Web-based Geo-Referenced Image Manager (WebGRIM):

Automated correction, processing and management of aerial data

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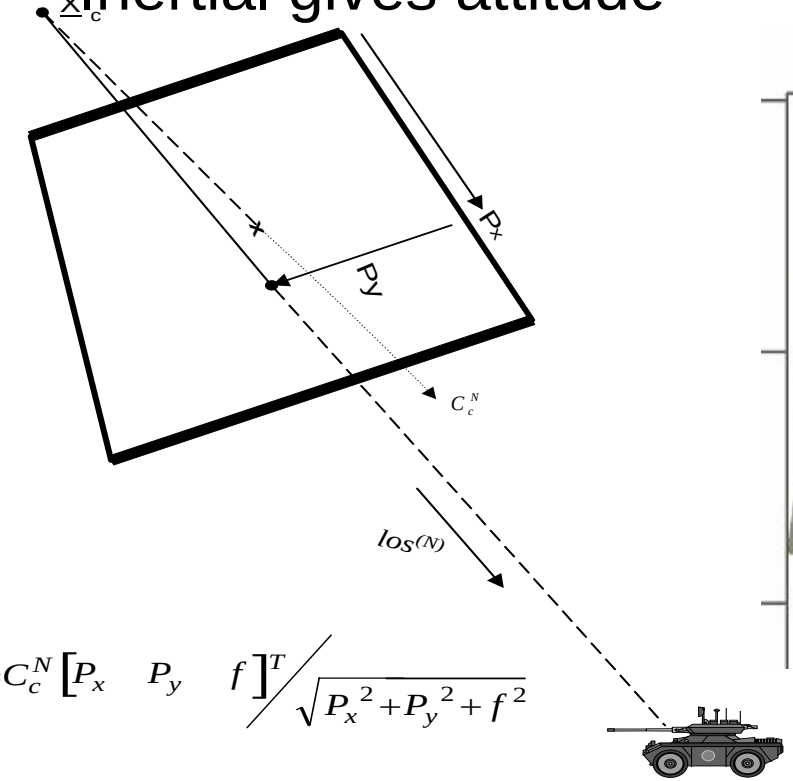
Need for Timely Georeferenced Imagery Products

- Popularity of web-based Location Based Services is increasing
- Answer posted for FAQ at Google Earth: "How old is your data"

  "Google Earth acquires the best imagery available, most of which is approximately one to three years old
- Access to near real-time imagery products opens up new markets and applications for Location Based Services

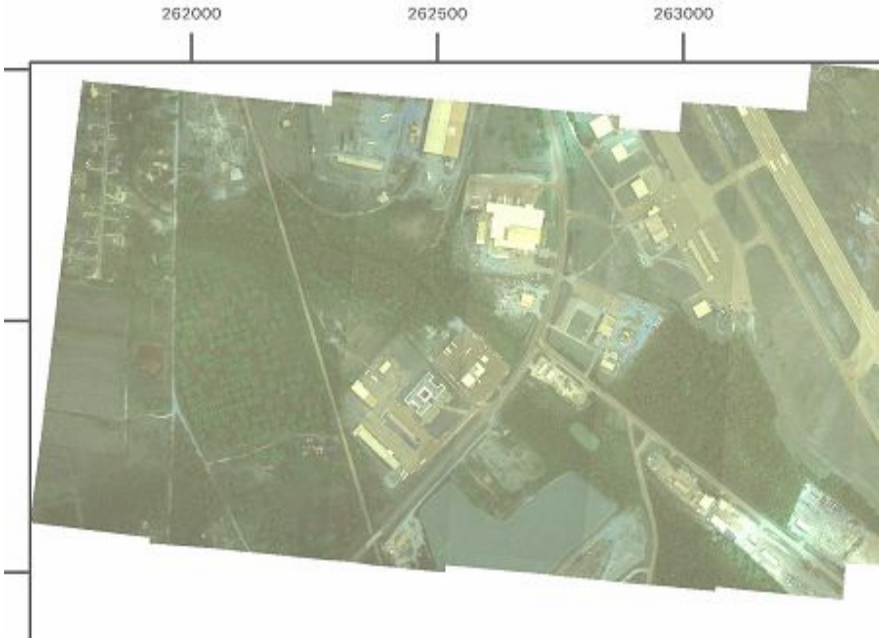
GI-Eye Sensor Registration

- GI-Eye Product
  - GPS gives position
  - Inertial gives attitude



$$los^{(N)} = C_c^N \begin{bmatrix} P_x & P_y & f \end{bmatrix}^T \Big/ \sqrt{P_x^2 + P_y^2 + f^2}$$

- GRIM Enterprise Server
  - Manages registered sensor imagery
  - Auto-mosaic generation



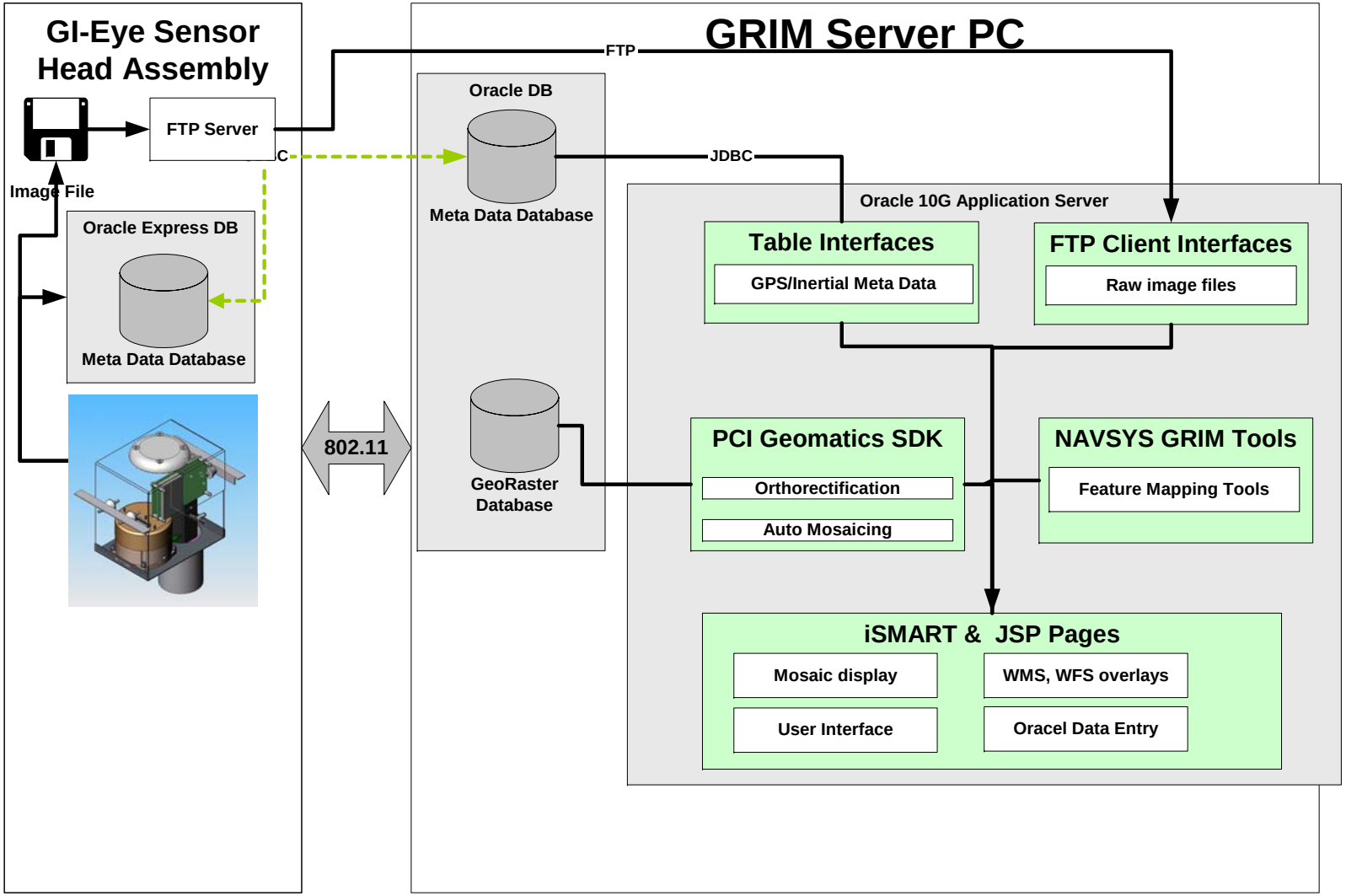
GI-Eye Systems

NGA Tactical Surveying and Targeting System (TS2)

