Homeland

Security through The Palanterra

MASTER SGT MARK SUBAN, AIR FORCE NEWS DEPARTMENT

From the Super Bowl to the World Series, and from the Reagan funeral to the Republican and Democratic National Conventions, the National Geospatial-Intelligence Agency plays a crucial supporting role in homeland security event protection.

BERT R. BEAULIEU

As thousands converged on the U.S. capitol in June to honor the passing of President Ronald Reagan, NGA was there, providing security support for the largest gathering of world leaders since the September 11, 2001 terrorist attacks. The Washington, D.C., event drew all living presidents, U.S. congressmen, White House staff, hundreds of domestic and international dignitaries, not to mention 104,000 mourners from all walks of life.

Such national security events demand that agencies share spatial data to gain a near-real-time picture of the various venues in a manner that can be easily understood by security personnel at all levels. These data must be ready when called for.

Though it may come as a surprise to those who view NGA as strictly an intelligence community and defense combat-support agency (its prime mission, to be sure), NGA has also worked with civil government and private-sector partners to support multiple homeland security missions, including planned (training exercises and security events) and unplanned (emergencies and natural disasters) events since long before the war against terrorism began. NGA has, for instance, supported security for the G8 Summit, the Winter Olympics, and the annual Super Bowls. And its skillsets underpin security operations at this summer's Democratic and Republic National Conventions.

For such deployments, most of the geospatial tools and intelligence needed to inform security plans are already in place, thanks to the ongoing efforts of the NGA's Office of the Americas and its geospatial community partners.

Building the Data to Secure a Nation

Generally, NGA applies its imagery and geospatial expertise — gained in supporting combat and intelligence entities — and analytic resources to traditional foreign missions. In prescribed circumstances, though, it also applies these skillsets to the homeland security mission. This has been especially true since 9/11.

Shortly after the terrorist attacks of 2001, NGA began a collaborative project with the U.S. Geological Survey (USGS), forming a team to identify the geospatial and other critical infrastructure information that would be necessary to address the anticipated requirements of defense and homeland security organizations. Using *The National Map* coverage (which includes elevation data, vegetation cover, hydro-

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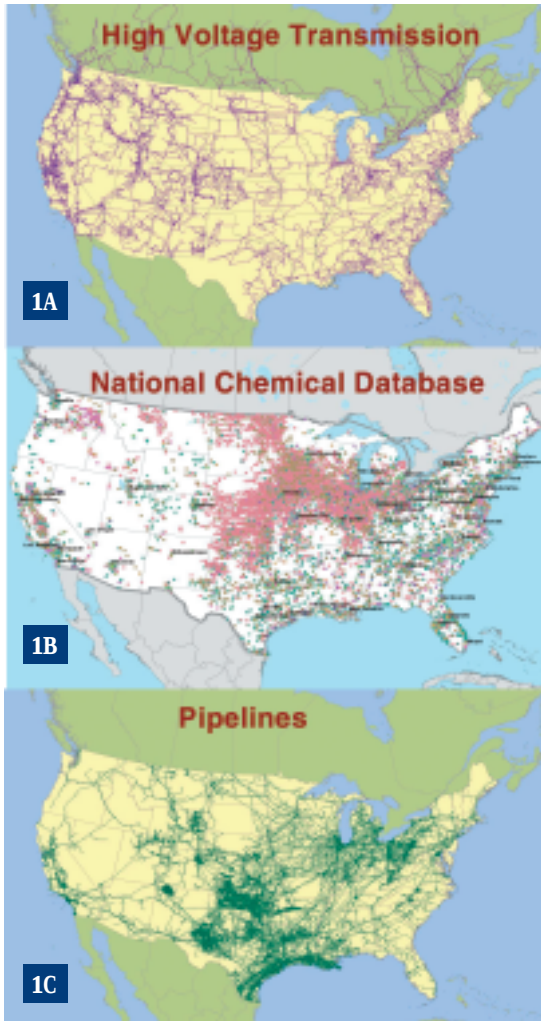
graphy, imagery, government boundaries, and more) as a foundation, the team identified the required data for both national and urban levels and established an approach called the Homeland Security Infrastructure Program (HSIP). The program data flows from the 133 Cities Project, also known as 133 Urban Areas Project, an NGA/USGS initiative aimed at developing critical infrastructure datasets for the most populated municipal areas of the United States (see "Nunn-Lugar-Dominici Act & 133 Cities" sidebar). HSIP national coverage data layers range from transportation and utilities infrastructure to public health and financial assets. Urban layers include airports, government installations, place names, landmarks, high-resolution imagery and elevation data, and much more (see Figures 1A–1C).



