

ICCAGRA USGS Update – May 2009

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The USGS/AM Pilatus PC-6

- Owned by the USGS
- Likely the first DOI/AM approved EAARL aircraft
- Unused past 3-4 years
- Denver, Co.
- High Altitude (28k)
- Unimproved runways
- Slow survey speed (65 kts)
- Turbo Prop engine
- Existing down looking port
- Large cargo doors
- Slow transit speed (110 Kts)
- Primarily for mountain operations too high for twin Cessna 310.
- Have USDA/FS project to Fraser Forest in Rocky Mountains



New USGS Contract Cessna 310 Aircraft

- Normal EAARL Aircraft
- Faster transit
- Longer flight duration
- Two engines enabling over water operations beyond gliding distance
- Best aircraft for mapping:
 - Wetlands
 - Coasts
 - Coral reefs
 - Forests



NASA Experimental Advanced Airborne Lidar (EAARL)

Green laser

(532 nm)

Low power

(70 μ J/pulse)

High pulse rate

(3000+ Hz)

Small footprint

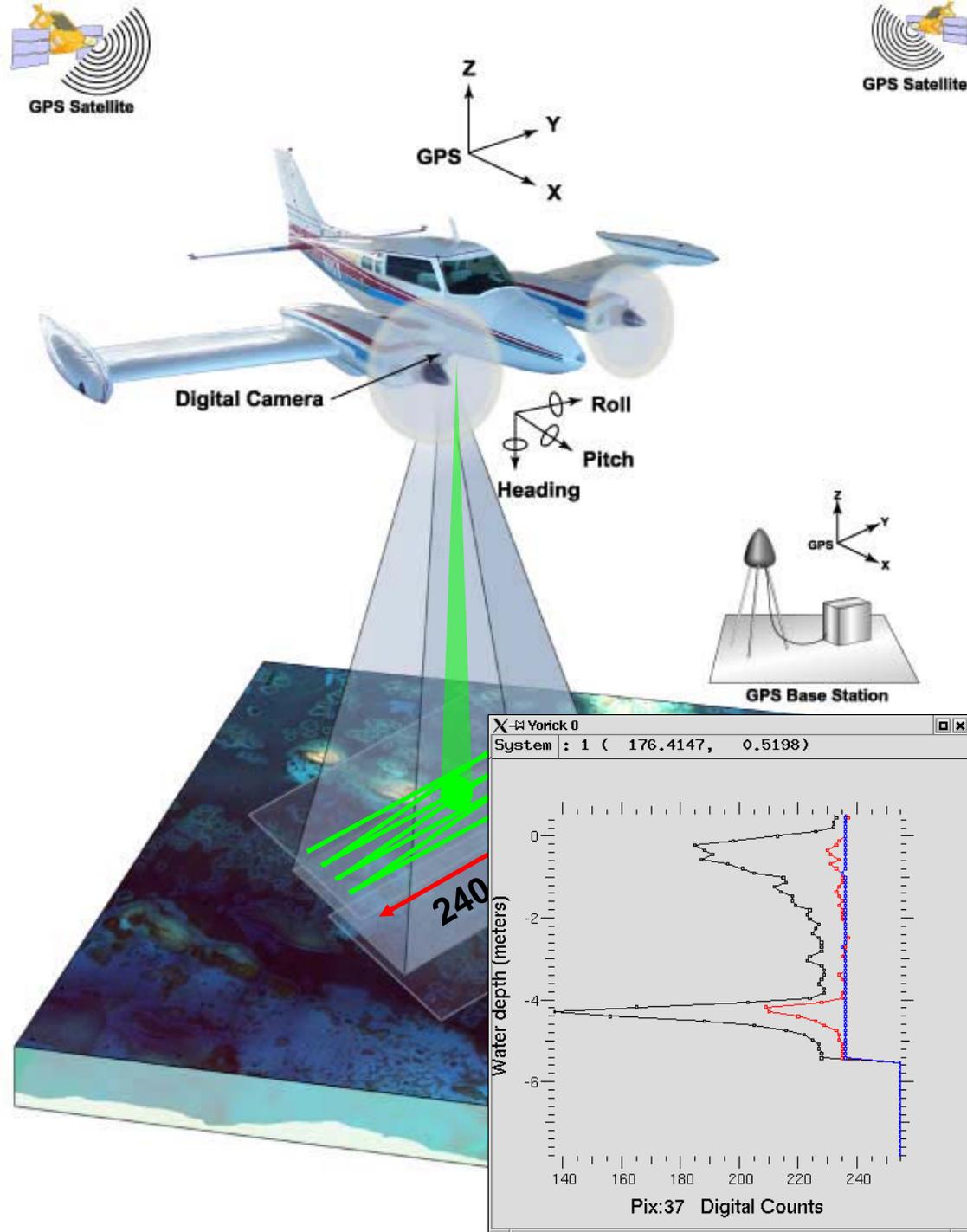
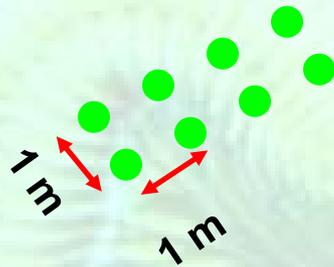
(15 cm)