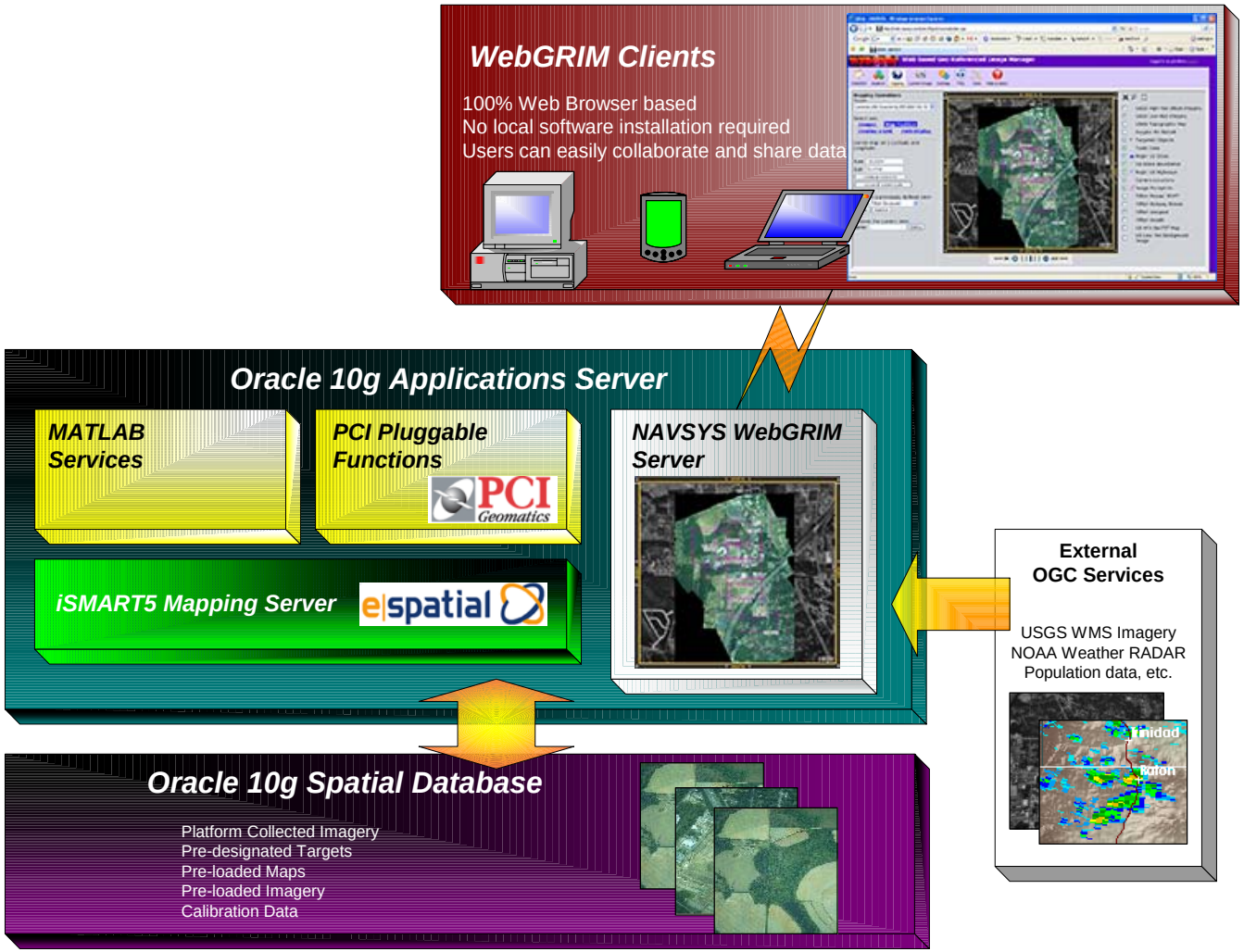
FLIR StarSAFIRE III

Dual GI-Eye System Flown at USAFA

GI-Eye and GRIM Architecture



WebGRIM Architecture



ProSDK Components

ProSDK and GDB Technology

- Base framework and file format interchange

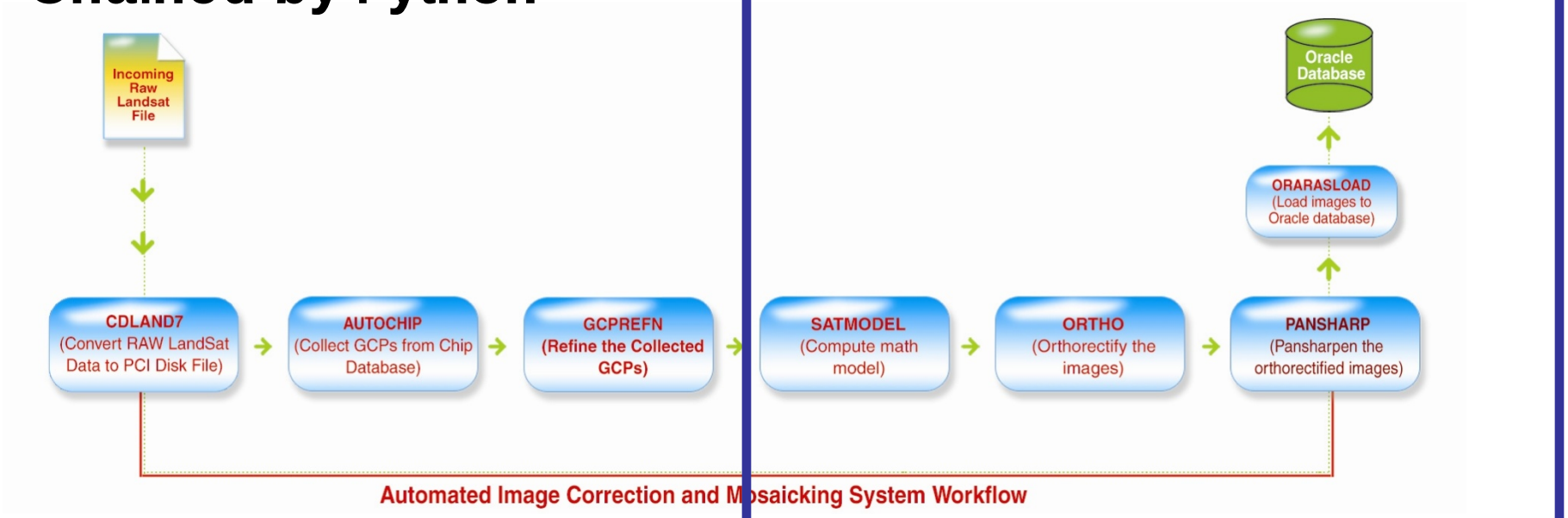
ProPacks

- Groups of PCI Pluggable Functions (PPFs)
- Grouped according to function
- Build Workflows using Python, C++ or Java

Automated Workflows using PPFs

Example:

