ft. Bliss not only provided soldiers to each of the forward deployed sections and being a deployable section, but also has the mission of teaching the JTAGS Individual Qualification Training Course. On average, this course produces 52 qualified JTAGS operators. Because Theater Missile Warning Company has the ability to run its own school house as well as conduct a war time early warning mission, it enabled the company to take daily lessons and incorporate them into the instruction at the school house. The ability to quickly incorporate lessons not only increased the knowledge base of our JTAGS Operators, but also provided "ownership" to the forward

*(See Early Missile Warning, page 68)*

# Space Ops Division

## The Future for Space Operations in Korea

By MAJ Kathi Thornton & CPT Joseph Guzman

CPT Joe Guzman currently serves as Orbital Safety Officer/ Launch Officer, Cheyenne Mountain Operations Center. He served as the Deputy Space Operations Officer for Eighth U.S. Army, Yongsan U.S. Army Garrison, Korea from June 2002 to September 2003. A branch Qualified Field Artillery Officer, volunteered for the Eighth U.S. Army Space Operations assignment in Korea to learn more about Army Space Operations and earn his 3Y Additional Skill Identifier. He aspires to be an Army FA40.

MAJ Kathi Thornton currently serves in Yongsan, Korea as the FA40 and TENCAP Manager for Eighth U.S. Army since August 2002. After earning her Masters of Science in Strategic Intelligence from the Joint Military Intelligence College, she served as an evaluator for the Army Test and Evaluation Command. Her evaluator expertise strongly supports her involvement in Korea's Spiral 2 of the JROC-directed Joint Blue Force Situational Awareness Advanced Concepts Technology Demonstration. Previously she served at the Kunia Regional SIGINT Operations Center in Oahu, Hawaii and as a Signal soldier she served as a SATCOM Ground Station Repairer/Operator for the TENCAP site in Fort Bragg, NC and for the strategic DSCS site in Fort Buckner, Okinawa, Japan.

Over the past two years the 8th U.S. Army Space Operations Division has evolved in its scope and function. The division, currently residing within the Assistant Chief of Staff, G-2, touches all facets of Space Force Enhancement. Additionally, it serves a limited role in Space Control for the Commander, 8th U.S. Army and, as required, for the Commander, U.S. Forces Korea (USFK). Army Space Operations Officers coordinate with Space Operations personnel from all services to enhance Battle Command for the Korean Theater of Operations (KTO). Staffed by MAJ Kathi Thornton, FA40, and CPT Joe Guzman, the Space Operations Branch coordinates Space-related activities for all U.S. Army units in the KTO. Looking to the future, this coordination will continue to include real-world armistice operations, exercise support, support for ongoing Advanced Concept Technology Demonstrations (ACTDs), and development of Space-based support capabilities and tactics, techniques, and procedures.

Through participation in the Joint Requirements Oversight Council directed Joint Blue Force Situational Awareness (JBFSA) ACTD, the 8th U.S. Army Space Operations Division learned just how challenging Blue Force Tracking (BFT) can be in a combined environment. Future battle command in Korea will depend heavily on the use of the Common Operating Picture - Korea (COP-K). As the theater's visualization tool, the COP-K must provide a near-real-time picture of both Red and Blue forces. Currently, Combined Forces Command units update their locations and status by manually inputting data into the Army ground database. The data are then transformed into BFT information for the theater and displayed on the COP-K. This BFT method taxes the resources of units that must continually update the database to provide a near-real-time picture for the commander. By utilizing the automation, accreditation, and dissemination process of Army Space Command's mission management center, the theater would reap immediate benefits. The JBFSA ACTD will provide the means for the theater to employ a mixture of Commercial Off-The-Shelf (COTS) and military BFT devices, to support a variety of missions ranging from logistics to special operations. This information will then be shared with coalition partners via broadcast or network solutions, increasing situational awareness, and limiting the incidence of fratricide. By employing systems tailored to the mission, the JBFSA ACTD will balance the use of national technical means with commercial vendors for BFT and provide users with maximum access to Space-based resources. Users will ship all data via network to the mission management center, which will integrate and transmit information to theater servers for fusion onto the COP-K. Utilizing the Network-Centric concept, the ACTD will bring South Korea to the forefront in fully automated BFT and will vastly improve situational awareness and command and control.

Space Operators in Korea continue to push the envelope in the area of Intelligence, Surveillance, and Reconnaissance (ISR). Ironically, the real challenge in Korea lies not in the acquisition of overhead imagery, but in the dissemination and exploitation of that imagery in a combined environment. Army Space Operators have identified this shortfall and continue to collaborate with USFK J-2 to optimize dissemination. Together with Department of the Army (DA) G-6, the National Imagery and Mapping Agency will upgrade the imagery product library architecture in the KTO in this fiscal year. By coordinating Army requirements with DA G6 and other Service Components, 8th U.S. Army Space Operators are paving the way for network-centric imagery sharing and exploitation across a wide array of security domains. Furthermore, we will push for data sharing between Service Components, which will enhance the overall capabilities of Imagery Intelligence production and exploitation in Korea.

The newly refurbished 8th U.S. Army Headquarters, Yongsan U.S. Army Garrison, Seoul, South Korea. Home of 8th U.S. Army Space Operations.

In another effort, the 8th U.S. Army Space Division assists the Army Space Program Office (ASPO) in all facets of the Army's Tactical Exploitation of National Capabilities (TENCAP) program. We represent theater TENCAP users by coordinating assets to fulfill theater and division requirements at the 501st Military Intelligence Brigade, whose customers include the First, Second, and Third Republic of Korea Armies and the 2nd Infantry Division. Our efforts in the past year included the validation of current and future requirements to ensure theater capabilities and the transition to the Distributed Common Ground Station for Army users. In 2003, ASPO will field the Distributed Tactical Exploitation System to the 2nd Infantry Division, facilitated by Space Operations Officers. TENCAP systems play a significant role in the Indications and Warnings mission supporting the commander during armistice and wartime operations.

Working to improve future intelligence, surveillance, and reconnaissance (ISR) capability in Korea, 8th U.S. Army G-2 seized an opportunity to gain Space expertise by sending the G-2 Geospatial Information Systems (GIS) Technician, WO1 Randy Johnson, for training at the Spectral Operations Resource Center in Colorado Springs, Colo. He received training on specialized software that enables the exploitation of multi-spectral imagery. He was the first GIS technician trained by U.S. Army Space and Missile Defense Command and looks forward to sharing his knowledge of spectral imagery with other GIS personnel. By enhancing future multi-spectral imagery exploitation, Space Operations directly influences tomorrow's battles. The importance of applying emerging capabilities to the KTO must not be underestimated; that idea applies to potential adversaries as well.

North Korea, like other threat nations, may possess the capability to employ COTS or reverse engineered technology to jam Global Positioning System (GPS) signals. Army Space Operators provide staff members and components with threat assessments and information briefs in an effort to mitigate risk to Combined Forces command and 8th U.S. Army. Training on the employment of countermeasures and maintaining a high level of situational awareness about the potential for GPS jamming ensures that major subordinate commands will be ready for such events. By keeping the Command informed of emerging threats like GPS jamming, Space Operations helps to win the battle for information dominance and to preserve friendly access to Space-based products.

The 8th U.S. Army Space Operations Division plays a vital role in both current and future operations for Korea. It provides the theater with access to Army Space assets and products from the Spectral Operations Resource Center. We educate and train the staff on Space-related issues such as emerging threats and technologies. Over the past year, Space Operations received a variety of requests for information from the 8th U.S. Army and USFK staffs. These requests indicate the increased staff awareness about the military use of Space that occurs not only in Korea, but around the globe. Space Operations personnel continue to provide value-added to the commander, 24 hours a day, 7 days a week. As we look ahead, the 8th U.S. Army Space Operations Division will support each of the five missions of U.S. Strategic Command. With windows into the worlds of Space, Global-Strike, Information Operations, Integrated Missile Defense, and C4ISR, Space Operators must enable transformation while we continue to support current operations.

— it's their money; they can buy what they want. But ultimately, if a threat does occur, they can always rely upon the military-procured system, which is designed to counter the threats.