Raster scanning

(25 rasters/sec)

1 x 1 m sample

Spacing (2 passes)

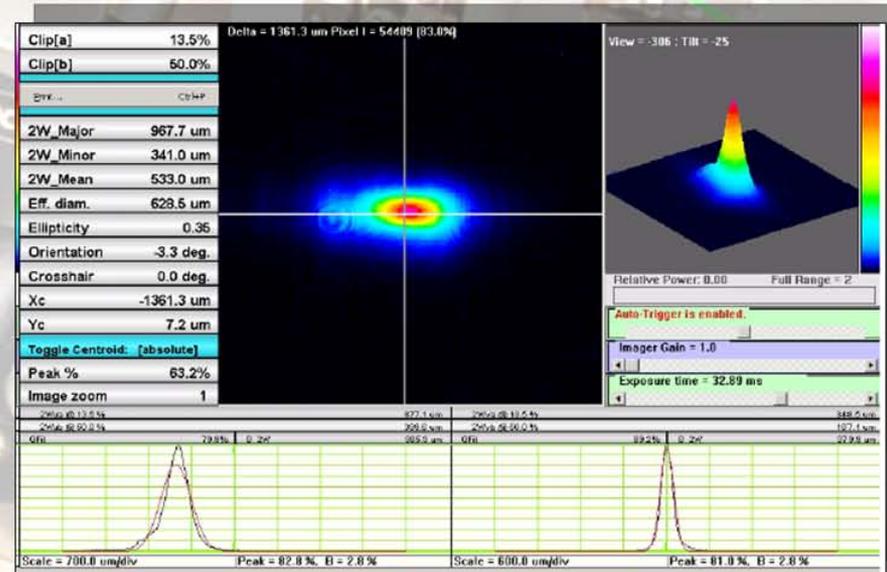


Nd:YAG
gain module

USGS Laser Upgrade

- \$145k awarded to CCWS by CMCg program for new equipment
- 10x increase in laser power output
- From 70 uJ/pulse to 700 uJ/pulse
- 2x increase in sample rate (5k/sec to 10k/sec)