- **Seven PPFs used in this flowline**
- **Chained by Python**

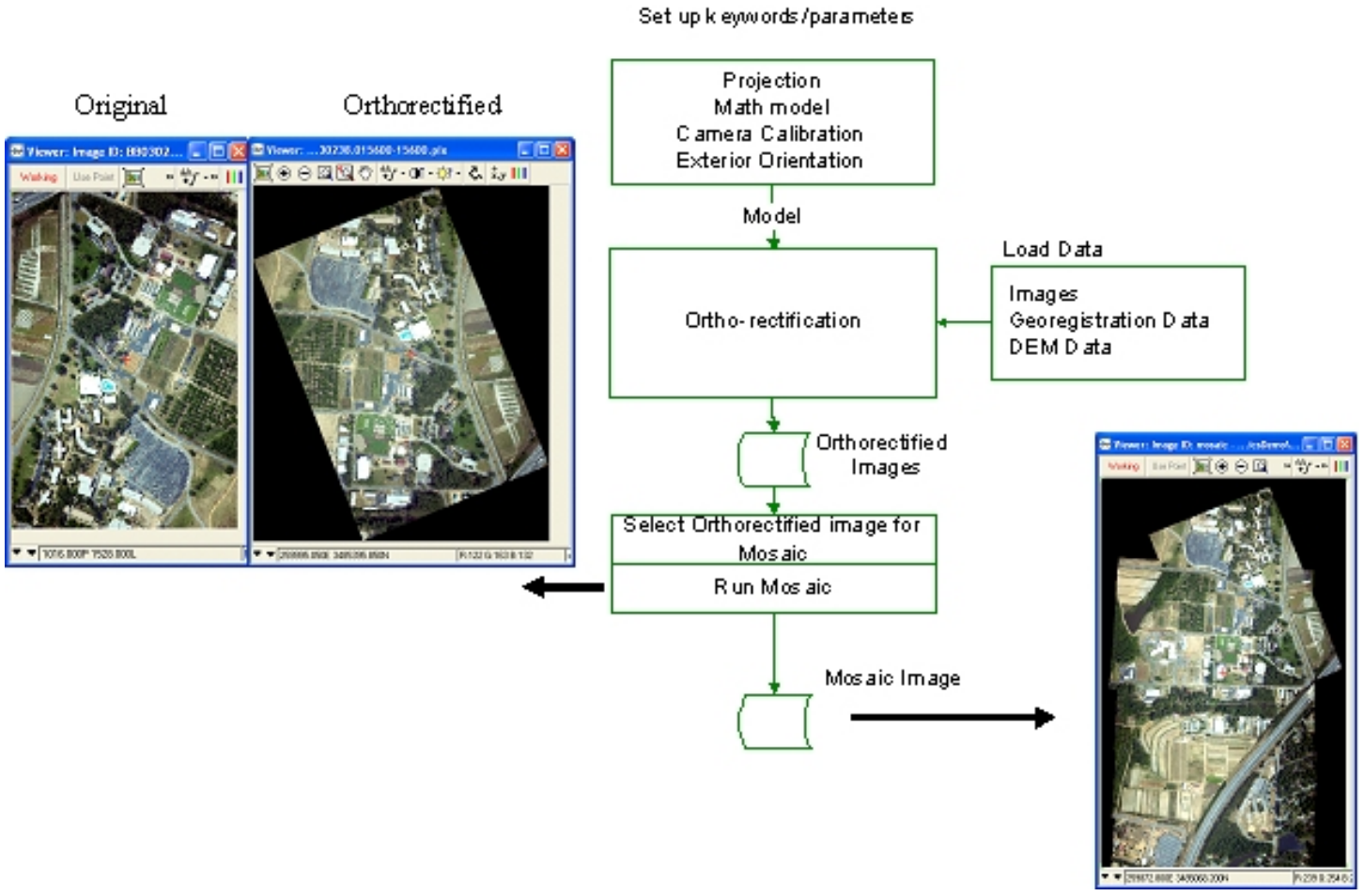


Benefits:

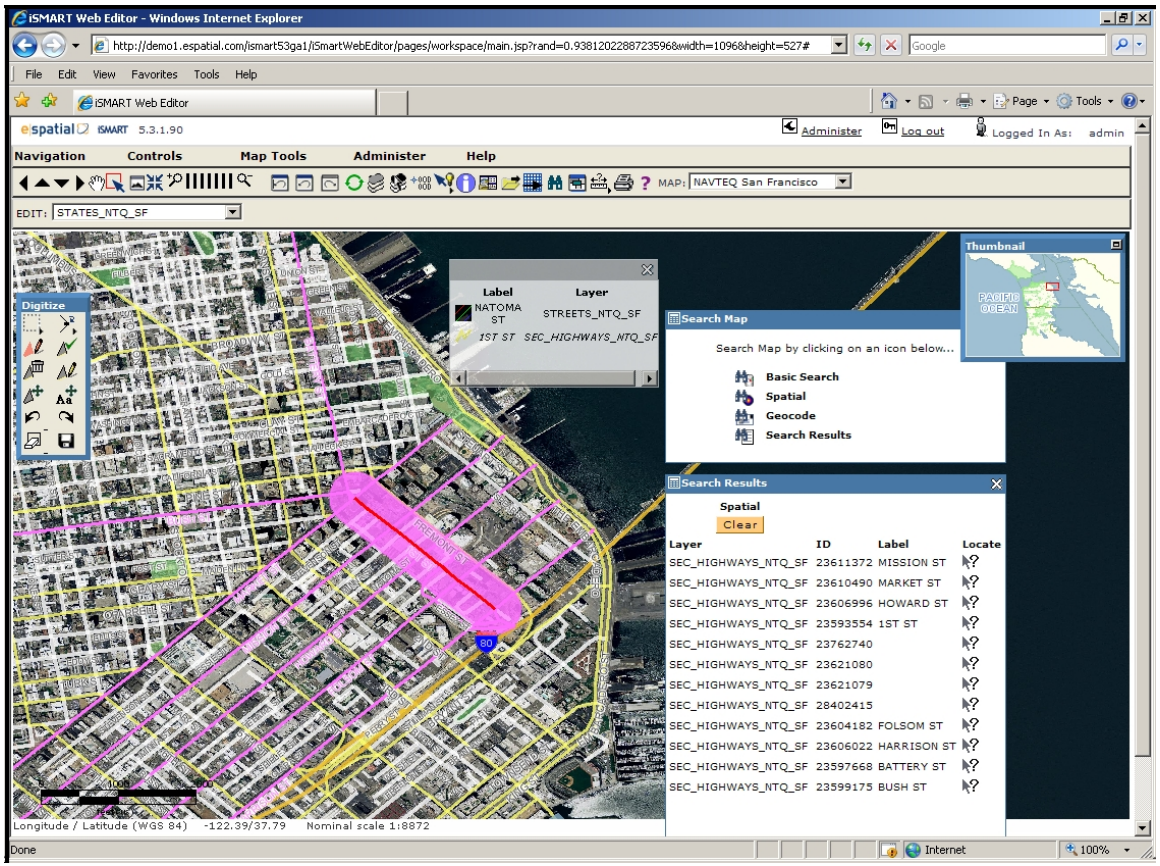
- ☒ **completely automatic**
- ☒ **easy to chain**
- ☒ **parallel processing**