**Q: Another question for Colonel Fox. One of your charts says the Army relies on Space for tactical imagery. In what instances would you use satellites for tactical imagery and in what instances would you use UAVs for tactical imagery?**

Fox: In the discrimination between how and what sensor you're going to use in order to gather data or information - it's determined by a process, and in the Army we call it the collection manager. The collection manager has at his disposal tools to determine what is the best asset to use to determine which makes sense.

Heuristically, you can understand that if we're not in a particular theater yet, it's nice to have something that has reach; that you don't have to have folks on the ground or near the ground in order to receive what information you need. So you can see immediately maybe in an early operation you may prefer a system that can have access to an area that perhaps you're denied. And as we gain access to an area, you can see easily how perhaps airborne platforms become more readily available, and then even after that, you can see perhaps even tactical systems become more prevalent.

**Q: So when you're in theater, you prefer to have organic assets, not Space necessarily?**

Fox: Again, I have to say it depends; it depends on the operation and the situation.

Blaisdell: You have a synergy between both of them. That's why you have a great opportunity with a combination of air and Space assets. Which is why Secretary Roche, Mr. Teets, General Jumper, General Shinseki, and Admiral Clark are pushing so hard to bring those together. And I think they're doing a pretty good job of it. If you're over the theater with Predator, it provides you a very focused look. Global Hawk, I think you've read material, will map something the size of the state of Illinois. And then the higher up you get, obviously, you can get a better expanse.

So the access part that Colonel Fox talked about depends again: Is the enemy controlling the area? Can we fly weapons-free, if you will? That's what dictates.

**Q: General, I wonder if we might just go back to Iraq very briefly, because I —**

Blaisdell: And I know you want to, don't you?

**Q: We know what the Chinese and other countries have active, electronic counter-comms programs that they're building for the 21st century. Could we ask if the Iraqis — I mean, the Iraqi military seems kind of a depleted and demoralized bunch. Are they in any way into this? Did they try to do it during the Gulf War, for instance? Are you aware of the fact that not only might they try it, but are they likely to try it? And did they show any abilities during the Gulf War in this kind of thing?**

Blaisdell: I'm not familiar with their attempts at trying to do any of that during the Gulf War.

**How about you, Colonel Fox?**

Fox: No, sir.

Blaisdell: So I am not an expert on all of Iraq's Capabilities, but I will tell you that they're going to have a pretty hard time doing it.

Fox: I would say that we do understand what threats are possible. I mean, we do design our systems from an acquisition perspective. We take them in consideration.

**Q: I believe that in the last gulf war the United States bought off the commercial surveillance capability, I guess you would say. Has that happened this time around? Have you acquired the capability of commercial imagery?**

Blaisdell: Commercial imagery was bought up. You're correct. The commercial imagery is controlled by NIMA, and all of the activity in terms of what we would do commercial-wise goes through NIMA. They're our collector. So DOD leans to NIMA to control all of that. So I would allow them to answer that question, to be honest.

**Q: This is a follow-up to that, actually. How much does that cost? How much money does the Defense Department shell out for commercial imagery?**

Blaisdell: Like I said, NIMA handled that. I'll have to take that one for the record on how much we did. In OEF I think we can get you that.

**Q: I have a question to do with GPS and selective deniability. Since the entire commercial aircraft industry totally depends on GPS for navigation, do you have the capability to ensure that if you selectively deny GPS, you can do it in such a way that it does not disrupt commercial aviation in a particular region? Or do you have to basically warn that region to shut down commercial activity for a certain period of time? How do you work that?**

Blaisdell: America's policy — I thought that you might ask me that. America's policy with respect to GPS selective availability is that we do not degrade this global naviga-

tion support service from its advertised capability, and so we will not do it.

**Q: Colonel Fox, you mentioned the tracking devices small enough to either wear on a backpack or a belt. Is this something every soldier going into the Gulf is now equipped with, or is it used in select spots? Or are you telling me every soldier has a tracking device?**

Fox: Every soldier does not have a tracking device. There are selected units in selected — I'd say units, basically, that get the devices.

**Q: But if you have this capability, wouldn't it be useful, especially in helping to avoid friendly fire incidents?**

Fox: Yes, it would be. And it's just a matter of, I would say, an amount of resources available at this time in order to outfit the force, although we have within the last few months made tremendous progress. And we're not really focusing so much right now on soldiers as I believe we're focusing on platforms, because those are the important aspects, we think, right now.

**Q: How much are these devices, the individual devices, the soldiers carry, give or take?**

Fox: Well, the capabilities vary tremendously. The — one program that I actually run is the Grenadier BRAT program. And this program - the initial buy was about $14,000 per unit, and we did an initial buy of about 400. It was really just a prototype. It was just to prove out the concepts. The world changed, and all of a sudden the prototype became a very important piece of equipment to be used immediately.

**Q: And that was used in Afghanistan?**

Fox: Yes, it was.

**Q: How many more have you purchased since then? Can you tell us?**

Fox: Yes. We've gone in for a second buy of another 400. That's of — just of the program that I run. There are other programs out there that are also using the same technology that I'm using, in order to get out to the thing. I can say there's over a thousand devices that I'm aware of right now, based on the same Grenadier BRAT technology, being used.

**Q: General, could you talk about what advantages Space provides you for either offensive or defensive weapons? The Missile Defense Agency has started a Space interceptor program. They've got a Space-based testbed that's being built. Can you talk about what your view is and what work you're doing, maybe even in the policy area, of getting this idea out there, getting it kind of cemented as a national policy?**

I would tell you that all of the services — Army, Navy and Air Force — are cooperating there. As a matter of fact, my particular folks sit with the Missile Defense Agency in trying to work through just those policies that you outlined, as I know the president has asked for operational capability here in 2004 on the system that General Kadish and his fine folks are putting together. So there's a lot of activity that will occur here.

**Q: Well, what about from a service perspective? I just mentioned MDA because they're the first ones who are sort of in that program. From your perspective, what opportunities do you see for the Army and the Air Force?**

Blaisdell: There are a number of opportunities. I know the Army here is working — and obviously Colonel Fox can jump right in — but they are working the close-in and mid-course intercept, and have successfully tested a number of opportunities off of Vandenberg (AFB) out there in the Pacific and demonstrated their ability to do that. The shipborne piece for the Navy — and again, mid-course a part of that with Aegis cruisers — is also an opportunity, in my opinion. But I'd let the Navy talk to that.

Air Force-wise, I would tell you that doctrinally, it is offensive/defensive counter-air. And an offensive counter-air issue for the Air Force would be to actually try to strike any threat against the United States or allies prior to them coming out of a silo or whatever. And so that whole doctrinal piece between Army, Navy and Air Force is exactly what we're working, and that's kind of what my shop is engaged in. But that's about as far as I want to go with it because it's still kind of in draft.

**Q: General, I understand you don't want to get into the tactical applications of your technology vis-a-vis Iraq, but you did talk about our dominance, your pity for the enemy. Then there's the timing of this briefing, sort of coincidental to the prospect. Are you sending a message, by your briefing today, to Iraq?**

Blaisdell: Am I sending a message? I am providing you a rundown on how great your Space capabilities are and the dominance that we have in that area.

**Q: What message would you like this to convey? (Laughter.)**

Blaisdell: I would — whether it's Iraq or any enemy of the United States and its allies, I would tell you that we are so dominant in Space that I pity a country that would come up against us. The synergy with air, land and sea forces and our ability to

control the battlespace and seize the high ground is devastating. Many of them, unfortunately, don't really understand how powerful we are. And you see several demonstrations, I think, in different areas of that. I would tell you not to single out any countries, but all countries respect the power of the United States and they respect how dominant we are in this region.

**Q: General, may I follow up on that just a little bit, picking up on your line about if you're going to make a difference in any battle, can you just sort of specify what it is that might make this battle particularly more successful, say, than 10 years ago in the Persian Gulf —**

Blaisdell: Which — which battle might this be, ma'am?

**Q: Any future battle you might be facing. Say, in Iraq? (Laughter.) Why — what — any particular thing that you can point to that could demonstrate the power, that would demonstrate the capability this go-around.**

Blaisdell: Well, the slides that I have given you — the speed, the lethality, the persistence, the information dominance, the precision, the battlespace characterization, bombs on target, real-time battle management. That's what we're about. And that's what we are able to deliver through Space, air, land and sea, and the capability of all of those to come together. We started that in Desert Storm; we've done that in each conflict since. And we get better, and better, and better.

