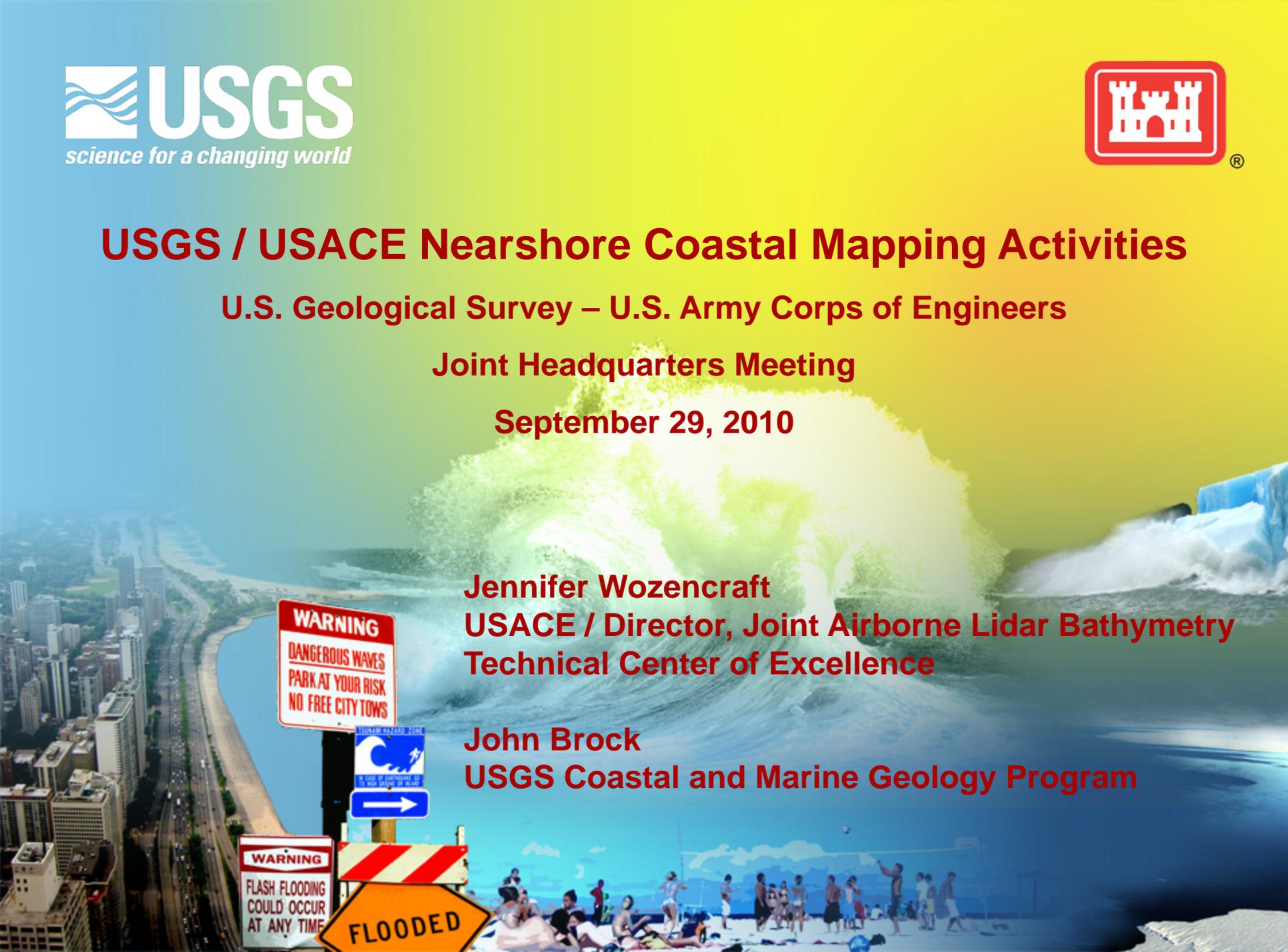


# USGS / USACE Nearshore Coastal Mapping Activities

U.S. Geological Survey – U.S. Army Corps of Engineers

Joint Headquarters Meeting

September 29, 2010



**Jennifer Wozencraft**  
USACE / Director, Joint Airborne Lidar Bathymetry  
Technical Center of Excellence

**John Brock**  
USGS Coastal and Marine Geology Program