Geomatica

Auto-Mosaic Generation Process with GI-Eye Meta-Data

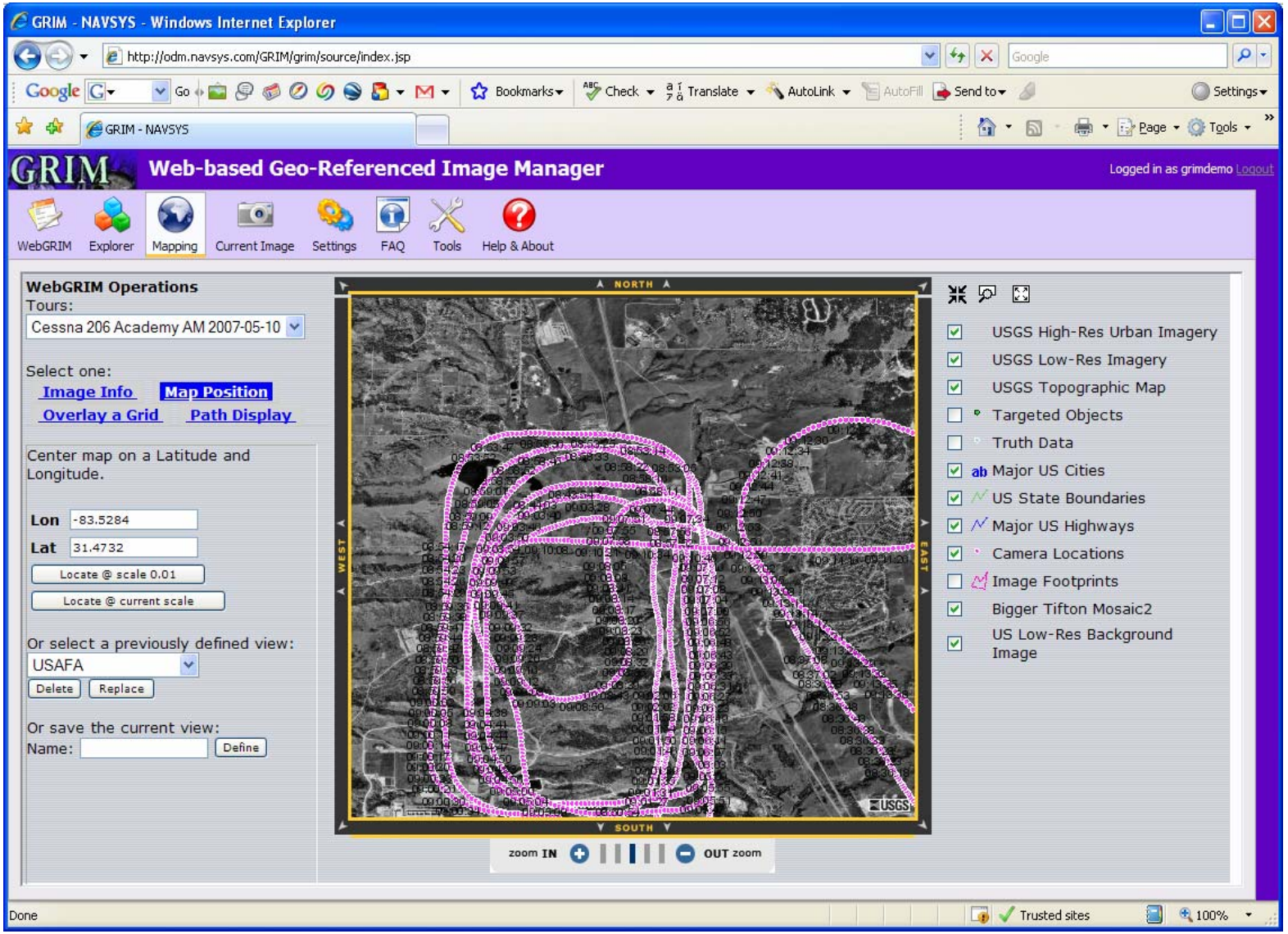


iSMART Web Server

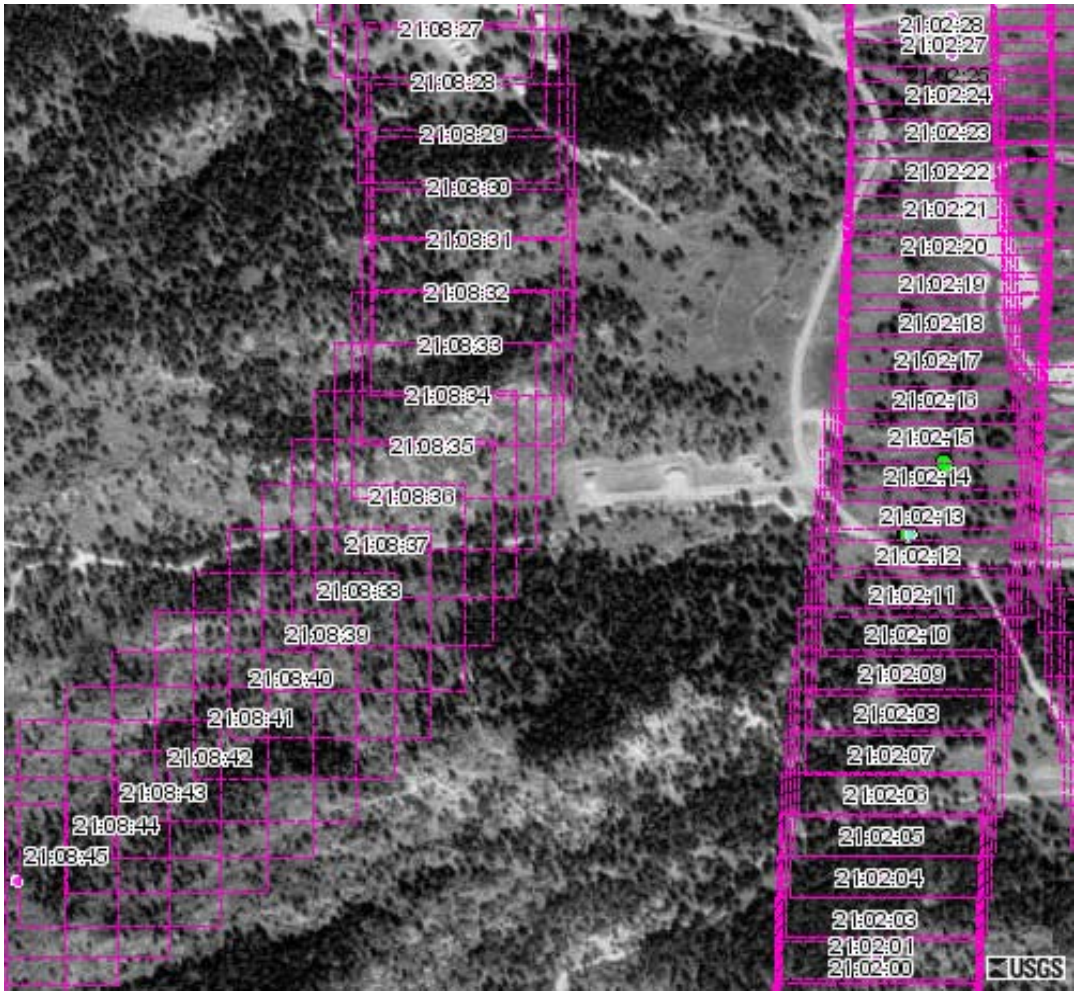


- **Allows viewing of GRIM imagery products**
- **Compatible with Open Geospatial Consortium (OGC) Standards**
- **Needs only Web Browser to view (Thin Client)**