**Q: Isn't one of the major advances you've made since the Gulf War, speaking of instant communications, is, can't you now retarget TLAMS while they're in flight, as opposed to having to target them before they leave the ship, set a target then?**

Blaisdell: I'd rather not discuss our ability tactically to be able to do different things. But I can tell you that the Tomahawk Land Attack Missile is a very potent weapon. I just showed you a clip of it there. It does use global positioning system information. Beyond that, I'll let the Navy talk for their system.

**Q: Yeah. Could you talk a little bit about how satellite windows and your Space tasking might affect the decisions of a combatant commander? And also, could you talk about whether the Army and Air Force Space have any piece of homeland security?**

Blaisdell: On your first question, the windows, are you looking — you want to clarify a little bit more in terms of — are you looking for gaps, or —

**Q: It's something I don't understand very well. If you could help clarify for me and for us how a combatant commander is sitting down and what they're seeing in a Space tasking order and how they make their decisions based on things that you're doing.**

Blaisdell: Absolutely. First of all, let me tell you that the air tasking order and the Space tasking order are combined, and that any combatant commander, no matter what the theater, is able to look at both of those and understand what we bring to the fight, what Space assets are available when and where.

To help him do that — and here's another change somewhat from Desert Shield, Desert Storm — the Air Force and a number of Army — and Colonel Fox talked to this because he mentioned to you Army support teams. The Air Force has very highly qualified personnel embedded in our Air Operations Centers, Combined Air Operations Centers, or CAOCs. And they have at their disposal on the screens tools that tell them the best availability of Global Positioning System data. They have when, what's the best opportunity for warning, what's the best opportunity in weather. All of those tools that I was showing you here, those prime pillars, are all brought together and integrated in the Combined Air Operations Center.

If they need additional expertise in Space we have a reach-back capability through Air Force Space Command and to their component at 14th Air Force, or SPACEAF, which is at Vandenburg Air Force Base, commanded by Major General Hamel. His folks right there in their Combined Air Operations Center, are able to provide that kind of instant update, if you will, or clarification, for the Space folks that are already in theater.

So you've got great people, a weapons school, qualified individuals that are right there with your air component and Space component commanders. We've got those kind of folks that are with the Army and the Navy and the Marine Corps. And they understand what's available to them. And more and more, this is integrated into the fight.

**Q: Are there certain types of missions that, say, would not be flown at a particular time or on a particular day because the constellations might not be aligned the way you'd like it, or do you have pretty much persistence to do whatever you want whenever you want?**

Blaisdell: We have the persistence to do whatever we want when we want.

**Q: And on homeland security, could you just mention, do Army and Air Force bases have any homeland security pieces?**

Blaisdell: General Eberhart, of course, has got that. We're working out with a newly defined Strategic Command that Admiral Ellis is putting together. Air Force Space Command, which is now carved out under General Lord, supports both of those component commanders. So when you say homeland security, General Eberhart has that responsibility here within the United States. He is supported. And Admiral Ellis at Strategic Command, with General Lord as his Air Force component, are supporting him in his homeland security duties. That's pretty much how I would characterize it.

Fox: I can only say I'm not familiar with the parts of the command that might have interest in it, but I have received requests about technologies that I'm familiar with, and I've passed that on to those that have asked the question.

**Q: Sir, what sort of capabilities or technologies will the Military be providing to homeland security?**

Blaisdell: Warning — any warning, which is back to some of the missile defense questions, but warning of any possible attack against the United States. Those sensors. Supporting through Strategic Command, General Eberhart with his homeland responsibilities, for example.

**Q: Has your bandwidth capacity improved any since OEF last year? Also, how are you working to manage the capacity crunch that you're probably going to have, and how you manage that and how you get the operators in the field to make that less of a problem?**

Blaisdell: The bandwidth has grown. Let's see — let me give you some rough orders of magnitude, okay? I think we're at 100 - 250, I think I showed you on a chart, for bandwidth, Desert Storm. That was roughly half a million troops. And now we're at probably — Operation Enduring Freedom, our allied force I believe was two and a half times that, roughly. And then — and now Operation Enduring Freedom, less people — six times the requirement.

And in answer to your second question, what are we going to do about that? What you see out there in 2010 and on is the transformational communications system that we're trying to put forward that has to do with laser packaging, a push-pull Internet in the sky, if you will, where you can go up and pull down information if you need it, or push information if you need it. And that's kind of where we're trying to get to.

**Q: But more immediately is where I was going. If, say, a major contingency comes up in the next week or two, there's obviously, you know, 250,000 troops that are involved. You know, if you're going to have a major bandwidth crunch, how do you work to deal with that?**

Blaisdell: What many folks may or may not know is that our commercial carriers assist us in terms of the broadband width responsibilities. Video-teleconference type, message-processing type. Very similar, the satellite we just put up, the Defense Satellite Communication System, is a broadband type operator. Let me give you some statistics.

Within Kosovo, I believe approximately 50 to 60 percent of our broadband capability was off commercial transponders that we leased. I would expect that commercial activity to occur again here in the event that we had any hostilities somewhere.

**Q: There's been some reporting about the availability of relatively cheap GPS jammers made by Russians and otherwise. How real is that as a threat to targeting of our weapons and that kind of thing?**

Blaisdell: There has been a lot written about possible availability of GPS jammers. We are the country, obviously, that puts up GPS. We've done a great job of doing that. We understand the system. We understand the pros and cons of the system. We design in what's needed to be able to operate that system, especially militarily. And we have opportunities, if you will. We have tested that possibility. And let met put it this way, I think General Leaf mentioned to you not too long ago, I think he said any enemy that would depend upon GPS jammers for their livelihood is in real trouble, is in grave circumstances, let's just put it that way — if that's where you're going with the question.

**Q: Yes, a related question. The system's getting old and the satellites haven't been replaced as quickly as you had hoped. I notice in some parts of the world when I use the military system, that it's taking more time to grab satellites now than it had been even a few years ago. Can you guarantee to the troops that when they need GPS, it will be there for them?**

Blaisdell: I can tell you, ma'am, that the constellation we have is better than the requirement that we generated — right now.

**Q: In the 1970s.**

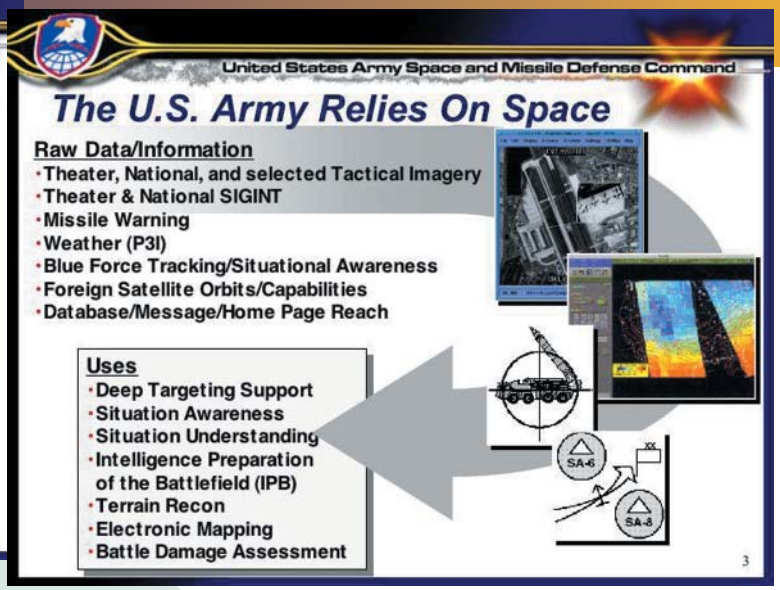
Blaisdell: Much better.

**Q: The requirement you generated many, many years ago-**

Blaisdell: Much better.