FIGURES COURTESY OF NGA

FIGURES 1A–1C. As a result of HSIP, NGA can provide access to multiple layers of critical infrastructure data at national and urban levels. Such data can be viewed in detail through Palanterra.

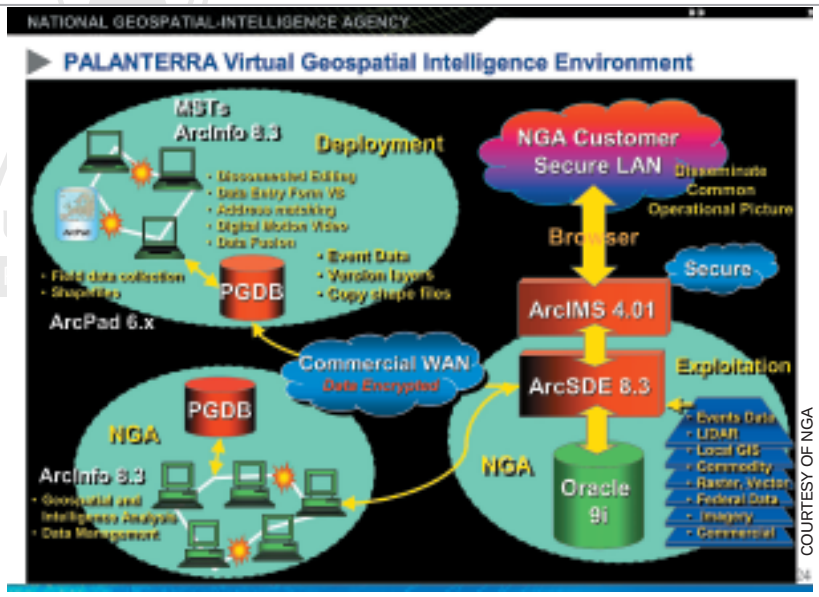


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FIGURE 2. The Palanterra virtual geospatial intelligence environment enables relevant agencies to view HSIP data to support their security event activities.

Working with USGS to obtain and integrate data from state and local governments, the private sector to acquire commercial datasets, and the Federal Geographic Data Committee (FGDC) to develop homeland geospatial standards and other support, NGA began to consolidate HSIP data such that it could be shared with relevant agencies during security events. As the datasets grew, the agency also developed Palanterra, a secure, Web-enabled COP (common operational picture) data viewer, or portal (see Figure 2).

Built using commercial-off-the-shelf software, Palanterra supports thick- and thin-client operations. Accessing Palanterra's national-level site (see Figure 3A) provides critical infrastructure and asset data for the entire United States. Zooming to an urban site (see Figure 3B) gives controlled access to high-resolution datasets of major cities. HSIP data are vector- and raster-based and include satellite and airborne imagery and light detection and ranging (LIDAR) data. Such products are employed to create virtual analytic environments for 3D analysis in support of national security events. One example is the use of such 3D models for line-of-sight analysis to ensure security at the 2002 Super Bowl in San Diego, California (see Figure 4).

Palanterra allows users with varying levels of security clearance — such as state and local law enforce-

NUNN-LUGAR-DOMINICI ACT & 133 CITIES

Part of HSIP, the 133 Urban Areas Project has its origins in the Nunn-Lugar-Dominici Act (Defense Against Weapons of Mass Destruction Act of 1996), in which the Department of Defense was tasked with helping state and local governments to prepare for and respond to chemical, biological, and nuclear incidents in 120 major cities. After 9/11, USGS and NGA expanded this list to 133 by adding major cities not originally included. NGA and its partners are now expanding data holdings across 133 priority areas, as well as most of the 13 national critical infrastructure sectors identified by the Department of Homeland Security (DHS), including defense installations, ports and airfields, coastlines, and the Canadian and Mexican borders.

FIGURES COURTESY OF NGA

FIGURES 3A and 3B. Palanterra provides real-time, Web-enabled access to an analytical spatial environment and HSIP layers, giving authorized security agencies a shared picture of a given event at national (3A) and urban (3B) levels.

ment agencies, the FBI (Federal Bureau of Investigation), U.S. NORTHCOM (the Department of Defense's Northern Command), NGA, and Secret Service — to share a view of a given situation by way of a Secure Internet Protocol Network, known as *SIPRNET*, or via *JWICS*, the Joint Worldwide Intelligence and Communications System. On Palanterra's virtual geospatial intelligence environment, authorized personnel anywhere in the world can see, in near-real time, spatial information about current situations as well as security events as they happen.