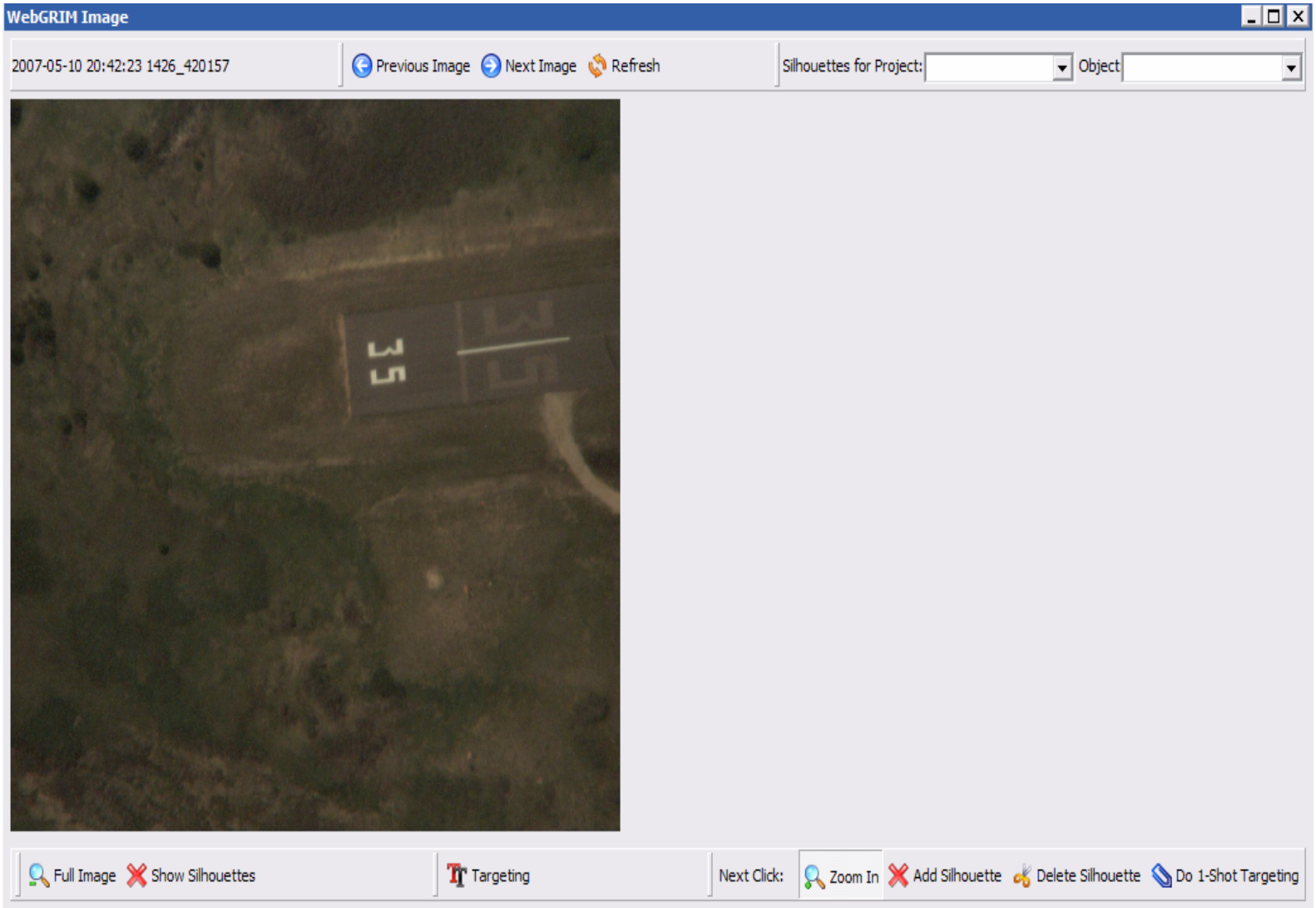
GRIM Data Overview



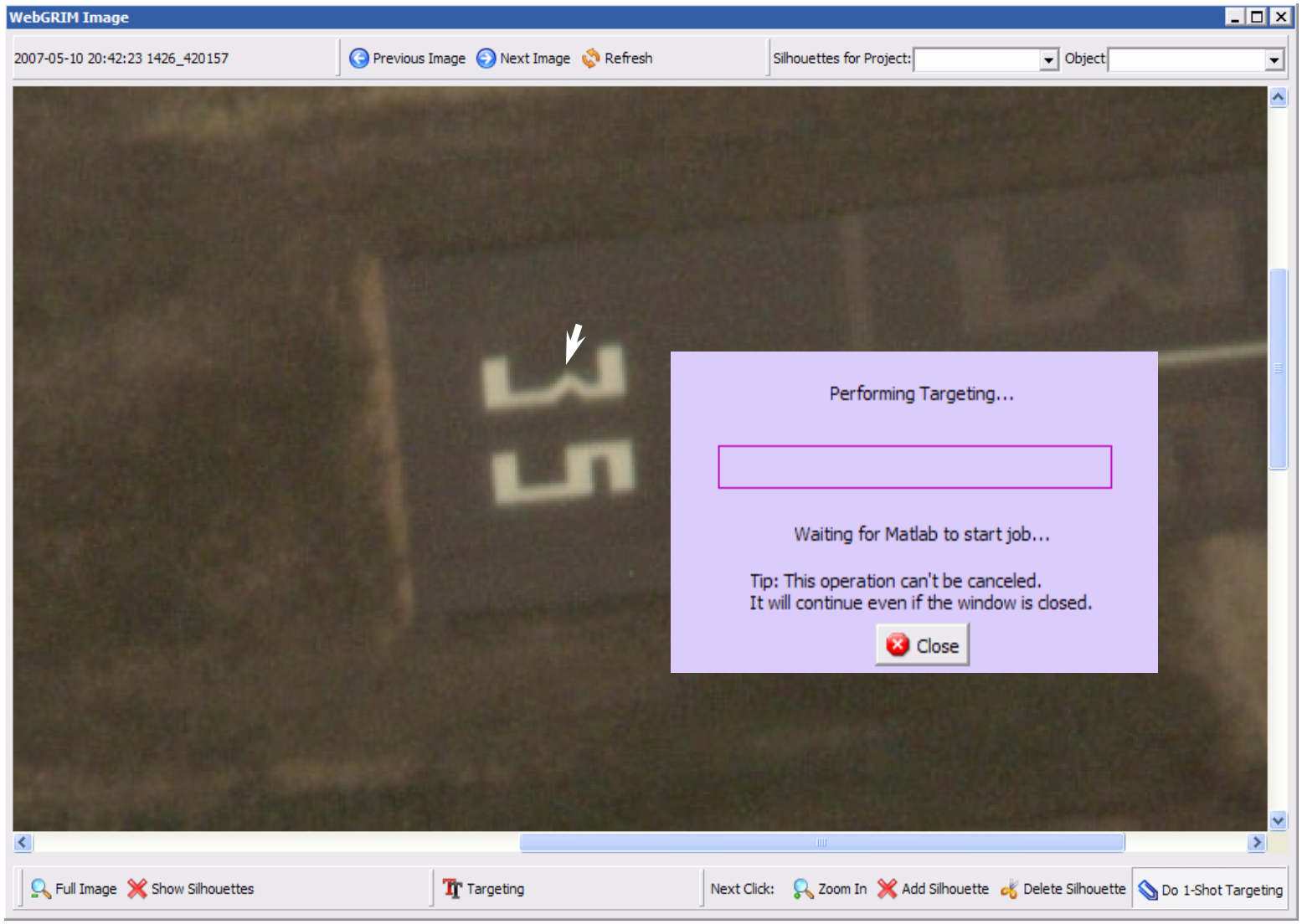
Zooming in to AOI



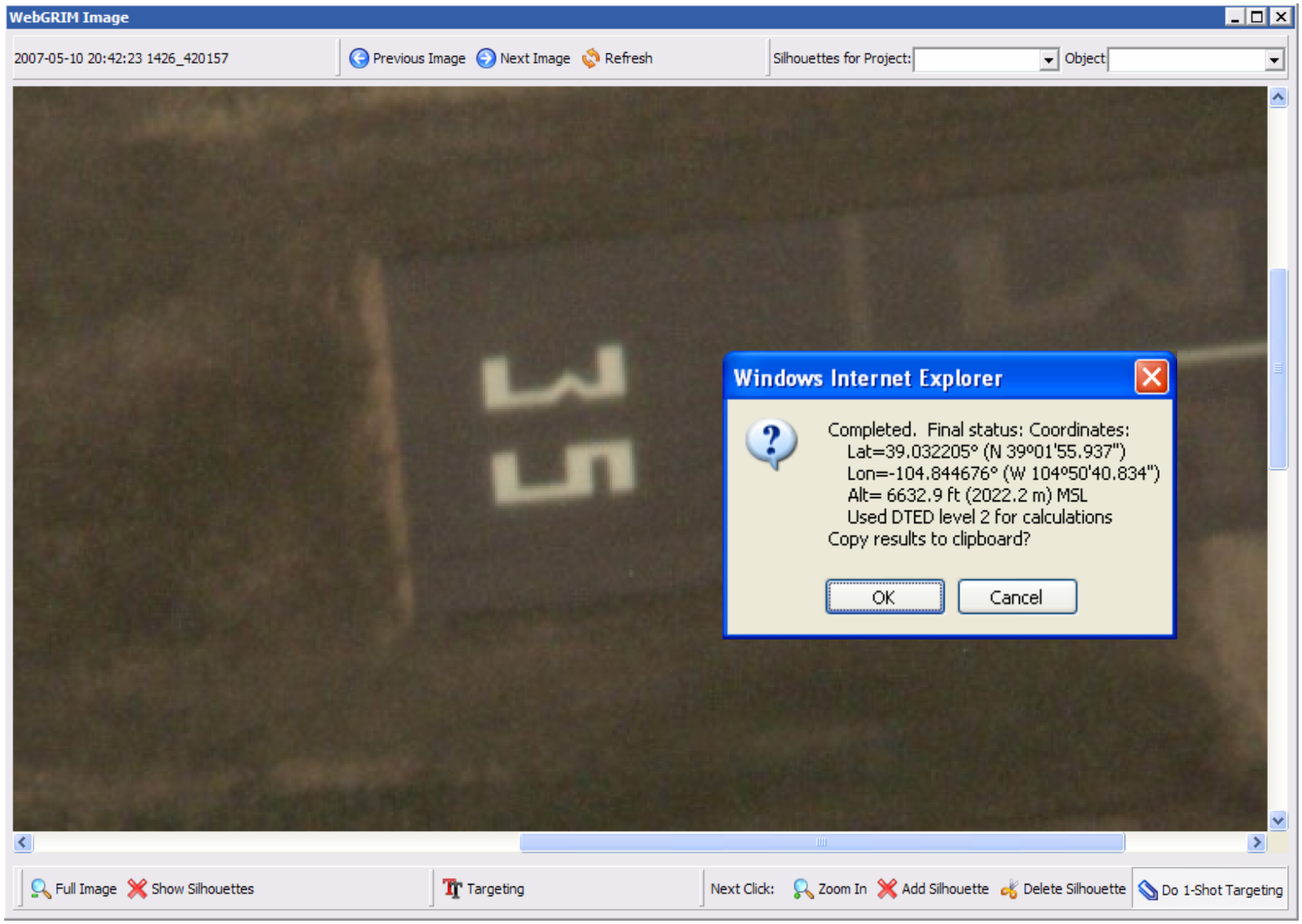
Targeting/Reviewing



Single-Shot Targeting



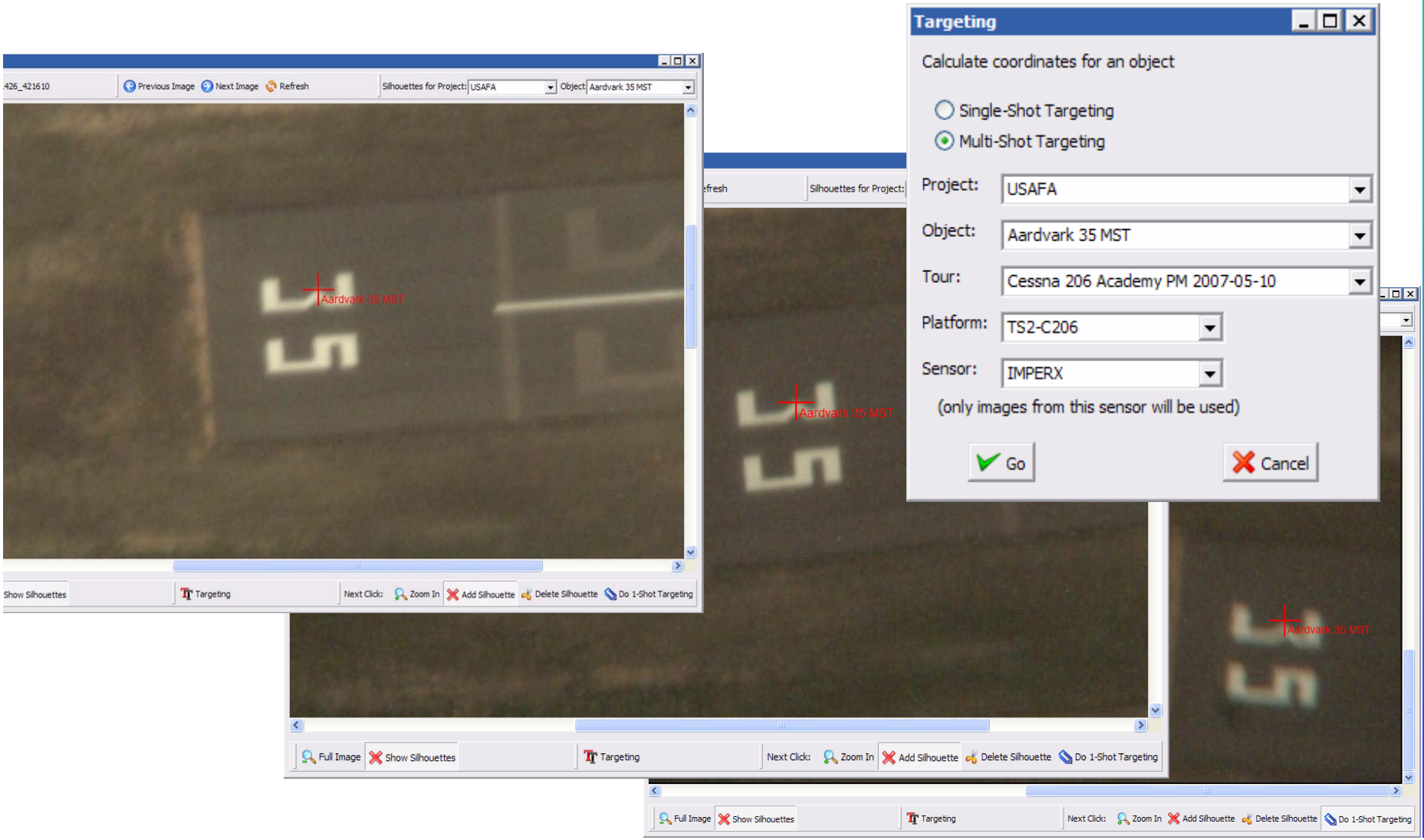
Single-Shot Targeting Results



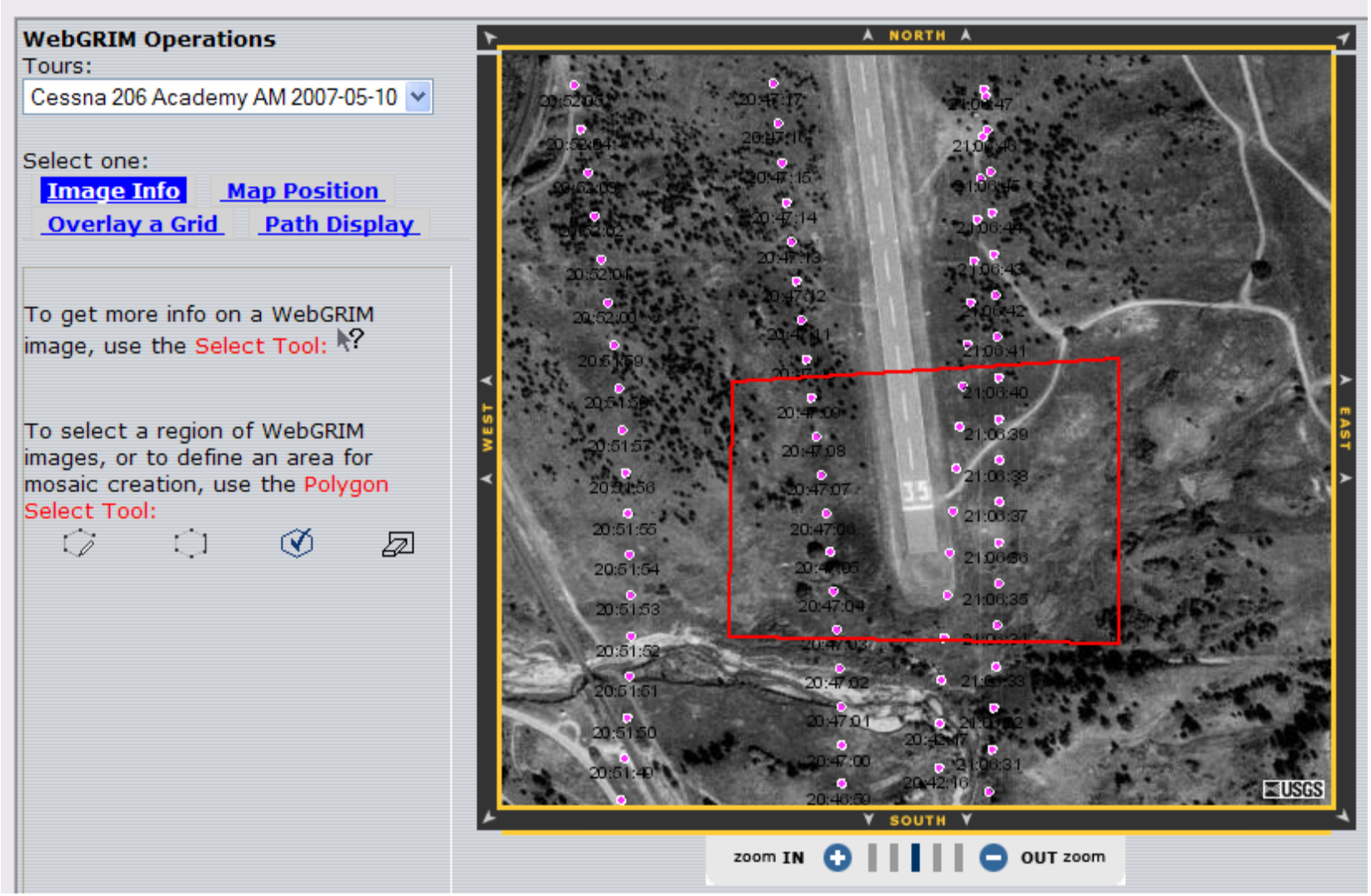
Multi-Shot Targeting

navsys CORPORATION

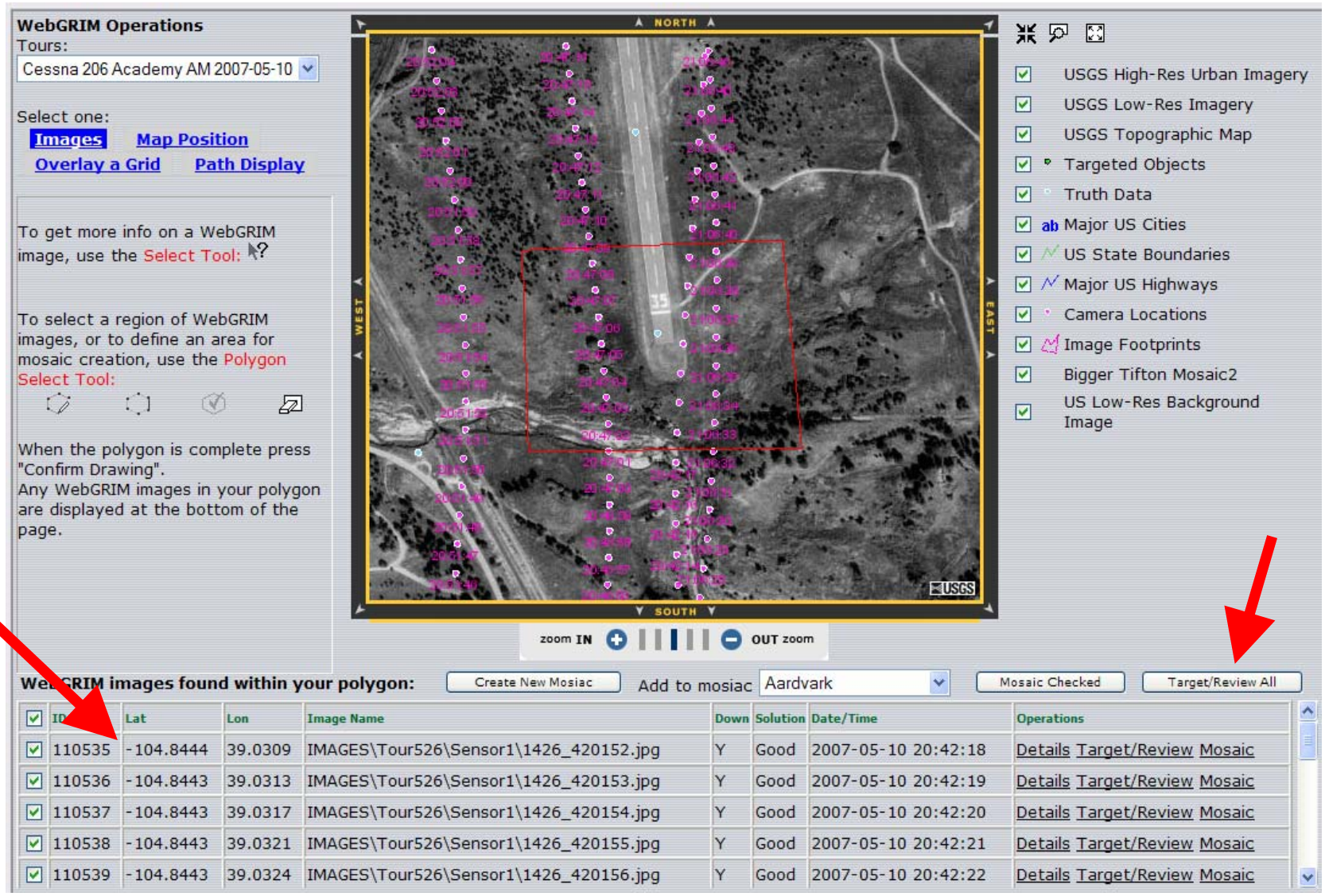