**Q: — when things were very different.**

Blaisdell: You know that the




requirements of the civilian community are pretty demanding as well. And you know what? They are absolutely ecstatic with the types of accuracy, timing and precision that they get. So I can tell you, since global positioning system's up there at 11,000 miles in the Van Allen belt, not easily accessible in low earth orbit, that our satellites are doing pretty well. And, as a matter of fact, we're looking at a follow-on system called GPS-III that you'll hear Mr. Teets talk about, which also has a number of discussion items in it that goes to your question on jamming, those kinds of issues. GPS-III is even better than what we have today, and what we have today is absolutely superb.

But, I have to tell you, the enemy doesn't stand still. I mean, they get better, systems get better, and you're right. You know, there's a life span on those GPS satellites. And they get old. And they deteriorate. And we need to replace them . GPS is not just U.S. Because the United States has really made it an international resource, we need to deliver on that. And we will.

**Q: General, just as a follow-up, does thick smoke or intense fire have any effect on GPS, or would you send the same message, anyone relying on fire as a defense mechanism would also be in trouble?**

Blaisdell: We'll have no trouble with the GPS. No, ma'am.

**Q: Sir, I've been thinking about your discussion about precision and timing and with more and more people using your Space application. What changes have you made either operationally or doctrinally to make sure that the critical information or data that's being sent by an individual — perhaps on a horse — can get through the enormous clog to the right person so a precision weapon can be used? And the same question would go to the Space tasking order. Are you considering pushing down controls further down than the — you know, the commanders talk up at — the combatant commanders' centers?**

Blaisdell: I think you're getting into the issue of encryption, perhaps? We have an —

**Q: Not really. If the sergeant on the horse takes a digital picture, sends the information, and there's other soldiers with other information, what makes his information go faster so that the target he's looking at doesn't move by the time that critical but specific data gets there? What good's a precision weapon if the things move? How does he get through this bottleneck that we keep hearing about since Desert Storm?**

Blaisdell: You know, a lot of that is not just technology. A lot of that is tactics, techniques and procedures. And we know where our folks are, we understand what they're engaged with. And the priority associated, whether you are engaged with the enemy in a particular target area, you're going to get the priority. And so the frequencies that you're on and the systems that you have through a Combined Air Operations Center or the Land Component Commanders Center, who is engaged in the fight and who has the priority — you know, everything is a priority, but we understand — we have good situational awareness. I think you're making my point here in terms of Space assets. You need good situational awareness, and that's what Space will provide to you.

Before, we had to fight a number of those conflicts, and we didn't have a good view of the battle area — real-time battle management. Now, between air resources, land, sea and Space, we have a much better opportunity to do that. We know who needs the immediate opportunity for additional forces — I think is where you're headed with it — and that allows us tactics, techniques and procedures, not always the technology.

## Unprecedented ... from Page 49

Indonesia has admitted jamming the APSTAR 1A satellite components operated by Tonga. The jamming resulted from a dispute over who owns the sought after orbital 134 degree east longitude slot over the equator linking the Pacific and Asia. The dispute dates back to a meeting in late October 1993 when delegates met to resolve the issue. Tonga claims registration rights to the slot, while Indonesia believes the agreement reached in 1993 gives them indefinite rights to the 134E slot.

*Turkey and the Kurds*

In 1998, according to the Sabah newspaper published in Turkey, the Turkish government took responsibility for jamming the Kurdish language broadcast on Med-TV satellite channel. In August 1997, the same channel, carried aboard the EUTELSAT was jammed for three weeks by the Turkish government.

*China and the Falun Gong*

In September 2002, China complained that during the previous weeks its SINOSAT satellite TV system had been regularly hijacked by signals coming from Taiwan. In 1999 China declared the Falun Gong an "evil cult" and outlawed its existence. Evidently, the Falun Gong has sought haven on Taiwan to beam its message to the Chinese mainland. To avoid future satellite piracy, China is outfitting its systems aboard the French-built APSTAR VI satellite with a powerful anti-jamming capability. APSTAR VI is slated for launch in late 2004.

*U.S., Cuba and Iran*

The most recent, and pertinent, transnational Space war began in July 2003 and involves a jamming source originating from Cuba against a U.S. satellite that is broadcasting information into Iran. In a complex set of links and nodes (Figure 1., page 49) the Los Angeles-based ParsTV, Azadi, and Appadana Television are uplinked from California via the TELSTAR-5 satellite. This signal arrives at the Washington international teleport and is further uplinked to the TELSTAR-12 satellite over the eastern Atlantic Ocean and broadcast into Iran across the Voice of America (VOA) network. The TELSTAR-12 uplink is being jammed. According to a letter from Loral (the TELSTAR operator), the interference began at 5:35 p.m. on July 5, shortly after the start of VOA broadcasts.

Loral determined that the interference was caused by a third party and asked a separate commercial firm, Transponder Location Services (TLS) of Chantilly, Va., to attempt to locate the source of the interference. TLS determined the probable source of the interference as Havana, Cuba.

*Countering the Threat: Commercial SATCOM Interference Geolocation*

Transponder Location Services (http://www.TLS2000.com) touts itself as a leader in protecting against satellite interference, unauthorized transponder use, and intentional disruption. TLS applies radio interferometry (time difference of arrival of a signal at different locations) to passively and accurately locate unauthorized users and interferers. According to its Web site, TLS has investigated more than 7,000 incidents since its formation. In 1996, the company added a heliborne geolocation capability known as Final SearchTM to pinpoint signal origins. Apparently there are a lot more incidents than the commercial Space-based information providers are willing to share with us. Remember, these information providers are in the business to make money and any reports that their systems are providing less than 100 percent service will adversely affect their revenue streams. So just like companies don't like to admit their computers got hacked and millions of dollars stolen, information providers don't like to admit their vulnerabilities.

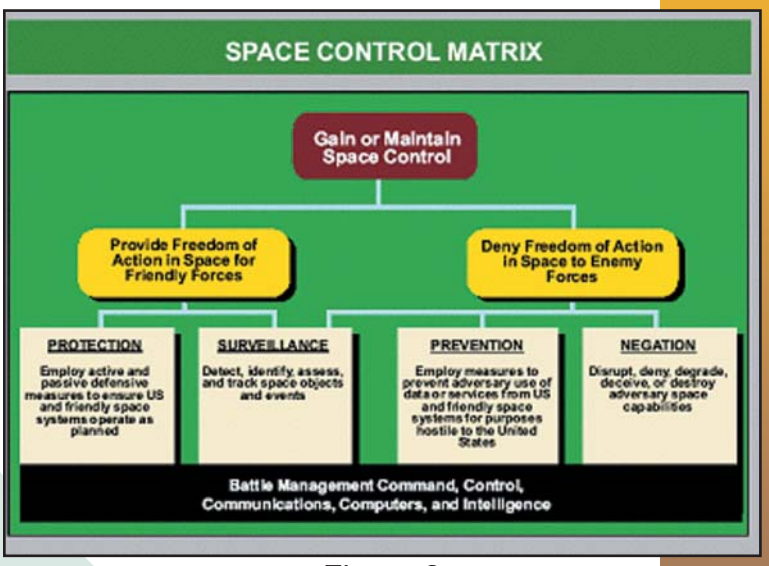



Figure 2

In the case of the recent VOA broadcast being jammed out of Cuba, according to BBC technical analyst Martin Peters, changing satellites is not the answer as the audience would need to know about this, move their (satellite) dishes and retune their receivers. Peters described Cold War cat and mouse games where western broadcasters would simultaneously use as many frequencies as possible because Russia had only so many transmitters for blocking signals.

*And Now the Bad News*

The bad news is that just like hacking, Space information warfare has become an active underground battle that fills the Internet with "how-to" guides. I shall not proliferate such information here, but suffice it to say that a brief search revealed a lot of information. One article begins with an introduction to orbitology and pointing, then details the satellite transmit and receive chains, explains how transponders work and details frequency pairing.

Another article explained that for $7,500 a small group of young amateurs built a high-powered UHF

SATCOM jammer using wood, plastic, copper tubing, and some electronics purchased at a swap meet.

**Implications for a Space-Based Military**

So what does all this mean to the U.S. Army and in particular its Space forces? On the continuum of Space Control, we are now focusing on the Protect element (Figure 2). Thus far, this article established that the U.S. military relied heavily on Space information systems during OIF and that commercial Space systems are under heavy attack from nation states, transnational actors, Space-hackers, and criminals. Now let's put it together and see what it means and what we can do to ensure our freedom of action in Space as specified in DoD Directives and Army Space Policy.