Combined, HSIP and Palanterra form the foundation of security situational awareness at planned or unplanned events at a moment's notice. Take the recent Reagan memorial services, for example.

Spatial Readiness at Reagan Commemoration

When the world learned that President Reagan had passed away, homeland security forces were already extensively deployed in support of the G8 Summit, with NGA on hand to provide spatial intelligence. Most of the key security players were in Georgia, including teams from the FBI and Secret Service. These teams decided to stay put, though, to plan and execute many of the Reagan event activities from this location. After all, Palanterra is a true COP containing seamless, evaluated, integrated, conflated data from the best possible sources. Using Palanterra, any authorized security personnel could view this COP and determine what activities were occurring and where, and all in near-real time, no matter where they were.

Deployment in Georgia had involved setting up a central command center at which all participating agencies, including state and local law enforcement and federal homeland security personnel, coordinated activities and shared intelligence via a variety of methods, including through Palanterra and other spatial tools. It also involved working with the National Reconnaissance Office (NRO) to set up secure communications systems and downlink capabilities for satellite imagery.

NGA datasets employ an inordinate amount of bandwidth, so when the agency deploys, it brings as much of its data holdings as possible on SNAP servers and firewires. If a major security event were to occur that called for NGA to quickly acquire and disseminate new imagery, they'd be ready with NRO's deployed systems.

Though the extensive infrastructure and datasets were already in place, the unexpected need to provide security support for events in Washington, D.C., and in Simi Valley, California, called for some additional data to be added as well.

GLOSSARY

COP: Common Operational Picture
CP: Capitol Police
DHS: Department of Homeland Security
DoD: Department of Defense
FGDC: Federal Geospatial Data Committee
GIS: Geographic Information System
HSIP: Homeland Security Infrastructure Program
LIDAR: Light Detection and Ranging
MOU: Memorandum of Understanding
NRO: National Reconnaissance Office
NGA: National Geospatial-Intelligence Agency
SIPRNET: Secure Internet Protocol Network
USGS: U.S. Geological Survey

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A Security Event Unfolds

In California, local law enforcement and regional FBI offices quickly filled spatial data shortfalls by acquiring new aerial imagery and integrating those with the NGA system.

Simi Valley presented unique challenges. It was beyond the extent of much of NGA's high-resolution imagery and infrastructure data of Los Angeles. Working with USGS, though, NGA acquired same-day, high-resolution color imagery of the area around the Reagan Library. Then using that imagery as a layer in a GIS, generated travel routes from the Naval Air Field up to the Reagan Library (see Figure 5). It overlaid routes on the new-collect imagery and used unclassified LIDAR data to create digital elevation models.

Using these models, NGA team members, working from the FBI field office, conducted viewshed analysis much like that done in San Diego in 2002.

Based on the 3D line-of-sight analysis, NGA deployed with security personnel to surrounding hillsides to determine what to monitor for vulnerabilities and where to place personnel to protect those areas deemed a risk.

In Washington, D.C., Capitol Police (CP), Secret Service, FBI, and other homeland security agencies quickly added current spatial data specific to the needs of the observance. CP, for instance, used a multimedia mapping system, which included GPS and a digital still and video camera, to collect georeferenced ground photos along several proposed motorcade routes. Back at the command center, they integrated these data into the GIS such that any team member