Alignment
tooling

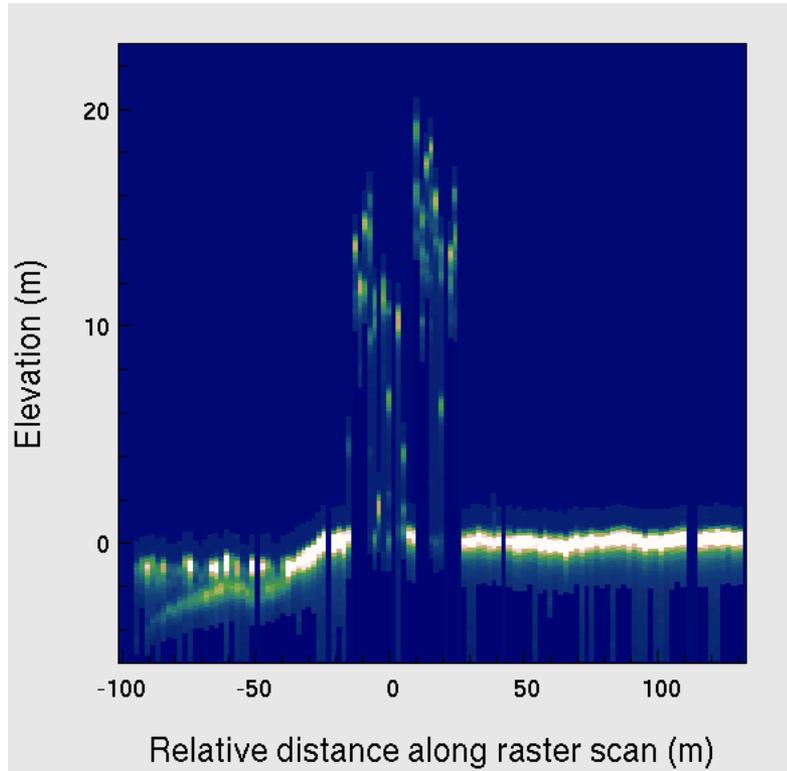


New Capability Enabled by New USGS LASER

- 6x increase in sampling density
- 30,000 Peak samples/second
- Only 2x increase in data volume
- Enhanced shallow bathymetry performance
- Enhanced deep (20-30m) bathymetry performance
- Sample spacing reduced from 2m x 3.0m to 1m x 1.5m



Cross environment surveying using EAARL



Lidar backscatter along scan

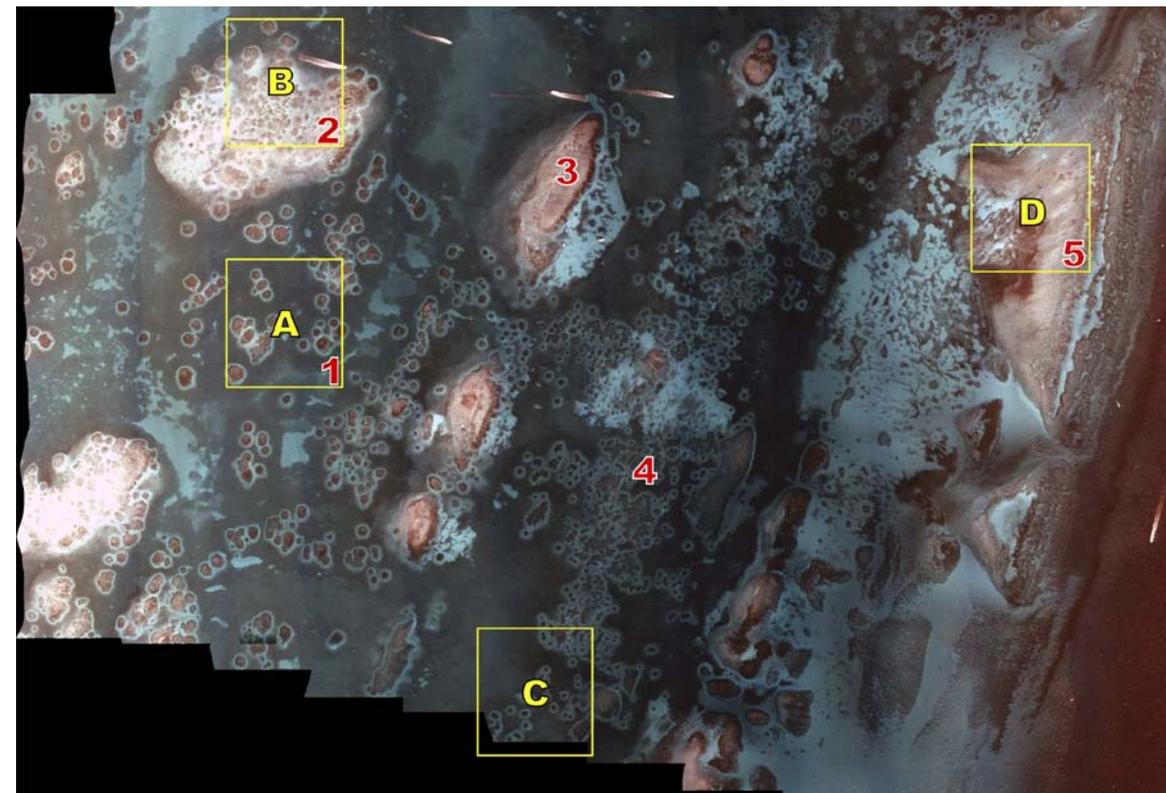
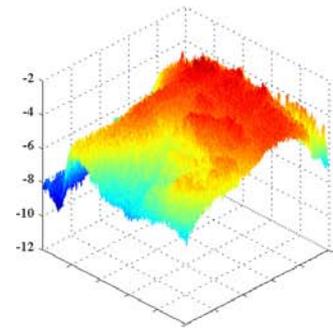
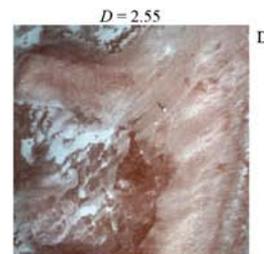
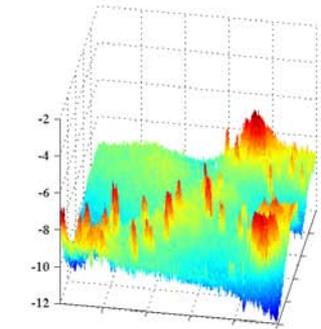
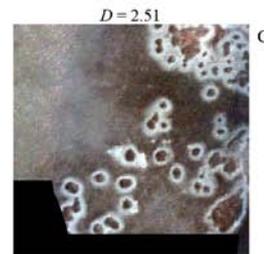
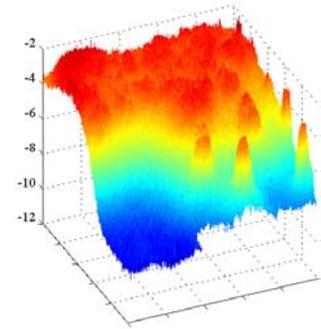
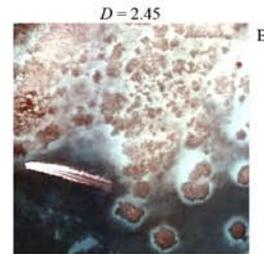
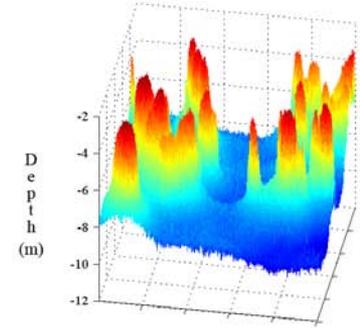
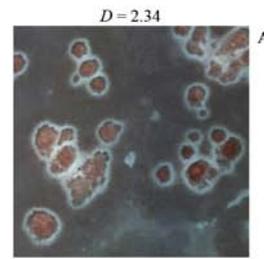