*Blue-Gray-Red Systems*

The security and cooperative nature of Space information systems and owner/operators varies tremendously. U.S. military secure Space information systems maintain robust protection and countermeasures and are controlled solely by U.S. forces. Next in line are the cooperative commercial systems such as Iridium where the commercial operator maintains the Space segment, but U.S. forces have a dedicated ground station under our control. Least secure are the commercial systems operated solely by commercial entities, especially those operators who may not be able to defend our interests, such as Thuraya. A concerted effort must be made to plan ahead and avoid using the category of systems such as Thuraya.

*Protecting against Hacks*

Given that the military will rely heavily on commercial systems for the foreseeable future, we must take steps to defend ourselves. One way to protect ourselves is to develop a system of alerts and warnings that spans from the first line of defense to the Space information system consumer to the ground system operator. A metaphor for such defense already exists in the computer network domain where operators through global network managers receive immediate warnings when malicious computer code is afoot. To accomplish this, operators must know how to identify and report service interference or denials. Additionally, a dedicated Space information awareness network could be applied at the management level to respond defensively.

*The Civil Reserve Air Fleet Model*

A significant part of the nation's air mobility resides with the Civil Reserve Air Fleet (CRAF). Selected aircraft from U.S. airlines, contractually committed to CRAF, support DoD airlift requirements in emergencies when the need for airlift exceeds the capability of military aircraft.

Participating airlines contractually pledge aircraft to the various segments of CRAF, ready for incremental activation when needed. To provide incentives for civil carriers to commit aircraft to the CRAF program and to assure the Unites States of adequate airlift reserves, the government makes peacetime airlift business available to civilian airlines that offer aircraft to the CRAF. DoD offers business through the International Airlift Services, which is the largest contract. For fiscal 2003, the guaranteed portion of the contract is $394 million.

The commander, U.S. Transportation Command, with approval of the secretary of defense, is the activation authority for all three stages of CRAF. When notified of call-up, carriers must meet specific readiness timelines.

The CRAF model could be applied to commercial carriers as follows:

- Commander U.S. Strategic Command would be the activation authority.
- Candidate systems would be identified and offered contracts to support U.S. military contingencies.
- Business incentives in the form of contracts and utilization would make participation compatible with a reasonable business model.
- An incremental activation plan provides for Space information system tailoring.
- U.S. forces modify major operational plans based on a prescribed level of commercial Space information system augmentation.

**Summary**

To an unprecedented degree, the military relies on commercial Space information systems to accomplish its assigned missions. The commercial Space information world is fraught with danger and malicious potential. Rather than be subjected to these dangers, we must embrace the future as an adaptive force of thinking leaders and operators to assure our access to the ultimate high ground: SPACE.

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## Rapid Prototyping ... from Page 23

not limited to:

· Global Positioning System Accuracy/Navigational Accuracy Products. This included analysis and implications of GPS jamming and analysis of GPS interference reports.

· Satellite Reconnaissance Advanced Notification Reporting. These reports provided information on Red, Gray, and Blue overflights.

· 3-dimensional "fly-thrus," for both air and ground route planning

· 2-dimensional imagery and map products. These included large charts, rectified city images and imagery. These products supported Long Range Surveillance Detachments, Corps Aviation assets and Office of Reconstruction and Humanitarian Assistance/Coalition Provisional Auth-ority map requirements (production of imagery maps for city planners/developers, showing lines of communication and war damage). The SSET-L provided the 1st Marine Expeditionary Force Topographic Team access to timely commercial imagery they could not acquire rapidly without the SSET-L.

· 3-dimensional perspective views (still perspective views of a specific "look angle")

· Development of Space-related candidate targets (this analysis supported Space control efforts).

· Support to Blue Force Tracking (BFT). This included assessing technical tasks, architectures and requirements for managing and displaying the Blue Force picture, to include ensuring Grenadier BRAT 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/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, and Integrated Broadcast System-Integrated. This task integrated data feeds from Defense Satellite Program and from multiple sea-based and land-based radars. Also provided was analysis of missile coverage, and TBM Warning Plans and continuous operations for notification throughout the Area of Operations.

· Development of Annex N (Space) to various Operations Orders

· Development of the Space Intelligence Estimate

· SATCOM Planning and Assessments. This included:

· Sun-Conjunction Activity/ Information Analysis/Reports/ Charts, which provided outage times for communications systems

· UHF 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 meetings and Information Operations (IO) meetings.

· Download of before and after national imagery to support target development and battle damage assessment in deep operations coordination centers and in some cases supporting Army tactical missile system 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 development of communications support Space forces is certain to retain organic and robust reach back capabilities.

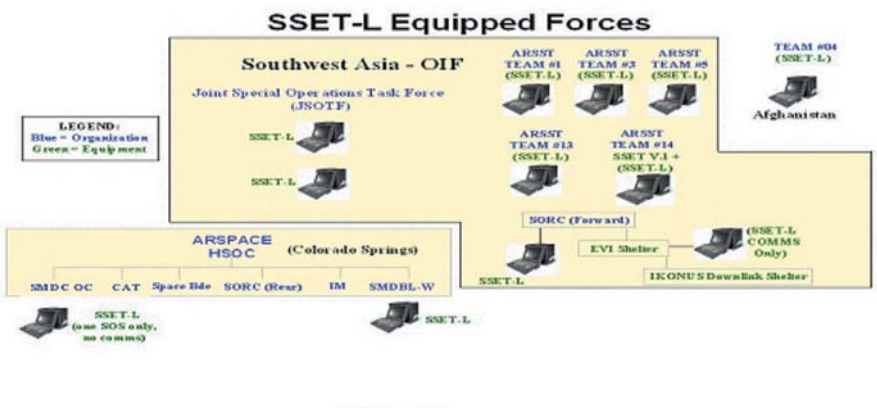

Figure 3

### The Road Ahead

SSET-L concepts and capabilities, along with supporting doctrine (tactics, techniques, and procedures included), evolving organization, leadership, personnel, facilities, and training requirements are continuing throughout SMDC at an unrelenting pace to support both the current and future forces. Following is a summary of ongoing efforts.

### Current Force and Future Force Related Efforts

Current Force:

· Further refinement of SSET-L software, hardware, and communications

· ARSS team Modernization to include the design and development of the ARSS Tactical Set

· Equip Major Command Space operations officers with next-generation SOS workstations

· SORC and SMDCOC modernization

· Designing, equipping, and training Stryker Brigade Combat Team 4 (2nd Cavalry Regiment) Strategic Support Element (two Space Operations officers, one enlisted seventy-four bravo)

*(See SSET-L, page 69)*

ability to deliver quality products in a responsiveness manner proved key to getting the right information — at the right time — into the hands of the warfighters.

### Secure, Reliable SATCOM Support Enabled Operational Commanders to See First, Understand First, Act First, and Finish Decisively

Even before the start of ground operations on March 19, 2003, the operators of the Defense Satellite Communications System (DSCS) steadfastly fulfilled their around-the-clock mission of ensuring reliable, robust, and continuous worldwide SATCOM support to U.S. warfighting forces, strategic military users, the intelligence community, and the National Command Authority. Primarily supported by B and C Companies, 1st Satellite Control Battalion provided planning expertise and operations support for the DSCS that supported the USCENTCOM theater. Multi-service RSSCs met all assigned theater requirements.

The operational impact of the reliable satellite communications was profound. Coordination of expanded commercial SATCOM multiplied critical operational communications capability and Situational Awareness, e.g. imagery and reachback, by a magnitude of 23 times over what was available during Desert Storm. Control of DSCS communications infrastructure also enabled launch orders to Tomahawk missiles, Naval C4I (command, control, communications, computers, and intelligence) afloat, and support of ISR (intelligence, surveillance, and reconnaissance) missions, including those involving the unmanned aerial vehicles, the Predator and Global Hawk. In the words of LTG David McKiernan, Commanding General, CFLCC, "The technology advances in our military today…allowed me to talk via tactical satellite communications and other means across a battlespace of hundreds of miles. It allowed us to make decisions and then execute those decisions faster than any opponent."