**WARNING**  
DANGEROUS WAVES  
PARK AT YOUR RISK  
NO FREE CITY TOWS



**WARNING**  
FLASH FLOODING  
COULD OCCUR  
AT ANY TIME

**FLOODED**

# Joint Airborne Lidar Bathymetry Technical Center of Expertise

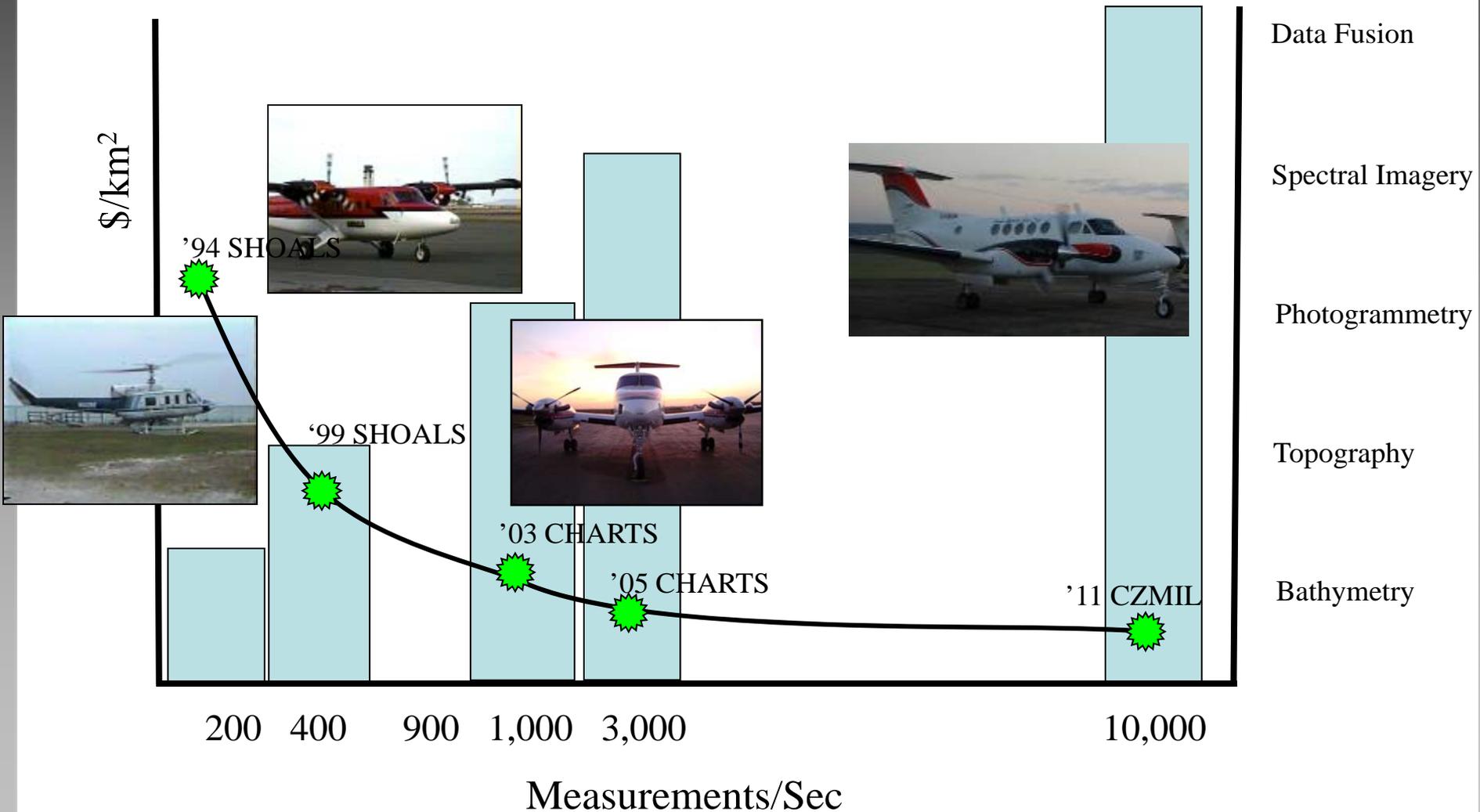


Annual Planning Meeting & Annual Technical Workshop

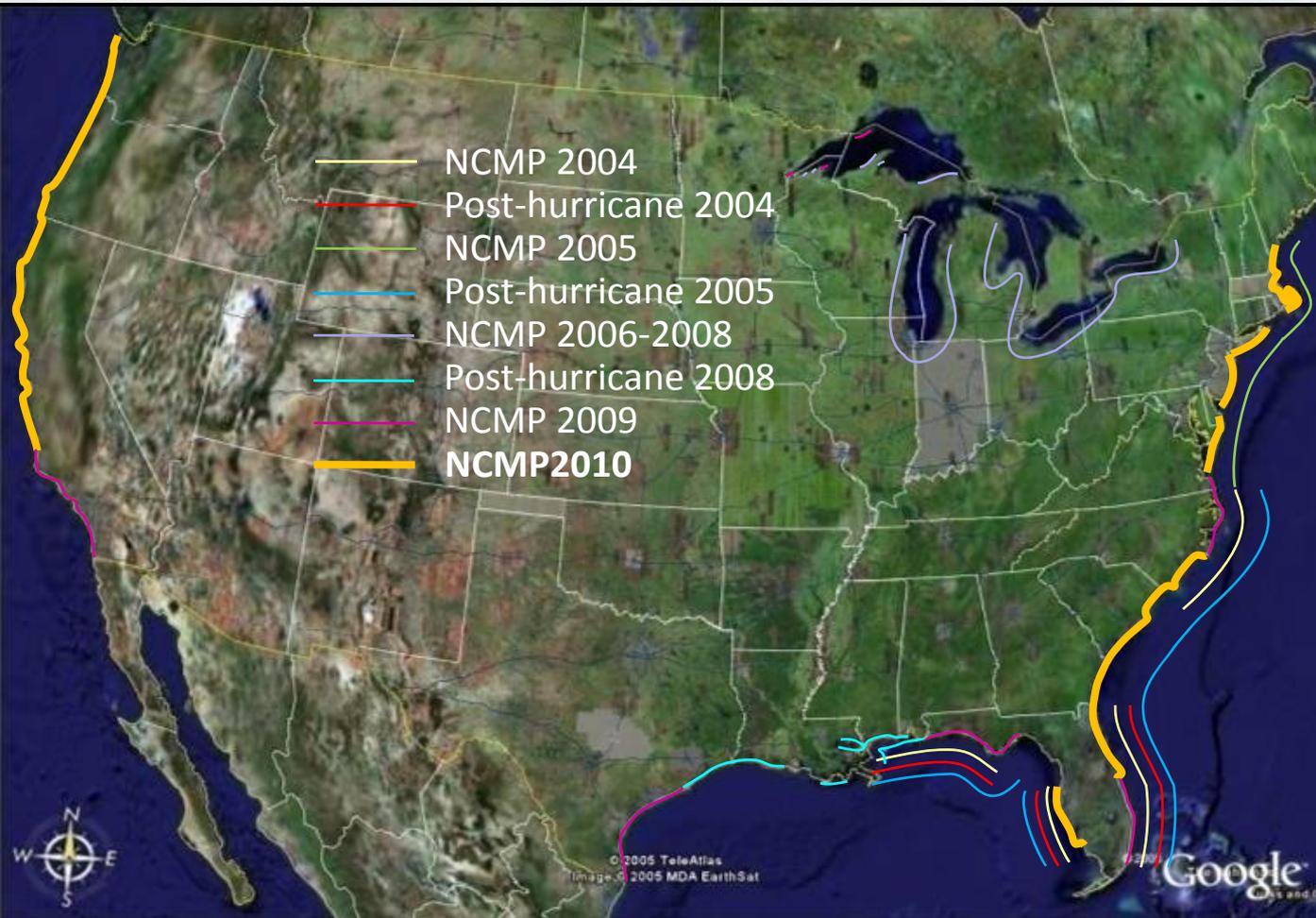




## USACE nearshore coastal mapping program history



# National Coastal Mapping Program



## Program summary

- Funded by HQ
- Initiated in FY2004
- Collect lidar elevation and imagery data
- Data to support regional sediment management
- Focus on sandy shorelines
- Annual planning meetings
  - Districts
  - PDT
  - Other agencies
- In-house and contract capability
- 5-year national cycle