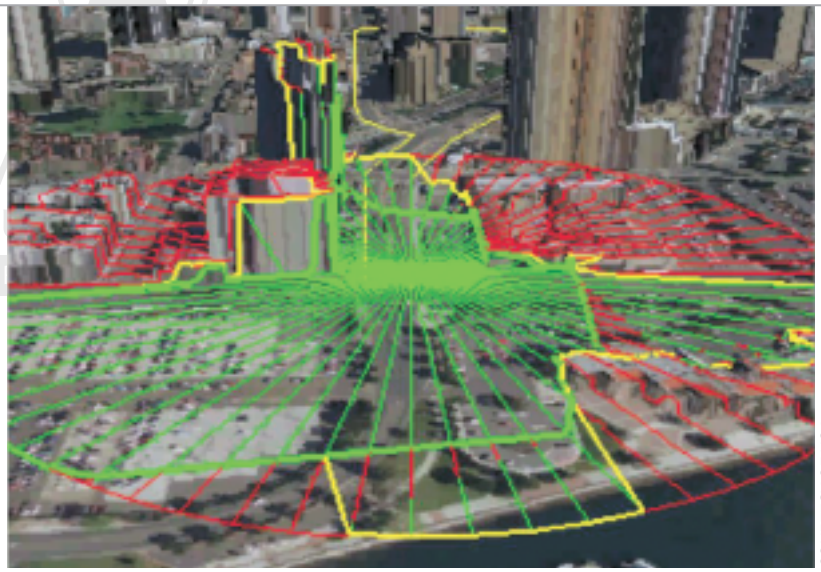

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FIGURE 4. Using LIDAR to create a digital elevation model, then draping it with imagery, NGA has created 3D virtual analytic environments of various U.S. cities, including Washington, D.C. Above, we see line-of-sight analysis for San Diego, California, conducted in preparation for security at the 2002 Super Bowl.

HOMELAND SECURITY PARTNERSHIPS FOR PROGRESS

NGA, USGS, and FGDC are well-positioned to answer the need for responsive, standards-based geospatial support to homeland security, and are doing so in full partnership. In a joint memorandum of understanding (MOU) pertaining to geospatial information for homeland security (July 29, 2002), these entities agreed to

- Coordinate each agency's plan to acquire and provide geospatial data, information, and services for homeland security customers at all levels of government
- Acquire, operate, and maintain the system capabilities necessary for a homeland security geospatial information architecture
- Contribute to the development of homeland security geospatial standards.

Under the MOU, each partner has specific responsibilities. The USGS, for instance, through The National Map program

- Ensures the availability of a nationally consistent set of base geospatial data in the public domain
- Develops sustainable partnerships to acquire, integrate, maintain, and disseminate base geographic information
- Brokers, through USGS/NGA state liaisons, access to information and data (including close-hold data) in support of national homeland security requirements
- Builds and maintains a distributed archive and interoperable Internet-based access capabilities.

NGA complements The National Map activities through HSIP by

- Providing and integrating urban- and national-level infrastructure data beyond that available through The National Map or that will not be made available to the public because of data sensitivity (such as classified information) or data that are restricted by license from the public domain (utilities data, for instance)
- Establishing and maintaining partnerships with other federal and private-sector organizations to acquire, integrate, or help broker data that may be restricted
- Establishing and maintaining geointelligence capabilities.

The FGDC fosters interoperability of defense and civil geospatial data to build a National Spatial Data Infrastructure through the FGDC Homeland Security Working Group (HSWG), which is co-chaired by USGS and NGA. Also participating in the HSWG are representatives from the Homeland Infrastructure Foundation Level Data Working Group, an informal group of more than 40 federal agencies and dozens of commercial vendors interested in developing a strong foundation for homeland security. FGDC also

- Provides FGDC standards-development processes as mechanism for developing needed data content, classification, and management standard for homeland security
- Provides coordinating mechanisms and related standards support.

