

# HURRICANE IRENE: ADVANCED SITUATIONAL AWARENESS USING INTEGRATED IMAGERY & GIS

The South Carolina Air National Guard (SCANG) participates in a U.S. Air Force program known as Eagle Vision. The Eagle Vision program consists of five ground stations capable of retrieving real-time satellite imagery from numerous commercial Earth-observing satellites to deliver time-critical precision images to support U.S. global crisis response. The ground stations are deployable worldwide.

Hurricane Irene was a large Atlantic Hurricane that left extensive flood and wind damage across the Caribbean and Eastern U.S. coast in late August 2011. In response to this event, staff from the SCANG were called to operate the Eagle Vision receiving station near Columbia, South Carolina. The downlink station or DAS (Data Acquisition Segment) acquires raw data from SPOT, CARTOSAT, RAPIDEYE, and RADARSAT. The Eagle Vision program works with SPOT to get the raw data from the satellite sensor to stitch images of cities, counties, and state. Generally SPOT 4 and SPOT 5 imagery is used to accomplish this task. For disaster situations, SPOT is a vital tool, readily available to assist in Humanitarian Aid Disaster Relief (HADR) workers in planning.

## Challenges integrating Spot imagery in ArcGIS

SPOT-4 and SPOT-5 produce highly valuable imagery that can be used to support near real situational awareness, however a key challenge to address was ensuring raw images collected through the Eagle Vision antenna could be rapidly corrected to align with other GIS datasets. The Eagle Vision program had been using ArcGIS 10 and ERDAS to stitch and correct the imagery.

Since turnaround time is very important, the most limiting factor in the existing workflow was the manual stitching of imagery, which is very time consuming and often times inaccurate or inconsistent. Master Sgt Troy Wilkerson (System Administrator for Eagle Vision IV Program) observed: "When trying to tie to together images that were acquired simultaneously with both satellite cameras imaging adjacent areas on the ground, we were spending hours collecting ground control, tie points, and diagnostic points. Each satellite pass, which only takes a few minutes, normally generated 4 to 20 new images."

Eagle Vision was evaluating other software packages to resolve these issues, however there was a strong desire to adopt a tool which was integrated with ArcGIS - this is due to the fact that they did not want to spend considerable amounts of time learning how to use new software that would be disconnect with their ArcGIS environment. The staff were frustrated with having to use multiple packages to accomplish their image processing requirements.

## Challenging problem addressed with simple solution

Master Sergeant Troy Wilkerson was actively looking at image packages to resolve his issues. Upon recommendation from his counterpart MSgt Chad Tedrowe (EV5 Hawaii Air National Guard), he decided to research PCI Geomatics. Upon taking a look at the website, he found PCI's GeolMaging Tools for ArcGIS.

Troy was interested in GeolMaging Tools from first glance on the website because its integration with ArcGIS eliminated the challenge of learning new packages.



### The Problem

Manual GCP and tie point collection was wasting valuable man-hours and creating inaccurate results. A new solution with ArcGIS 10 integration was required.

### The Solution

PCI Geomatics' GeolMaging Tools software seamlessly integrates data from multiple sources into any ArcGIS workflow quickly and accurately.

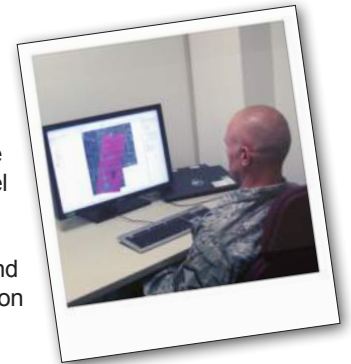
### The Results

What the SC Air National Guard used to measure in weeks and months can now be accomplished in hours; saving critical time and effort.

## An Easy solution to a complex problem

Prior to purchasing Geomapping Tools, the staff at SCANG were able to evaluate the capability through a downloadable trial version of the software. This allowed them to experiment and get familiar with the software by running through the tutorial which comes complete with a SPOT-4 dataset over British Columbia, Canada. In addition, the SCANG staff were able to follow along with instructor led videos and documentation provided on PCI's website.