### Enhanced Theater Ballistic Missile Early Warning Capabilities

Army Space warriors manning Joint Tactical Ground Station (JTAGS) detachments monitored enemy missile launch activity and other infrared events of interest in the USCENTCOM and USEUCOM theaters. Designed, developed, and fielded within 4½ years, JTAGS demonstrated SMDC's "fast track" capability to support Joint Warfighters.

Capable of receiving and processing direct down-linked data from the Defense Support Program (DSP) sensors and tied directly to worldwide and in-theater communications systems, JTAGS worked as designed, serving as a vital component of the redundant missile warning and alert capability. Immediately upon detection of a ballistic missile launch by Space based sensors, JTAGS crews were able to identify the type of missile, predict an impact point and time, alert Patriot and other missile defense forces, and warn units in the expected impact area of the impending attack.

### Space-Based Blue Force Tracking

One of the most important Space Force Enhancements capabilities during OIF was the increased Situational Awareness provided by Space-based Blue Force Tracking (BFT) devices and the support by the Mission Management Center (MMC). Transmitting data over secure communications assets, BFT devices employed GPS technology, a low probability of intercept/detection waveform, and other capabilities to provide a continuous, near real-time, beyond line-of-sight tracking and reporting capability for critical and deep attack assets. The Army Space Program Office's streamlined acquisition process was critical to making this happen.

Hundreds of Grenadier BRAT (beyond line-of-sight reporting and tracking) systems were put into the hands of Special Operations Forces soldiers and mounted in V Corps attack helicopters in Iraq. These devices, reporting via SATCOM through the BFT MMC in Colorado Springs, provided enhanced situational awareness for commanders, and were key to the prevention of fratricide. Reflecting on the impact of Space-based BFT, one CFLCC staff officer noted, "I'm a big believer in Blue Force Tracking. It really works." The success of these devices to provide combat identification and location capability will have a great impact on how BFT will be implemented in the Future Force and the Joint community.

### Timely Spectral Products Provided Significant Force Enhancement to Combat Commanders and Warfighters

As with Operation Enduring Freedom in Afghanistan, Space-based spectral imagery products were used extensively to provide information on the terrain and areas of interest. The Spectral Operations Resource Center (SORC) (Forward), equipped with the Spectral Exploitation Cell - Transportable (SPEC-TR) down-linked commercial imagery, providing for Joint Warfighters invaluable spectral products for which to make crucial operational decisions. Rather than waiting days, the deployable SPEC-TR was able to deliver detailed image products in many cases in only a few hours from request.

During OIF, the SORC delivered hundreds of imagery based spectral products, including those used for identification of terrain hazards, drop zone analysis, and route reconnaissance. Interviews with officers who served during OIF cited multiple instances where spectral products supported OPORD briefs, hung in the tactical operations centers as standard maps, and were referred to in planning counterattacks. SORC-provided spectral products also enabled production of imagery maps for a unit before they arrived in-theater to facilitate in their operational planning.

Spectral products furnished Warfighters invaluable change detection information on water levels to assist them in navigating otherwise impassable terrain. As the Coalition forces consolidated their positions after the end of major hostilities, spectral products provided the Office of Reconstruction and Humanitarian Assistance (ORHA), later renamed the Office of the Coalition Provisional Authority (OCPA), locations of mass graves of men, women, and children killed during Saddam Hussein's repressive and brutal regime. ARSST 13, still deployed in Baghdad, continues to provide a wide range of image and mapping products.

## Integration of Space into all Phases of Joint Warfighting

To an extent never seen before, Operation Iraqi Freedom is serving as a clear example of the vital role that Space contributes to all phases of Joint operations. SMDC, providing Joint support in everything that we do, has been fully integrated with land, sea, and air-based capabilities to provide the information demanded by the Joint warfighters.

The SORC, crewed by Army and Air Force personnel, processed and delivered unclassified commercial imagery used for USCENTCOM press briefings. Joint Army-Navy teams, staffing the RSSCs at USCENTCOM and elsewhere, were instrumental in providing direct support for Joint warfighters. JTAGS, supported by Army and Navy personnel, provided 24/7 theater ballistic missile (TBM) early warning to our forces. This system, linked directly to the TBM architecture, was vital to providing protection from enemy TBMs. The Army Tactical Exploitation System (TES), combining all the functionality of the previous Tactical Exploitation of National Capabilities (TENCAP) systems into one baseline, significantly increased interoperability for ISR and targeting. Army TES successfully demonstrated its capability to send real-time targeting and intelligence information directly to Air Force assets. Moreover, throughout this time, the ARSSTs were seamlessly integrated on-the-ground with Joint Forces, supplying responsive Space products and services.

Conclusion

As you read this issue of the Army Space Journal, I hope that you will reflect on the experiences, observations, and emerging lessons that are provided…and prepare yourself for the future. In the words of General Peter J. Schoomaker, the new Chief of Staff, "Leadership is dealing with change. You can't manage change. You have to lead it." Clearly, there is only one constant, and that constant is change. To be prepared for that change you have to be relevant and ready. Secure the High Ground!

## Warfighter's Perspective ... from Page 17

A: Army Space Program Office came through for us on the equipment side, with low cost receivers, providing a way to transfer large files of data through a trusted agent to mobile forces. Being able to transfer images and geospacial products to your forward elements is huge. A huge benefit, that is, the actual equipment was only the size of a small card table.

**Q: Did you see any evidence that the Iraqis employed Space assets or attempted to counter our usage?**

A: No command complained of degradation of Space assets due to either enemy action or the weather.

**Q: In line with your earlier response defending Desert Storm as a conflict using Space extensively, it has often been called the first Space war. You said you'd served as a targeting officer during that conflict. Can you comment further as to the differences between what Space supplied then, and its contributions to Operation Iraqi Freedom?**

A: You might expect me to say the equipment, but, although there are of course vast improvements in what there is to offer, I'd have to come down on the side of the integration of Space assets with the tactical ground maneuver forces. Giving ground forces a deep look at what they're getting into, and being able to synchronize space operations in advance of fast moving ground forces enables a layered approach. The investments in money and training are paying off.

**Q: Any comments on ARRST 5 specifically?**

A: Maj. Cockerham was a good choice to send as team leader. He was extremely professional and insightful and always ready to offer help with Space-based abilities. His team provided a valuable service to us, ensuring we had communications and data with which to perform analysis. We were glad to have them.

## Silent Support ... from Page 51

This ship was in the region supporting Operation Iraqi Freedom. The USS Nimitz provided Secure Internet, Internet and DSN phones to Fleet Command. This use of the DSCS satellite system shows the spectrum of support the 1st Satellite Control battalion provides to the joint warfighter.

In addition to supporting the warfighter from the DSCSOC, four soldiers of the 1st Satellite Control Battalion deployed to the region and two went to United States Central Command to provide expert DSCS satellite support. SPC Corey Wilson of Alpha Company in Fort Detrick deployed with an Army Space Support Team from the 1st Space Battalion to Afghanistan. CPL Chad Duncan of Bravo Company in Fort Meade also deployed with an Army Space Support Team to Iraq in support of the 4th Infantry Division. SFC Gregory Schuetz deployed from Landstuhl, Germany to work with the 10th Special Forces element in Iraq under the Worldwide Augmentee Program. SPC Daniel Alvarez deployed to Oman with the Space Electronic Warfare Detachment, and SFC Jerry Mobry and SFC Brent Smith went to CENTCOM to help out in Tampa, Fla.

The DSCS constellation is the workhorse satellite systems of the Department of Defense, and its effective operation relies upon the soldiers and civilians in the DSCS Operation Centers. The soldiers of the battalion showed their skills in satellite control during operations Iraqi Freedom and Enduring Freedom by providing exceptional and flexible support to the warfighters on the ground, sea and in the air. The 1st Satellite Control Battalion, with its worldwide, twenty-four hour, seven-day-a-week mission is always there for the warfighter.

## Early Missile Warning ... from Page 55

deployed sections. This practice continues today and continues to build our knowledge base.