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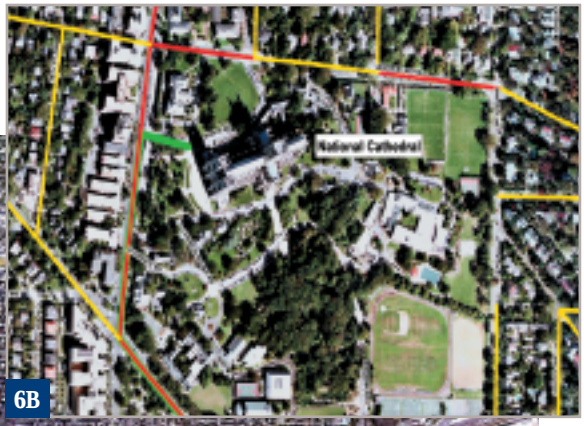
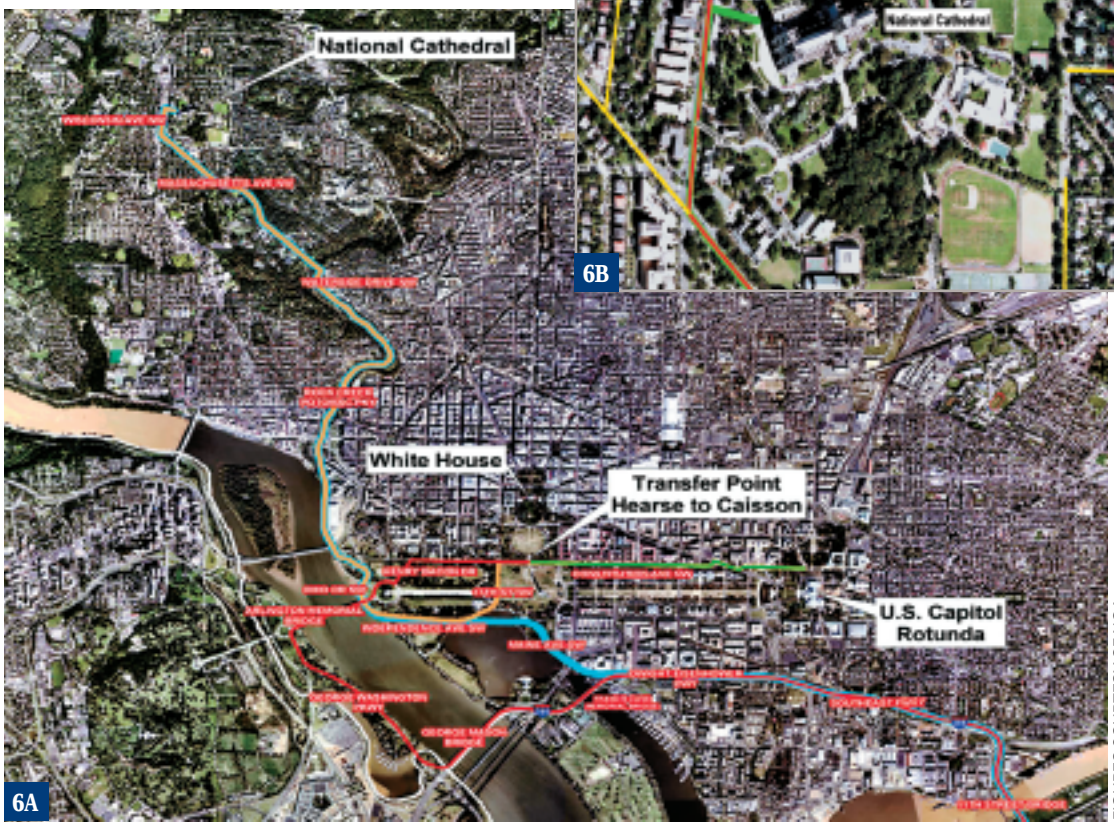
FIGURE 5. NGA worked with its state and federal security partners to quickly augment its existing data pertaining to the Simi Valley, California site. After acquiring current high-resolution aerial photos, NGA developed a route map and identified vulnerable areas along that route to help law enforcement and security personnel to best deploy their resources.

could see ground imagery by clicking on a point in the map. This proved to be an indispensable briefing tool, helping security teams to visualize their areas of responsibility. It also became part of the NGA dataset viewable through Palanterra (see Figures 6A and 6B).

This 360-degree imagery of the capitol accessible through Palanterra provided situational awareness and support to security personnel to help determine areas at potential risk. Based on these identified vulnerabilities (which could include chokepoints or blind spots), security agencies could determine where best to place security assets as it created motorcade routes.

The benefits of this analysis were quickly realized. While visualizing potential chokepoints along one pro-





FIGURES COURTESY OF NGA

FIGURE 6A and 6B. NGA possesses extensive data for the Washington, D.C. area. It combined its existing geospatial datasets with route information and ground-based georeferenced imagery provided by the Capitol Police to help security personnel to effectively deploy during the Reagan funeral procession in June. With Palanterra, users could gain a broad view of the entire route (6A) or could zoom in to an area of interest (6B).

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posed route, security teams realized that a particular area could be managed with three people as opposed to eight, saving time and money while still providing good security coverage.

NGA also obtained detailed information about motorcade routes, road closures, and locations of security barriers and chokepoints. It then produced overviews of the routes, inserting high-resolution graphics, 3D visualizations, and satellite and airborne imagery of all intersections along the routes.

The agency used the HSIP layers to identify where the nearest hospitals were along each route. In the event of an emergency, security personnel would know quickly where nearby services and facilities were and would be able to identify the fastest route to any given facility (see Figure 7). NGA also provided different perspective views, looking down from the Capitol along Constitution avenue, for example. These perspectives came from a virtual 3D environment of the entire capitol previously produced by NGA.

