

**DRAFT****Results and Recommendations on the  
Role of Airborne and Commercial Satellite Imagery in Emergency Response****Background**

In January and May, 2006, the American Society for Photogrammetry and Remote Sensing (ASPRS) convened meetings with a variety of stakeholders to discuss lessons learned during the 2005 hurricane season in the United States. The topical focus of the meetings was the acquisition of commercial imagery, both satellite and airborne, pre-and post-disaster. The anticipated outcomes of the meetings were communication among a variety of stakeholders from the government, academic, and private sectors, and a set of concise recommendations to be provided to those with influence over the administrative and technical processes used to acquire commercial imagery for use in emergency preparedness and response.

**January, 2006 Meeting**

On January 19, a group composed primarily of government agency representatives convened in Washington, DC. Federal agencies represented included:

- Department of Commerce - National Oceanic and Atmospheric Administration (NOAA)
- Department of Homeland Security – Federal Emergency Management Agency (FEMA)
- Department of Agriculture – Farm Services Agency (FSA)
- Department of Agriculture – Natural Resources Conservation Service (NRCS)
- Department of Health and Human Services – Centers for Disease Control and Prevention (CDC)
- Department of Interior – U.S. Geological Survey (USGS)
- Department of Defense - United States Army Corps of Engineers (USACE)
- Department of Defense - United States Army 82<sup>nd</sup> Airborne Division
- Department of Defense – National Geospatial Intelligence Agency

Most of the morning and afternoon sessions were devoted to individual agency briefings of lessons learned post-hurricanes Katrina and Rita. The afternoon session ended with the larger group breaking into logistical and technical subgroups. A set of high-level, draft recommendations was developed by these subgroups and posted on the ASPRS web site. All attendees agreed more time was needed to further develop these recommendations and increase input from stakeholders not represented at the meeting, notably including commercial imagery providers.

**May, 2006 Meeting**

On May 2, in conjunction with the ASPRS annual meeting in Reno, NV, a second lessons-learned workshop was held to further refine recommendations and get input from additional stakeholders. The morning session included a review of the January workshop and briefings from private sector commercial airborne imagery providers on their lessons learned from the 2005 hurricane season. The National Geospatial Intelligence Agency (NGA) was also invited to provide information on lessons learned since they were unable

**DRAFT**

to fully participate in the January meeting. Note that commercial satellite imagery providers were also invited but did not attend this session.

The May 2 afternoon session was devoted to refining ASPRS recommendations on the logistical and technical aspects of the acquisition of commercial imagery for use in emergency response. These recommendations were documented and posted on the ASPRS web site for review and comment by workshop participants. The following is the final version of the recommendations from these workshops.

**Logistical Issues and Recommendations:**

1. The Federal response to the 2005 hurricanes, as it related to imagery acquisition, did not appear to have been documented in any type of standard operating procedure nor was it well-coordinated with state and/or local geospatial data users or providers.

**ASPRS recommends the following actions be implemented to address planning and coordination issues:**

- Incorporate explicit references to planning for, acquiring, and using geospatial data in documentation describing the Incident Command System, NIMS, and in the National Response Plan. At a minimum, update the FEMA “Remote Sensing in Federal Disaster Operations Standard Operating Procedures” document, dated June, 1999 and/or replace it with a more appropriate document.
  - Consider implementing a separate and distinct geospatial Emergency Support Function (ESF) to allow more flexibility in acquiring imagery and other geospatial data to fulfill a variety of user requirements.
  - Conduct training exercises associated with implementation of the documents referenced above, including participants from all Federal, state, and local agencies with a geospatial mission associated with emergency preparedness and response.
  - Communicate the existence of these documents widely to all sectors.
2. Although a great deal of imagery was acquired during (primarily) post-event response, it was unclear to many in the geospatial community how or if requirements for data were being communicated to those responsible for image acquisition. Further, the data that was ultimately collected appeared to be primarily focused on a limited set of mission requirements and was extended beyond its intended use to address other critical needs.