A big plus for our sustainability was through our Depot support. Northrup-Grumman, which runs our Depot, provided a full time contractor, on the ground in CENTCOM, to help diagnose and fix any problems that we encountered with our equipment. Robert Ramsey's expertise not only enabled JTAGS to maintain our 24/7 posture, but also provided the necessary guidance in which to prevent failures that might come up.

Our operators are now focusing on smaller areas in which to identify possible missile launch sites. This focus enables our operators to provide better situational awareness to the warfighters and confirming possible intelligence for missile attacks. Our operators can help narrow a search area for an aircraft that has gone down or be able report static events that will enable first responders to get to a location quicker. We also are increasing our ability of situational awareness through upgraded equipment and procedures.

JTAGS is also continuing to develop the "Sensor to Shooter" capability. This capability will allow a JTAGS section to send data direct to a Patriot Battalion, Aegis Cruiser or even through to a fighter aircraft. This data dissemination not only increases the situational awareness but also decreases the enemy's ability to use ballistic missiles against U.S. and Coalition forces. Through the use of Joint Range Extension, the ability to push information Beyond-Line-of-Sight will enable units to process information without the data being filtered or delayed through a theater operations center data dissemination process. This does not diminish the need for such data dissemination, but rather enhances the ability of the warfighter to have the direct cue and readiness to handle a threat.

The road ahead to answer or improve upon our mission requirements is being answered with the Multi-mission Mobile Processor (M3P). The Multi-mission Mobile Processor (M3P) for the Space Based Infrared System (SBIRS) is a Pre-Planned Product Improvement (P3I) to the Joint Tactical Ground Station (JTAGS) currently operational with SMDC-Colorado Springs. M3P will have more missions related to the strategic environment, thus bringing SMDC-Colorado Springs in line with the Air Force, USSTRATCOM and Combatant Commanders' overall mission requirements in each theater, thus increasing our role within the Joint community. Because of the lifespan of both the JTAGS shelters and DSP constellation, it is necessary to bring new systems on line that will increase our awareness, improve our predicted impacts, provide better accuracy for TBM launches, and bring tactical advantages to our warfighters.

Operation Iraqi Freedom and Enduring Freedom reinforced the requirement for an in-theater early warning dissemination asset. Although hostilities are officially concluded in Iraq, the threat of TBMs around the world continues to exist. JTAGS continues to provide 24/7, 365 days a year early warning through our dedicated soldiers and sailors, on point. The proliferation of tactical ballistic missiles will continue to threaten not only the U.S. military, but also the freedom of the world's citizens. Providing timely, accurate, assured early warning will help to crunch global terrorism as well as provide confidence of freedom for all people.

## SSET-L ... from Page 65

Future Force:

- Concept and doctrinal development of strategic support (in accordance with U.S. Strategic Command's five mission areas of; Global Strike, Space, IO/CNO, Global Missile Defense, Global C4ISR) to Unit of Employment "X" and "Y" Strategic Support Elements
- Concept and doctrinal development of strategic support to Units of Action.

**Conclusion**

The lessons from SSET-L efforts to support OIF and OEF are currently being captured and analyzed. This analysis will continue for many months, and will permit SMDC to continue its support to operational warfighters, while adhering to the "Mud to Space" concept of tactical support. Feedback from "the field" remains a critical source of input, expertise, and requirements for this effort. Each of you is invited to provide the SMDBL your comments, suggestions, requirements, and insights to this continuing effort.

## Comparisons ... from Page 33

WRAASE receivers and there was a demand for weather support at progressively lower tactical levels. In Iraqi Freedom, great progress had been made in moving to real-time tactical weather prediction with enhanced systems and capabilities. In 1991, the Army used commercial sources to augment its map-making capabilities. It had dated maps at the outset of the campaign and faced delays in getting more accurate topographical products. It was able to combine several systems to achieve success. In Iraqi Freedom, the military map-making system had been significantly enhanced. Real-time, accurate tactical terrain data was available to units and readily updated using digitized databases and models.

The Army also used missile defense in Operation Desert Storm. In 1991, the threat was from Scuds or modified Scuds. In 2003, the threat came from shorter-range systems and cruise missiles. In terms of missile defense readiness, Opera-tion Desert Shield/Desert Storm seemed more like a crisis response operation. The 11th ADA Brigade began to move to the theater on C+5. The warning system TERS was assembled. By 2003, there was a well-integrated missile defense system with new systems and capabilities that had been extensively tested and exercised. Missile defense units in 2003 benefited from more than a decade of experience in the Persian Gulf.

Missile defense posture also changed. In 1990-1991, missile defense was concentrated around key cities and supported combatant Corps in breaching operations. In 2003, there was an integrated missile defense network that allowed the units to maneuver with the V Corps deep in Iraq.

In the Gulf War of 1990-1991, the Iraqis launched 93 missiles against Coalition targets. The Army claimed that it intercepted 79 percent of the missiles targeting Saudi Arabia and 40 percent of those targeting Israel. A GAO investigation determined that only nine percent of the claimed interceptions could be verified. In 2003, according to open sources, the Iraqis launched 17 ballistic missiles and two cruise missiles. All ballistic missiles were intercepted or were considered to pose no danger and declared "out of bounds." One cruise missile eluded the defenses. In Operation Desert Storm, the primary issue was the failure to intercept incoming missiles, while in Operation Iraqi Freedom the discussion has revolved around incidents of fratricide involving missile defense units.

The challenge in Desert Storm was to normalize and operationalize Space-based capabilities in the Army. This had been accomplished by the late 1990s and the use of Space-based systems has been integrated into Army training and exercises and into Army and Joint doctrine. The challenge now is to leverage Space in the process of Army transformation.

— Dr. Lewis Bernstein
and Roy McCullough

for Internal Look provided our first opportunity to validate some of our latest improvements to our training program. During the short time between Internal Look and commencement of combat operations, two important additions were made to team operations.

The first was vital Space-based Blue Force Tracking training to ensure the ARSST could handle all the support requirements resulting from the fielding of Grenadier BRAT and mini-transmitter devices as part of the Force XXI Battle Command and Control Brigade and Below system. The concept that an ARSST should be able to provide support in all things Space; that the team is the one-stop shop for all Space related matters, has been consistently advocated at the highest levels. In that spirit, the teams embraced and quickly mastered combat identification to support Blue Force Tracking during both OEF and OIF.

The second addition was the Space Support Element Toolset-Light (SSET-L) that provided the independent bandwidth and communications package mentioned earlier. This capability proved quite valuable for receipt of large data files that did not draw from the limited bandwidth of the supported unit. In the next section, I will explain how ARSSTs supported OIF and relate specifics regarding Space support to combat operations.

## Operation Iraqi Freedom

Three full teams from the ARSSC directly supported Operation Iraqi Freedom (OIF). Two additional teams stood up, trained and provided support to validate a proof of concept as depicted below in Figure 1. Figure 1 also shows the team that provided support to Operation Enduring Freedom in Afghanistan as part of the Combined Joint Task Force (CJTF) headquarters.

ARSST 1 supported V Corps and moved with the Corps headquarters from Kuwait to Baghdad. ARSST 5 supported the 1st Marine Expeditionary Force (I MEF) headquarters and executed split-based operations for both the main/forward and rear command posts of the MEF. ARSST 3 supported the Combined Force Land Component Command (CFLCC) headquarters and in addition to the normal ARSST missions also coordinated the space requirements between CENTCOM and the maneuver units supported by ARSST 1 & 5. ARSST 3 also provided administrative and logistic coordination and support for the forward deployed teams in the Area of Responsibility - on an as-needed basis.

One of the common observations from the group of experienced ARSST members is that no two Corps or supported units have the same requirements for Space Force enhancement support. This resulted in a diverse set of experiences across the ARSSTs. While there was significant commonality among the deployed teams' accomplishments it is the differences that stand out. For example, ARSST 5 conducted split-based operations that supported the I MEF main/forward command post. The team leader and two enlisted soldiers moved with the forward element and the rest of the team provided support from the rear command post.

In another example, ARSST 1 learned how to port the Grenadier BRAT - Blue Force Tracking data directly into user unit software. Prior to this work-around the unit experienced latency issues of 1-2 hours. In other words, ghost icons appeared on the units Common Operating Picture (COP) display after the aircraft had already landed. The ARSST work-around solution, while not perfect, allowed the unit to bypass latency issues associated with standard COP software (C2PC & GCCS). This effort resulted in decreased latency and improved the units' friendly force situational awareness.