Similar to the San Diego model discussed earlier, NGA uses these models to generate walkthroughs, flythroughs, 3D visualizations, and viewshed analyses, which have great utility for vulnerability identification.

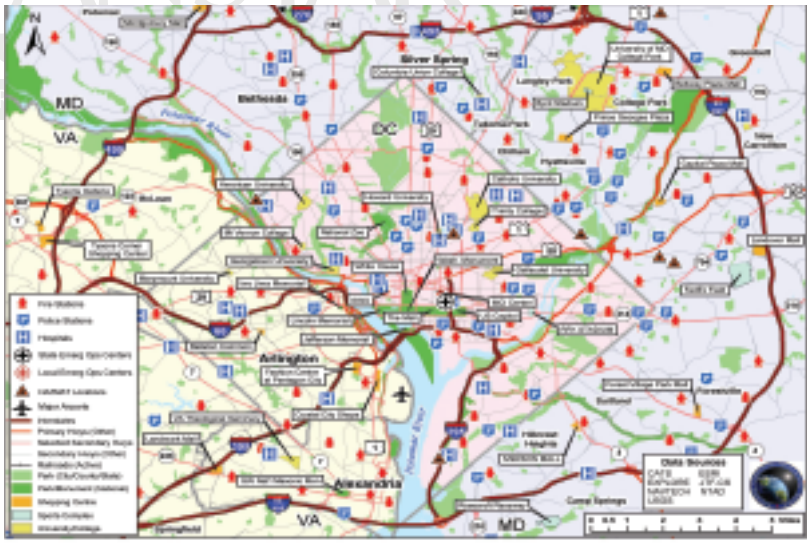

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FIGURE 7. Urban-level datasets accessible through Palanterra ensured that security personnel knew where hospitals, fire stations, and other emergency facilities were located in case unforeseen events required rapid response.

Monitoring the Procession

Having completed advanced visualization and security deployment planning and used spatial technologies to brief personnel, NGA and the various DHS agencies and local law enforcement were prepared for a tense day on June 9. Teams were ready at the FBI command center, NORTHCOM, NGA headquarters, and the White House Situation Room.

As events occurred, NGA personnel updated the COP in real time. An event manager monitored events throughout the day. Security personnel from all commands called changes into the operations center, where an event manager input them as quickly as the calls came in. Once input, any user on Palanterra could see the near-real-time event.

Some of the events were planned, known events, such as when the procession left a given point and the dynamic locations of dignitaries.

The Secret Service reported, for instance, when the president left the White House and when he arrived at the Capitol. This was automatically updated on Palanterra. These events were expected. Other events, though, were not so routine.

Several events occurred that were deemed threats. Police called in the locations of suspicious packages, which were immediately shared by way of Palanterra. NGA also logged a car fire along the motorcade route.

Another was when an aircraft strayed into the airspace over the Capitol. Lawmakers were whisked to a secure location, and crowds waiting to view the procession scattered as they were instructed to leave the area.

The aircraft turned out to be that of the Kentucky governor. Still, the stray aircraft was a real event of concern that was phoned in and added to Palanterra in near-real time.

Fortunately, the week of solemn observances passed without a major incident, and NGA and its DHS partners learned valuable lessons about their ability to respond to security events and use spatial technologies as an intelligence-sharing platform, as well as a COP for situational awareness.

Considering the suddenness of the event, the whole community demonstrated that they could work multiple events at the same time and quickly incorporate new activities into an existing one. This bodes well for emergency response and reflects positively on the ability of Palanterra and HSIP to support teams that manage such security events — including DHS, Secret Service, FBI, and the National Guard.

Manufacturers

NGA tapped **AirPhoto USA** to acquire new imagery over Simi Valley. Capitol Police employed **Red Hen Systems** and **IPIX** multimedia imaging/mapping programs. Private-sector vendors contributing to HSIP and Palanterra include **BAE SYSTEMS**, **Boeing Autometric**, **DigitalGlobe**, **ESRI, Intergraph Mapping and Geospatial Solutions**, **Intermap Technologies**, **Leica Geosystems GIS & Mapping**, **NAVTEQ**, **ORBIMAGE**, **Space Imaging**, **Surdex**, **Vexcel Corporation, 3001,** and more. c