Master Sgt Wilkerson contacted PCI for some assistance in trying to integrate SPOT-4 with his existing ArcGIS workflow. He wanted his SPOT-4 and SPOT-5 data to be accessible within a mosaic dataset in ArcGIS. Geomapping Tools is fully customizable since the software is part of the ArcGIS Geoprocessing framework. PCI not only provides individual tools but also existing models to automate workflows. Both the tools and models can be linked to existing ArcGIS Geoprocessing Tools as well as models within ESRI's Model Builder environment.

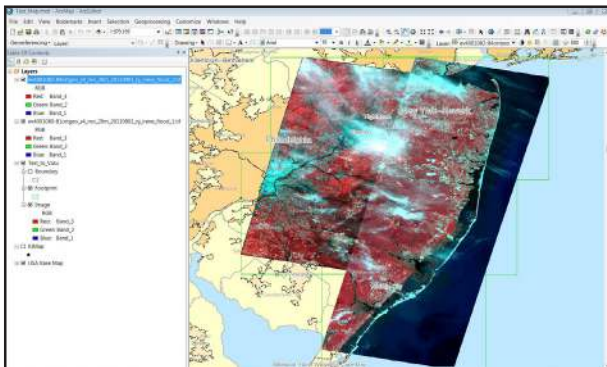


**“Time is the key. We are providing imagery to customers hours earlier than we could before**

Geomapping Tools have automated image to image registration and an automated block-bundle adjustment as well as tie-point allocation for refined accuracy.

Staff from PCI Geomatics met with Master Sgt Wilkerson to better understand the workflow. PCI was able to customize the workflow by integrating PCI Geomapping Tools with ArcGIS mosaic dataset tools. This allowed for the SPOT-4 and SPOT-5 imagery to be corrected using PCI tools and then stored within the mosaic dataset for better management and storage. In addition, Master Sgt Wilkerson loaded his reference images into a mosaic dataset for ease of storage.

Once familiar with the use of Geomapping Tools, the SCANG took it one step further - making use of the tools for operational response to Hurricane Irene, where newly acquired SPOT-4 imagery was collected. Eight new images were collected through the Eagle Vision DAS at the height of the Hurricane's landfall in upstate New York near Albany. A high resolution orthotiff image of New York state was used as a reference to automatically correct the newly collected SPOT-4 imagery. Normally, the process of correcting and integrating these eight newly collected images into ArcGIS would have taken approximately 14 hours - using Geomapping Tools for ArcGIS the eight SPOT-4 images scenes were orthorectified, mosaicked, exported as a geotiff, and reformatted into JPGs within 32 minutes using a fully automated workflow - a fraction of the time it would have otherwise taken!



## PCI is part of Eagle Vision IV workflow

Today, Master Sgt Wilkerson and the SCANG continue to make full use of PCI Geomapping Tools, creating new workflows for their growing stacks of imagery. The use of these tools have saved the SCANG and the Eagle Vision program considerable time and money, allowing them also to respond with ready-made image products within minutes, not hours.

As Master Sgt Wilkerson states: "The PCI Geomapping Tools extension for ArcGIS has saved us multiple person hours of processing time. This has given us the ability to provide imagery to a multitude of Federal, DoD, State, and Civil authorities that are responding to disasters such as Tornadoes, Hurricanes, Earthquakes, Floods, and Wildfires. Time is the key. We are providing imagery to customers hours earlier than we could before using PCI's tools."

Easily integrating satellite imagery with GIS continues to represent a significant barrier. Through the partnership between PCI Geomatics and ESRI, products such as Geomapping Tools for ArcGIS are helping GIS users better leverage their imagery libraries, and focus their attention on extracting the valuable information they contain, rather than spending hours on time consuming manual pre-processing tasks.



PCI Geomatics' Geomapping Tools provides ArcGIS users with a suite of tools for processing and analyzing imagery in the GIS. The release of Geomapping Tools version 2.0 coincides and integrates directly within ESRI's recently released ArcGIS version 10 software.

Geomapping Tools for ArcGIS version 2.0 is PCI's second Geomapping Tools product release, and features direct integration within the ArcGIS 10 Toolbox. PCI has also developed tools for advanced Radar Analysis, providing the best tools for Synthetic Aperture Radar (SAR) data processing and analysis PCI's flagship product, Geomatica also includes ArcGIS Integration. For more information about Geomapping Tools for ArcGIS, visit our website at <http://www.pcigeomatics.com/gitools>.



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