ARSSTs are often challenged with problems emerging from rapidly developing technology. Teams often require rapid solutions and use a variety of methods to achieve results in the form of new techniques and procedures for Space-based product and service support. A primary means for obtaining this type of support is through Home Station or reach support. Through the SMDCOC, teams can reach the Crisis Action Team, ARSSC, 1st Space Battalion, and other relevant staff as necessary.

The ARSSTs are the one-stop shop for all Space support to Army units. They provide relevant and timely Space-based products and services that will enable the supported unit to dominate their battle space. Through intense training, the team achieves a cohesive blend of skills that, when combined with Space knowledge, result in highly effective Space education, analysis, plans, and products and services.

Upon reflection, there are some questions that we should constantly ask ourselves: Were we relevant? Was there value? Can we improve? Always. Should we evolve? We have to. In fact, as I write this, all available ARSSC soldiers are in the midst of conducting an in-depth discovery learning to identify areas for positive change. This process of discovery, undertaken by the soldiers who deployed in support of OEF/OIF, is the basis for developing doctrine, organizations, training, materiel, leadership and education, personnel, and facility (DOTMLPF) solutions for ARSSC future support to the warfighter.

## Brigade Operations ... from Page19

tise in areas such as Space Based Blue Force Tracking, Space Based Battle Space Characterization, Multi and Hyper Spectral Imagery, etc. The support provided could be tailorable based upon needs of the supported element, if expertise and planning support is the requirement, a single LNO may be appropriate. If products as well as expertise are required the LNO cell could increase, to include the requisite skill set.

A potential side benefit of having the Brigade Commander and his ASFCOC in theater is the ability to coordinate administration and logistics support to Space forces in theater. This support could include a Maintenance Contact Team(s) and a limited Prescribed Load List for ARSST, JTAGS, etc. This would facilitate maintenance and repair of Army Space unique equipment. Further, this administration and logistics cell could act as the focal point for movement of supplies and equipment to forward elements.

Operation Iraqi Freedom provided 1st Space Brigade (Prov) numerous lessons ranging from how to integrate and deploy new tools, to the necessity to train logistics as well as Space. These lessons must be used to develop the future roles and doctrine for Brigade and Battalion forward and homestation elements.

## Products Plus ... from Page 47

mum accountability of ORHA personnel traveling in a somewhat unstable environment. The other Space force enhancement area that was of value to this mission was monitoring of Space environment and passing information on scintillation and possible communications disruptions to the C6. Navigational accuracy charts were of little or no value.

Because of the unique nature of this mission, task organizing the follow-on ARSST should be considered. This mission is obviously imagery intensive and requires an experienced spectral analyst as well. In this case, because the team is in a hardened facility with a well-established communications network, we should consider organizing a follow-on team that is imagery/spectrally heavy and lighter on the communications side. In fact, the command should consider task organizing all ARSSTs rather than establishing a hard and fast structure. The old phrase, Mission, Enemy, Terrain, Troops and Time available (METT-T) has merit when planning for the deployment of teams.

Shifting from the personnel/production side of things to equipment issues, there were a couple of significant problems identified during this deployment. First and foremost, EVERY piece of equipment developed or purchased by the Battle Lab (BL) must be worldwide deployable. It is imperative that all equipment is 110/220 V capable as well as 50/60 Hz capable. We encountered significant problems getting our equipment up and running because so much of it was designed for use in a 110 V, 60 Hz environment. We had to purchase additional uninterrupted power supplies, transformers, and power sources to get everything operational. Not only did this cost money, but valuable time as well.

The other equipment issue identified was the inability to access the SIPRNET on the SSET-Light. The SSET-Light is an excellent communications package if a team only requires NIPRNET connectivity. However, in order to access the imagery data (unclassified or classified), both through NIMA and the SORC, teams must have SIPRNET access. Having to depend on another agency to provide that connectivity cost us very valuable time and significantly delayed our initial production timeline. Download times for image scenes were also lengthy because the bandwidth of the established SIPRNET network was not designed to accommodate large image files. Expanding each team's bandwidth (not sharing a single transponder) and pushing for independent SIPRNET access via the SSET-Light are necessary changes to the team's communications capability.

In retrospect, we did educate ORHA, its components, and the maneuver units conducting military operations in the area on the support Space can provide to post-hostilities and stability and support operations. In fact, we educated them so well that to date we have produced and distributed more than 2,500 products, both image and geographic information systems. We developed image maps and photos for reconstruction projects, force protection plans, and military raids and operations. Where there was no map support, we created it, and we created it very quickly. We also revalidated the need for Blue Force Tracking, and provided assistance to the C2 and the C6. However, along the way, as almost always happens, we were educated as well. We learned the value and importance of partnering. We clearly validated the need for the Eagle Vision capability. We conducted a non-doctrinal mission in a new environment and learned to make Space capabilities provide significant value added. We examined personnel structure and equipment issues. We took up the "gauntlet" and accepted the challenge, became better Space operators, and proved the value of Space to full spectrum military operations.

# New FA 40 Web Site is Launched

On September 12, 2003, U.S. Space and Missile Defense Command launched a new FA40 public web site — http://www.army.mil/FA40. This effort was undertaken after a detailed analysis of the types of questions routinely sent to the FA40 Proponent Office clearly showed the existing FA40 public web site needed to be redesigned to more effectively communicate the following information:

- What is Functional Area 40?
- What is the Army Space Cadre?
- Where are FA40s assigned?
- What is FA40 training like?
- What is the career path?
- How do I become an FA40?
- What is Skill Identifier 3Y?

The new Space Operations Website will inform those unfamiliar with the functional area of the key factors about this Army career. The site addresses both AOC 40A (Space Operations Officer) and AOC 40C (Army Astronaut). Any suggestions for additions and/or deletions to this site should be sent to Patsy Campbell at the Proponent Office.

In a similar vein, work has begun on the long-awaited redesign of the Space Operations Network (SONET) to make it a more effective tool for shared communication and space education among Space Operations Officers/FA40 and other members of the Army Space Cadre. A redesigned site is expected to be up and running in the next few months.

*Low-intensity air operations had been taking place in the skies over Iraq since the 1991 cease-fire brought an end to Operation Desert Storm. Consequently, it's perhaps inaccurate or somewhat arbitrary to single out March 18, 2003, the first day of Operation Iraqi Freedom, as the day that marked the beginning of a new state of hostilities with Saddam Hussein's Iraq.*

Soldiers of 86th Signal Bn install microwave antenna for long range communication at Camp Virginia, Kuwait, March 12, 2003. The Division is currently deployed as a part of OPERATION ENDURING FREEDOM. (U.S. Army photo by Sgt. Igor Paustovski)

*Wideband commo was a vast improvement over what was available to us in Operation Desert Storm. The equipment your guys brought with them was invaluable, as there was great competition for communications resources. The ARRST came well equipped, a real boon for the gaining command.*

*— MAJ Michael Scheiern,*
*1st Marine Expeditionary Force*

*U.S. Psychological Operations and Special Operations Forces used pamphlets and brochures such as those pictured below in Operation Iraqi Freedom as part of an information campaign. The leaflets were often dropped from aircraft, informing the citizenry of the evils of the Saddam regime, consequences of using Weapons of Mass Destruction, and the advisability of cooperating with Coalition Forces. The campaign was considered to have had a positive impact.*

## English Version

Front

Back

Do not attempt to use nuclear, biological, or chemical weapons. The Coalition has superior satellite technology which allows Coalition forces to see the preparation and transportation of nuclear, biological or chemical weapons. Unit commanders will be held accountable for non-compliance.

## Arabic Version

Front

Back

لا تحاولوا إستخدام الأسلحة النووية أو البيولوجية أو الكيميائية. لدى الإئتلاف أقمار صناعية ذات تكنولوجيا متفوقة تسمح لقوات الإئتلاف رؤية التحضيرات وعمليات النقل للأسلحة النووية والبيولوجية والكيميائية. سيحاسب قادة الوحدات على عدم الإستجابة.