Color Infrared (CIR) Image co-registered with lidar

Tampa Bay, FL

Coral Reef Geomorphology – Fractal Analysis

Dave Zawada



Severe Storm Impacts, Abby Sallenger

Hurricane Isabel

Island breach in Hatteras, NC



September 16, 2003

September 21, 2003

Frisco, NC

Frisco, NC



breach



high dune

low dune

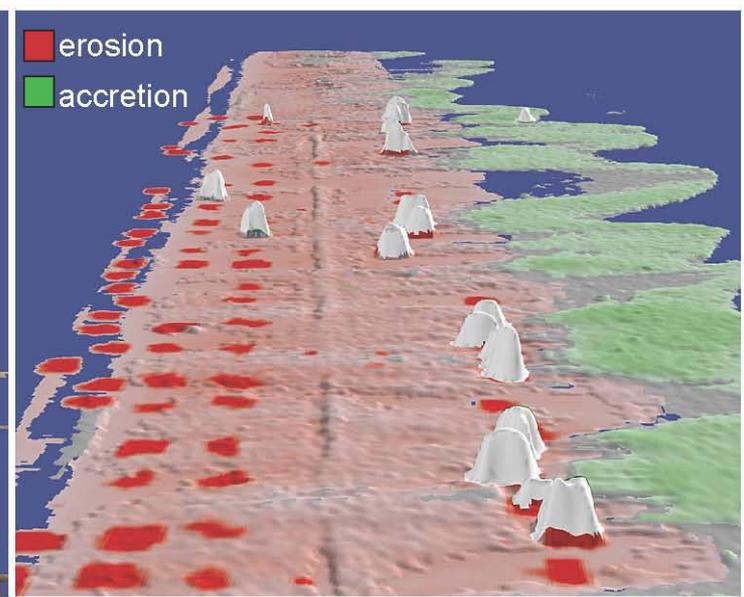
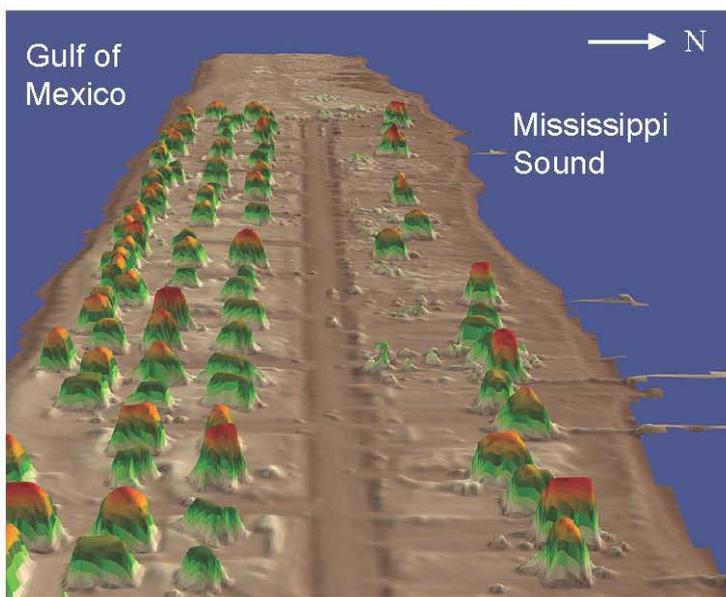
buildings