Multi-Shot Targeting



Selecting Images of Interest



Spatially Filtered Data



ID	Lat	Lon	Image Name	Down	Solution	Date/Time	Operations
110535	-104.8444	39.0309	IMAGES\Tour526\Sensor1\1426_420152.jpg	Y	Good	2007-05-10 20:42:18	Details Target/Review Mosaic
110536	-104.8443	39.0313	IMAGES\Tour526\Sensor1\1426_420153.jpg	Y	Good	2007-05-10 20:42:19	Details Target/Review Mosaic
110537	-104.8443	39.0317	IMAGES\Tour526\Sensor1\1426_420154.jpg	Y	Good	2007-05-10 20:42:20	Details Target/Review Mosaic
110538	-104.8443	39.0321	IMAGES\Tour526\Sensor1\1426_420155.jpg	Y	Good	2007-05-10 20:42:21	Details Target/Review Mosaic
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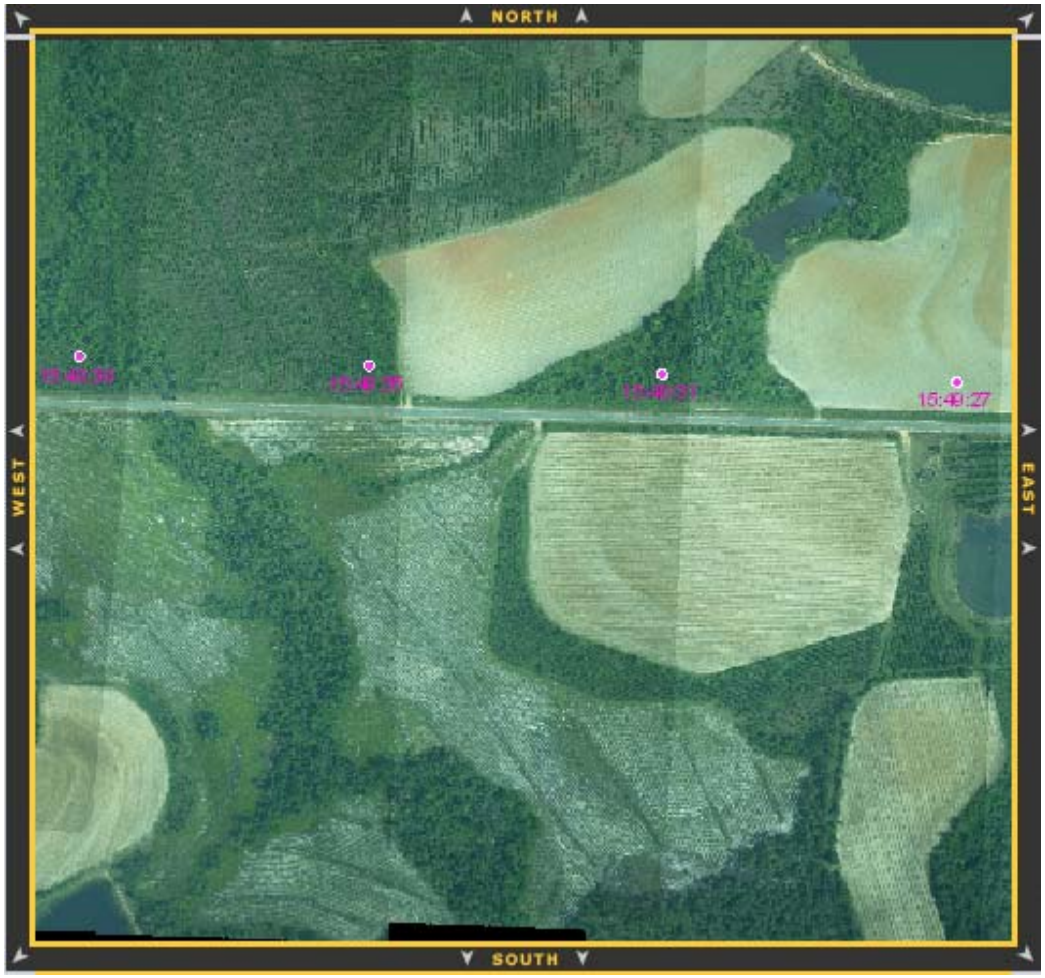
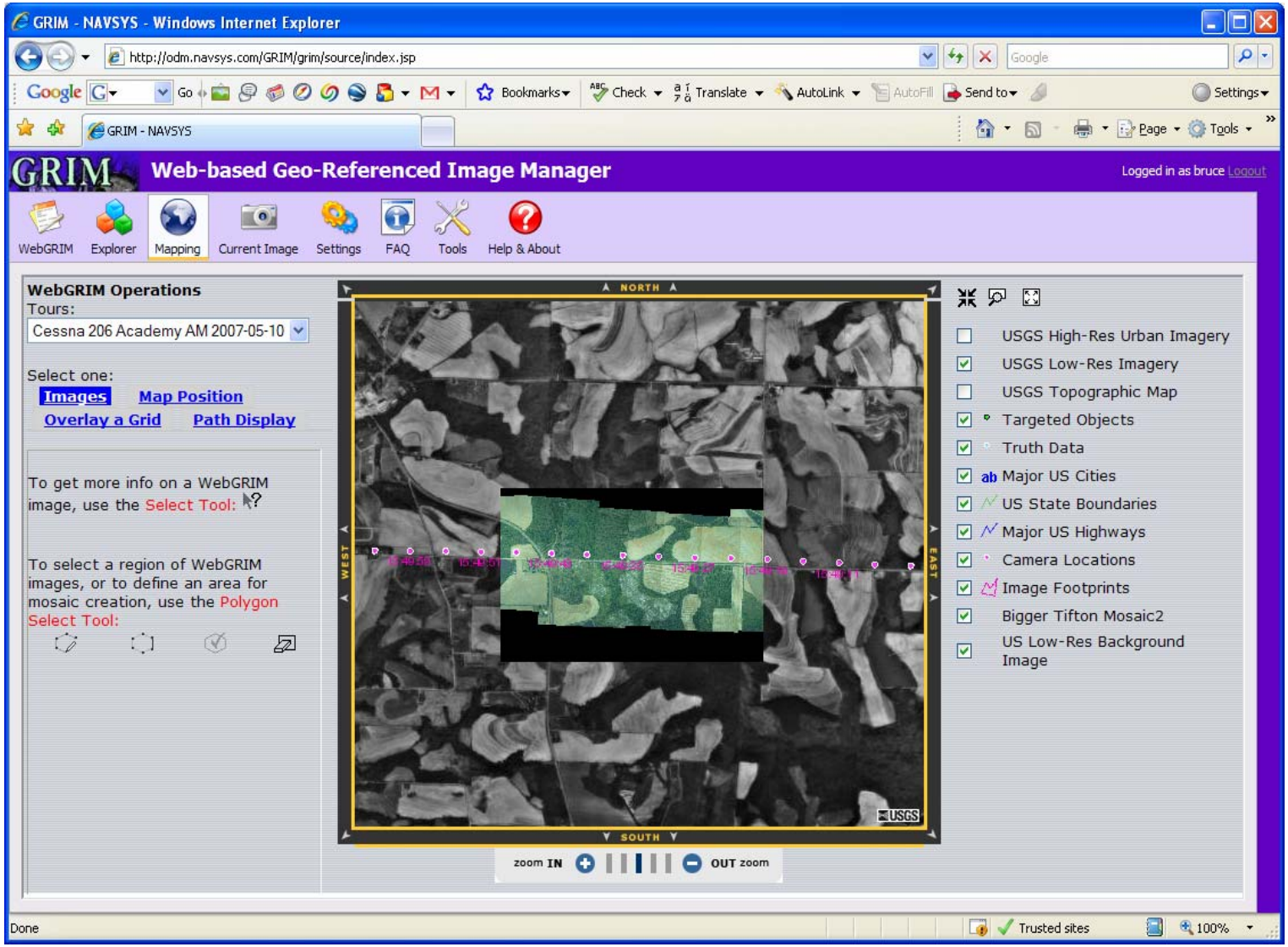
AutoMosaicing