**ASPRS recommends the following actions in order to more fully capture and address pre- and post-event imagery requirements:**

- Survey users at all levels on requirements; gather information on what image and geospatial products were most useful for particular applications.
- Plan to acquire data in phases post-disaster with appropriate technical specifications to address common emergency response functions. For example:

**DRAFT**

- Immediate post-event; acquire imagery for reconnaissance missions, damage assessment, and search and rescue.
  - 1-2 weeks post event; acquire or post-process more fully developed data for recovery, infrastructure assessments.
  - Longer-term, complete full metadata, catalog, and archive data for future access, insurance reference, and evaluation and study of the event.
  - Develop pre-scripted Mission Assignments reflecting specifications for imagery which meets common emergency response user requirements. Share these generally with commercial imagery providers so they can prepare capabilities to meet these requirements.
3. Funding availability for some of the imagery acquired in the hurricane season is dependent upon the President's declaration of a National Disaster. In many instances, valuable time is lost waiting for funds to become available under this scenario. After a hurricane, there is often a window of 24-36 hours after the storm when the weather is clear. Unfortunately, it often takes at least this long to get funding in place and paperwork processed to enable acquisition of new imagery due to the dependency on declaration of a Natural Disaster.

**ASPRS recommends the following actions to address funding and related contract issues in the future:**

- Make funds available to pre-stage capability and data prior to an event.
- Establish contracts in advance with clear requirements for emergency response capabilities to be provided in a rapid response mode.
- Perform a return on investment study for the use of geospatial data in disaster response to provide a business case for acquisition of data under a broader set of specifications and for establishing funding to enable pre-staging capabilities.
- Fund post-event documentation and archive of data in mission funding.

**Technical Issues and Recommendations:**

1. One of the most common issues recognized by users of imagery acquired in the 2005 hurricane season was the lack of usability of the imagery.

**ASPRS recommends the following actions to address imagery usability issues:**

- Provide data in commonly used formats; do not introduce a new or limited-use format in an emergency response situation. A very commonly mentioned issue post-Katrina and Rita was the lack of capability by the civil user community to ingest data in the NITF format provided through NGA by commercial satellite vendors. Note that NGA has responded to this issue by agreeing to provide commercial satellite imagery in 2006 in both GeoTIFF and NITF formats.
- Develop, adopt, and communicate a common file-naming and/or media labeling convention. Because users were inundated with large volumes of imagery in the

**DRAFT**

hurricane season of 2005, many did not have time or resources to evaluate data that was not clearly labeled or logically named.

- Provide browse images as part of the product deliverable to enable easy evaluation of large image files.
2. Technical issues identified for non-imagery products seemed to center around product specifications and the need to meet a variety of user needs.

**ASPRS recommends the following actions to improve product usability:**

- Develop requirements and prepare products which meet the needs of users at varying levels of technical sophistication. There are many users who do not have GIS or image processing software who could greatly benefit from image and geospatial products.
  - Recognize the continuing need for preparing hard copy products.
  - Develop requirements and prepare products (particularly important for hardcopy or scanned map products) with multiple coordinate systems. Different user groups require the use of different coordinate systems for their applications. For example, some required products showing state plane coordinates, while others required latitude/longitude or UTM. Further, there seems to be a significant lack of understanding and/or unwillingness to adopt the National Grid. At a minimum, products should be clearly labeled or contain metadata with coordinate system, projection, and datum information.
3. Data distribution, especially for extremely large image files, was a major issue which limited data utility or delayed deployment beyond a timeframe in which the data could most beneficially contribute to the effort.

**ASPRS recommends the following actions to address data distribution issues:**

- Plan for at least some distribution on portable media. Portable hard drives were preferred over DVDs which tended to have data corruption problems.
- Document optimum image compression ratios for different image types and applications.
- Plan for backup and failover capabilities between image hosting/serving sites. Local government data is particularly vulnerable to a single point of failure.

**Next Steps**

ASPRS recognizes that many of the above recommendations either have been or are in the process of being implemented. The next steps by ASPRS on these subjects will be to hold a discussion forum on Wednesday, November 8 at the ASPRS/MAPPS 2006 Specialty Conference in San Antonio, TX. ASPRS will also host a special session at the annual ASPRS meeting in Tampa (March, 2007) to discuss the changes agencies have made to processes and procedures to improve the acquisition and usefulness of imagery provided in support of emergency preparedness and response.

Presentations, minutes, and other reference materials from the January and May workshops may be accessed at [http://www.asprs.org/news/disaster\\_ws/](http://www.asprs.org/news/disaster_ws/).