beach

2 buildings
lost

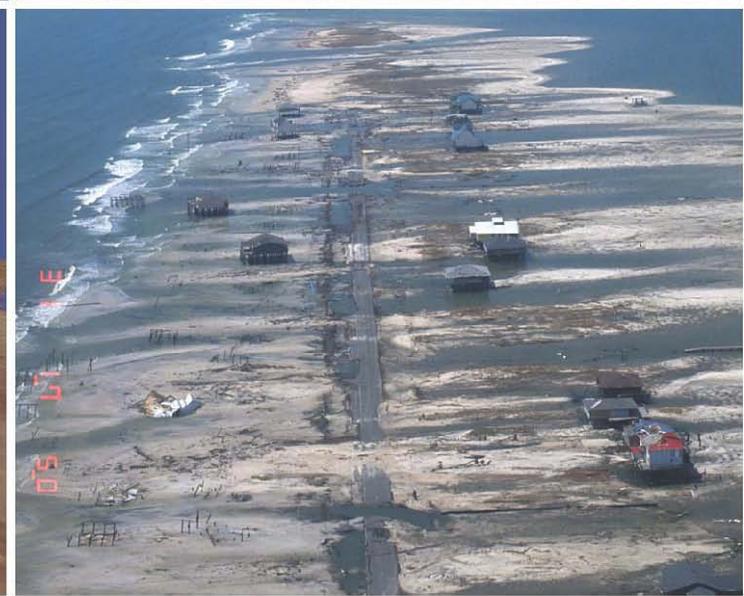
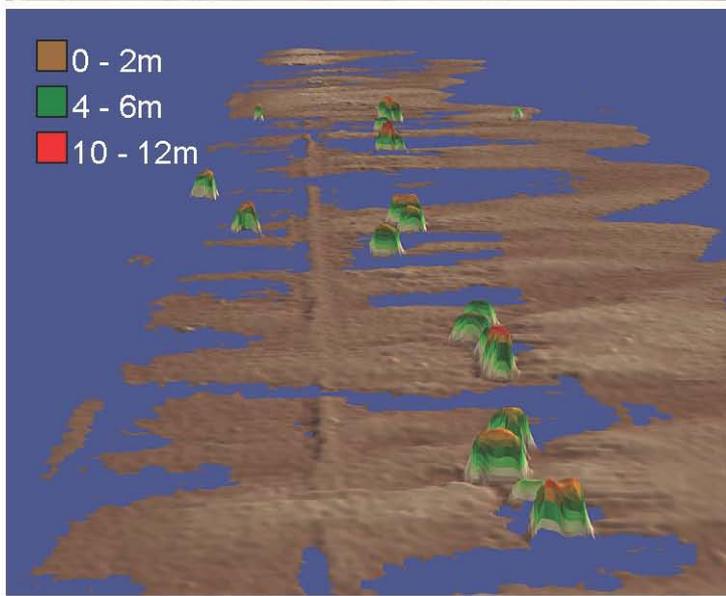
Coastal Response to Hurricane Katrina - Dauphin Island, AL

September 2004



difference (2005-2004)