Web Mosaic View



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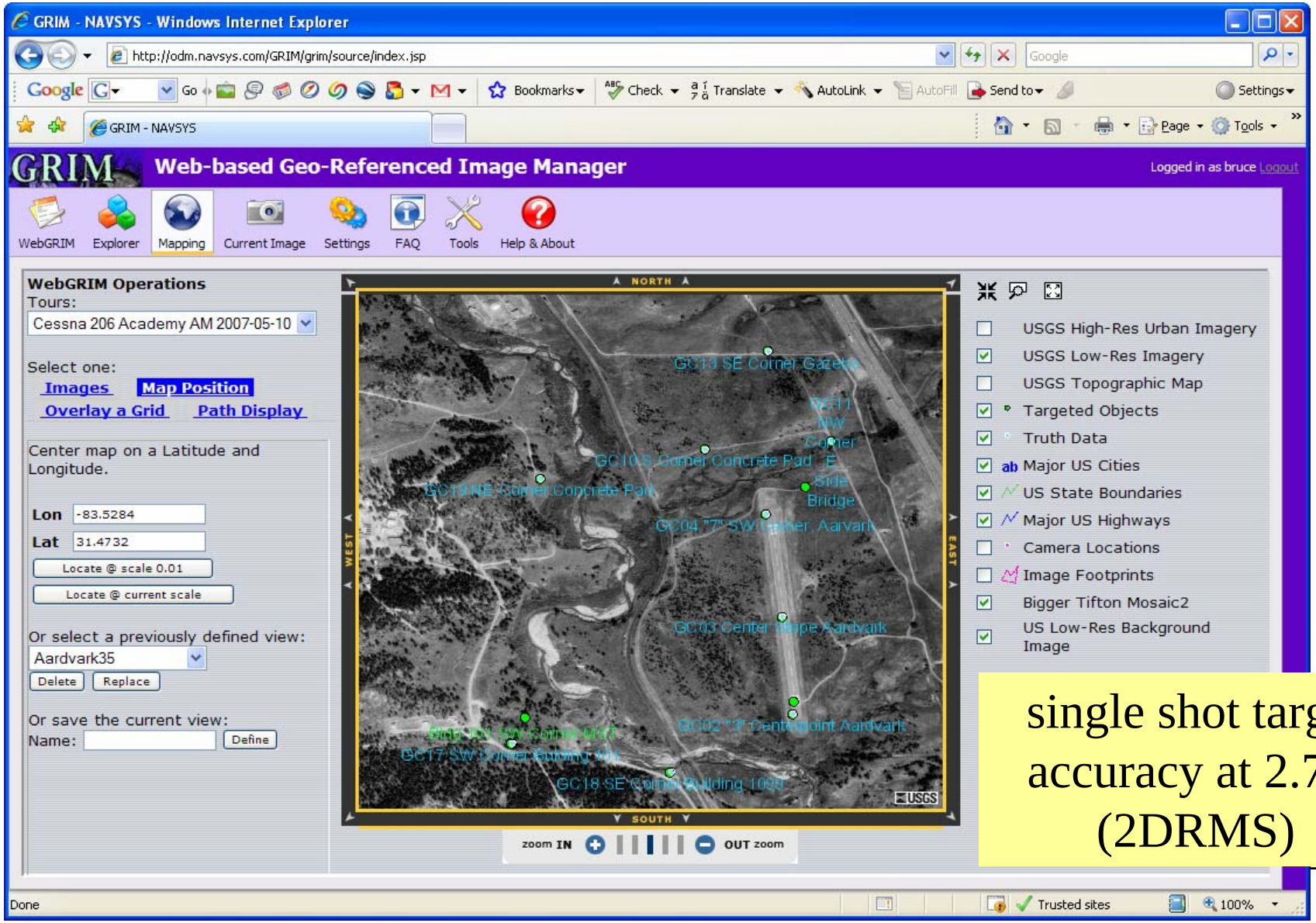
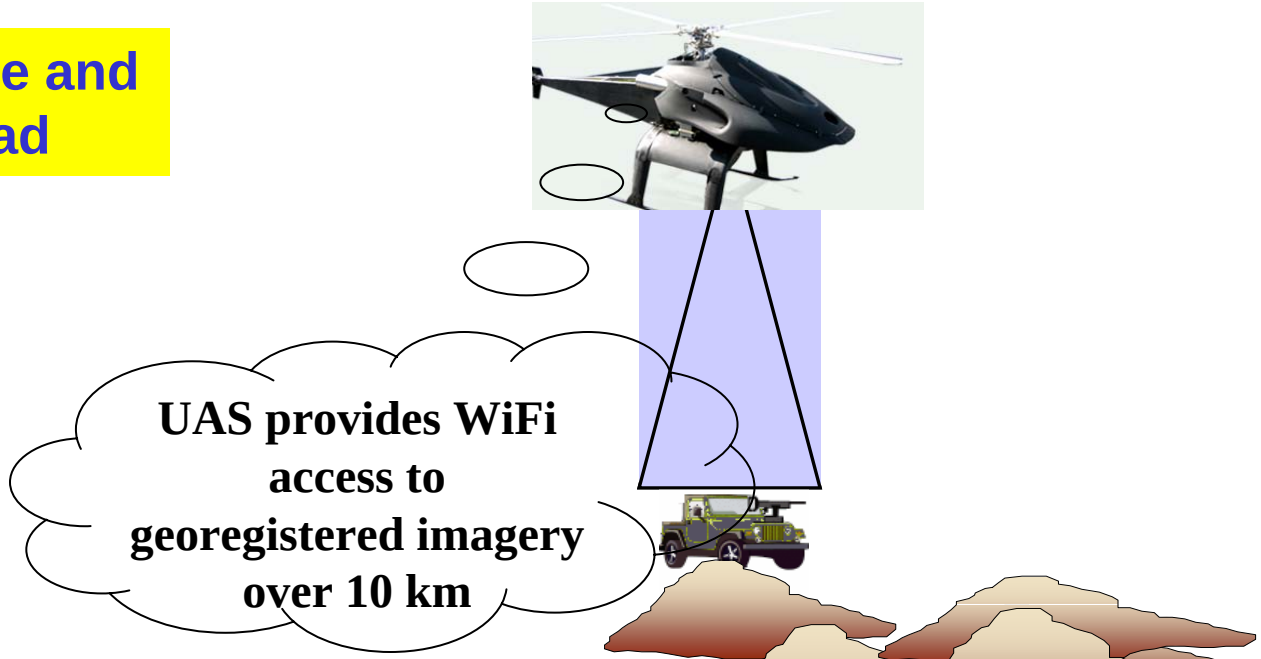
Targeting Results



single shot target accuracy at 2.7m (2DRMS)

UAV GRIM Application

UAV carries GI-Eye and GRIM in payload



First Responders or Ground Forces get real-time access to Web maps

Conclusion

- GPS/inertial video provides precisely referenced imagery in real time
- Flight test data showed single shot feature location accuracy at 2.7m (2DRMS)
- Use of PPFs within WebGRIM allows automated mosaicking of images
- Use of iSMART in Web GRIM provides near real-time web access to mosaicked imagery
- Applications include situational awareness for military, first responders and commercial users

Back-Up