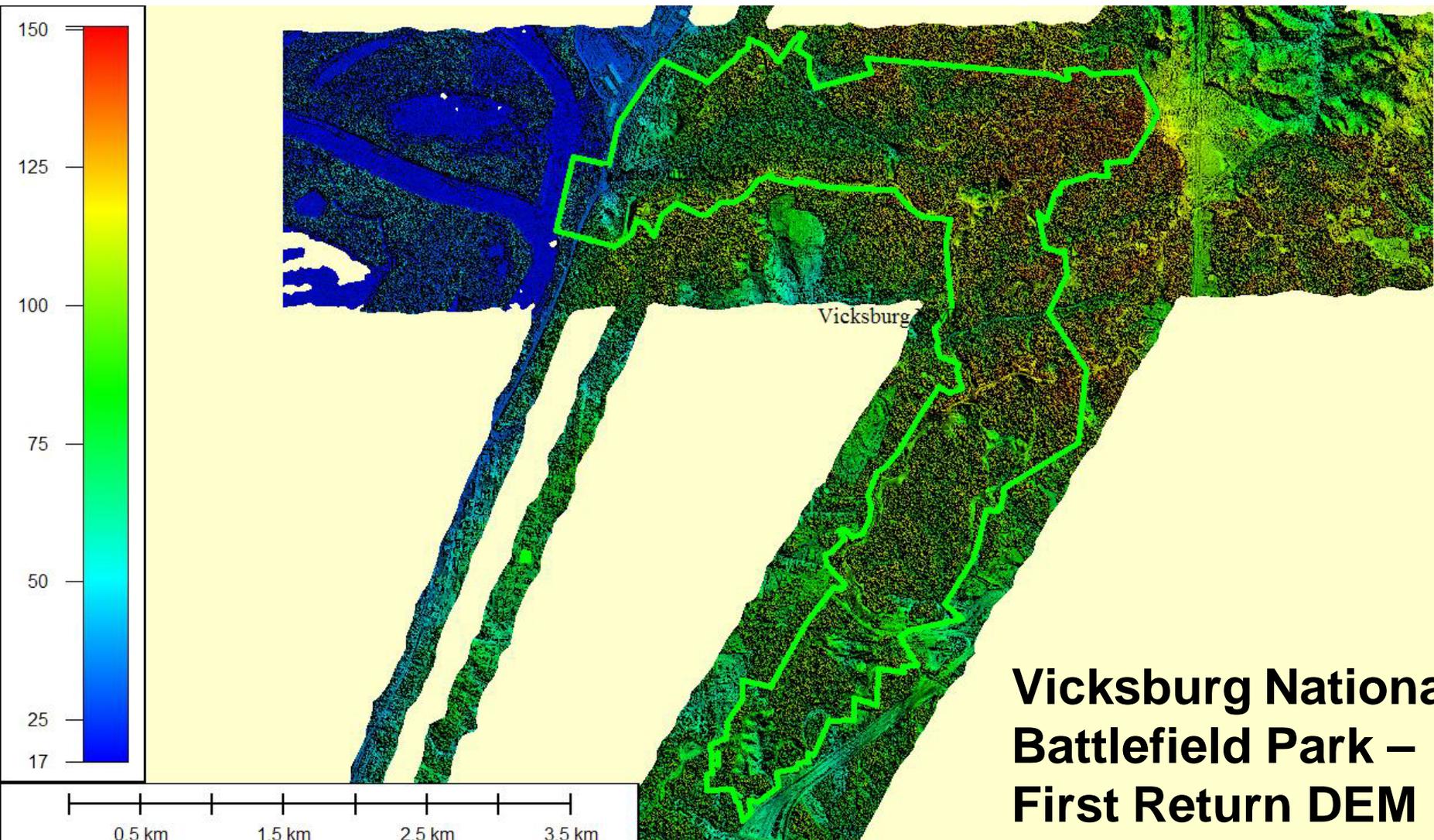
September 2005



September 2005

Cultural Resource Analysis

Amar Nayegandhi



**Vicksburg National
Battlefield Park –
First Return DEM**

Land Remote Sensing Program

Investigation of Technologies for Modeling and Monitoring Landscapes

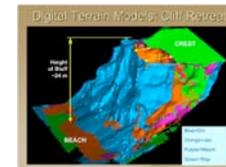
- Airborne Systems

- Portable Digital Multispectral Manual System
 - Aircraft Based
 - 2MP image size – Variable Resolution 5cm to 30cm/pixel or greater
- True Color Digital Automated System
 - Semi-Autonomous Remotely Operated Aircraft
 - 5-10MP image size – Variable Resolution .5cm to 30cm/pixel or greater



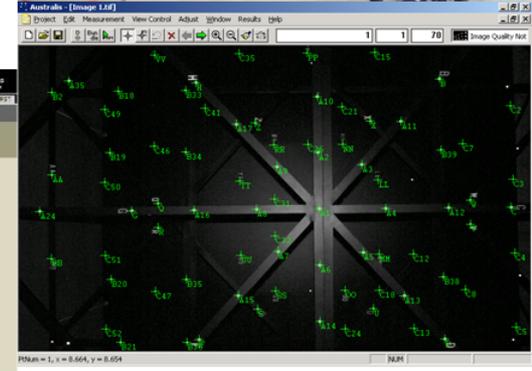
- In-Situ Systems

- Landscape Monitoring Systems / Wireless Sensor Networks
 - Aeolian Transport/Dust Studies
 - Flood / Erosion Studies
 - Phenology / Ecosystem Change Studies
 - Regional Climate Change Monitoring
 - Natural Hazards Monitoring / Early Warning Systems
- Sensor Development / Research
 - Automated Cameras
 - Particulate Sensors
 - Field Deployable Radiometers
 - Ground Based Lidar
 - Close Range Photogrammetry



USGS Calibration, Characterization, and Image Quality Assurance

- USGS has a strong history of sensor calibration (Landsat and Photography)
- USGS Optical Sciences Lab (OSL)
 - ◆ Responsible for calibration services for film camera in U.S. since '73
- ASPRS panel of experts >> USGS should address digital aerial sensor and satellite calibration processes (2000)
- U.S. Digital Camera Calibration responsibilities centered at USGS (2002) <http://calval.cr.usgs.gov/>
 - ◆ Validating Laboratory and *In-Situ* calibration methods
 - ◆ Establishing Calibration Processes and Guidelines
 - ◆ USGS Plan for Quality Assurance of Digital Aerial Imagery
- Successful Joint Agency Commercial Imagery Evaluation (JACIE) 8th Annual Workshop
 - ◆ Workshop information @ <http://calval.cr.usgs.gov/jacie.php>
 - ◆ Aerial and Satellite
 - ◆ Characterization & Application
 - ◆ International Scope
 - ◆ Catalog of Worldwide test sites
 - ◆ http://calval.cr.usgs.gov/sites_catalog_map.php



Civil Commercial Imagery Evaluation Workshop

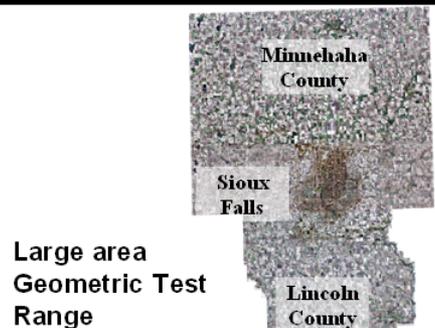
The block contains the title of the workshop and the logos of the participating agencies: NASA, USDA, and USGS.

The screenshot shows the USGS Test Site Catalog website. It features a header with the USGS logo and the title 'The USGS Remote Sensing Technologies Project'. Below the header is a search bar and a list of test sites. A world map is visible, showing the locations of the test sites. The website is designed with a clean, professional layout.



USGS Calibration, Characterization, and Image Quality Assurance

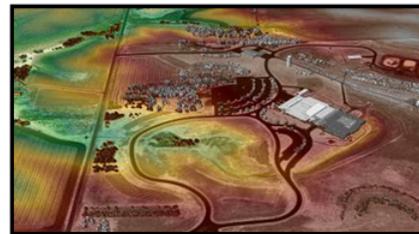
- **USGS Plan for Quality Assurance of Digital Aerial Imagery**
 - ◆ **Sensor Type Certification (Manufacturer type certification)**
 - Working with International Partners to establish a common practice
 - Canada, Asia, Europe (EuroSDR), Australia, ...
 - ◆ **Data Provider Product Certification**
 - Developing Cal/Val Range Standards & 6 National
 - Dual use for hi-res ortho & satellite, & LiDAR cal/val
 - ◆ **Image Quality Guidelines and Processes**
 - Spec and Check Tool development
 - Contracting and QA guidelines



Large area Geometric Test Range



Spec development and QA check tool



USGS EROS Lidar derived 3D image map



USGS Cal/Val Basemap range: hi res image and LiDAR data



Geometric Targets and Control