**BUILDING STRONG®**

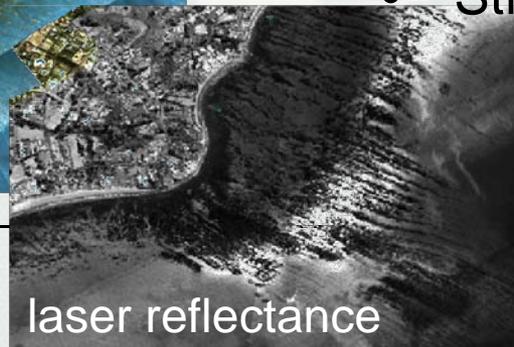
# Applications and products

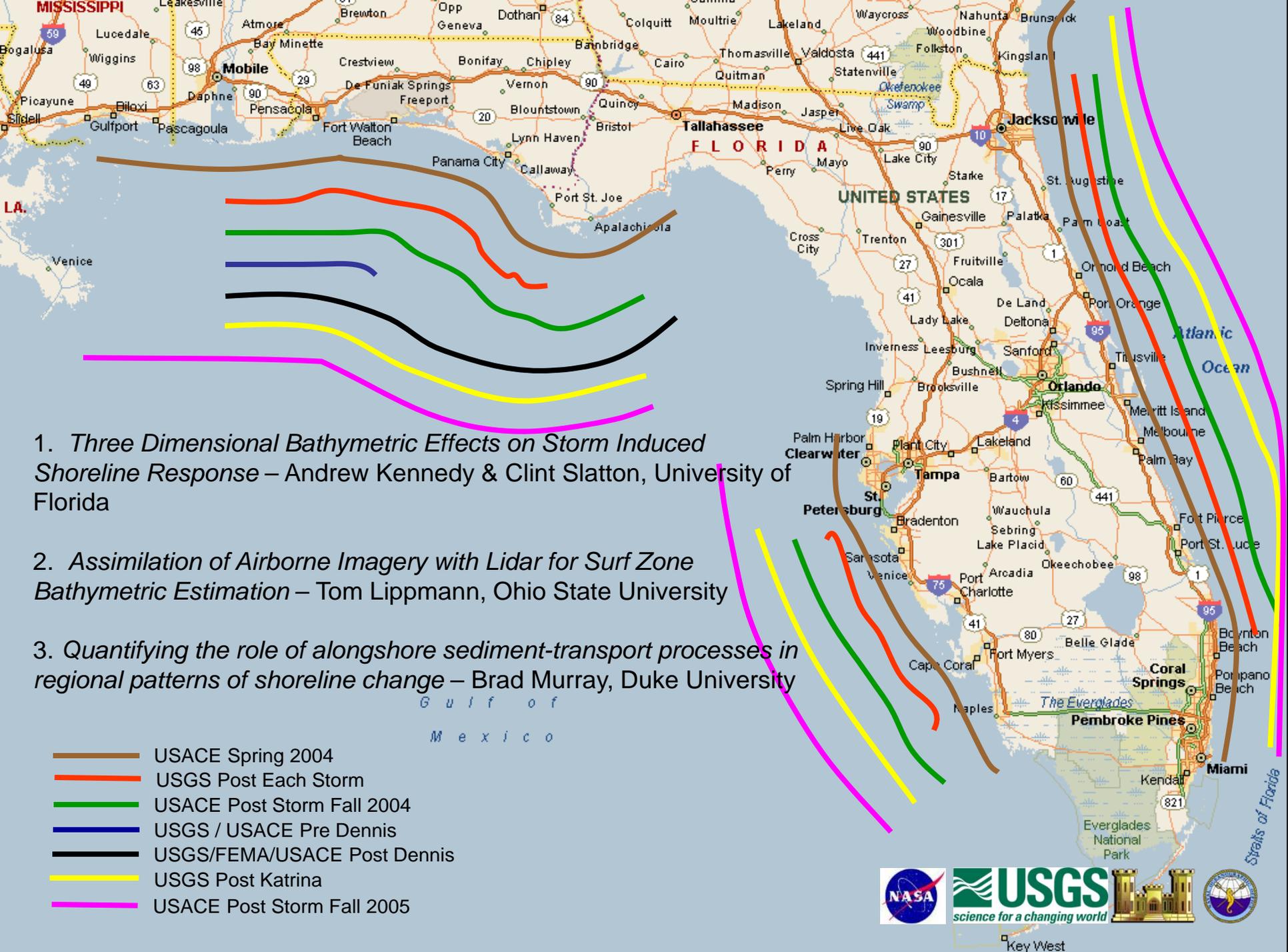
## Mapping priorities

- Watersheds and systems
- Flood risk management
- Disaster response
- Knowledge management
- Asset management

## Supporting data products

- Shoreline vector
- RGB mosaics
- 1-m bathy/topo DEMs
- 1-m bathy/topo bare earth DEMs
- Laser reflectance images
- 1-m landcover classification
- Volume computations
- Shoreline change
- Geomorphologic inventory
- Structure condition





1. *Three Dimensional Bathymetric Effects on Storm Induced Shoreline Response* – Andrew Kennedy & Clint Slatton, University of Florida

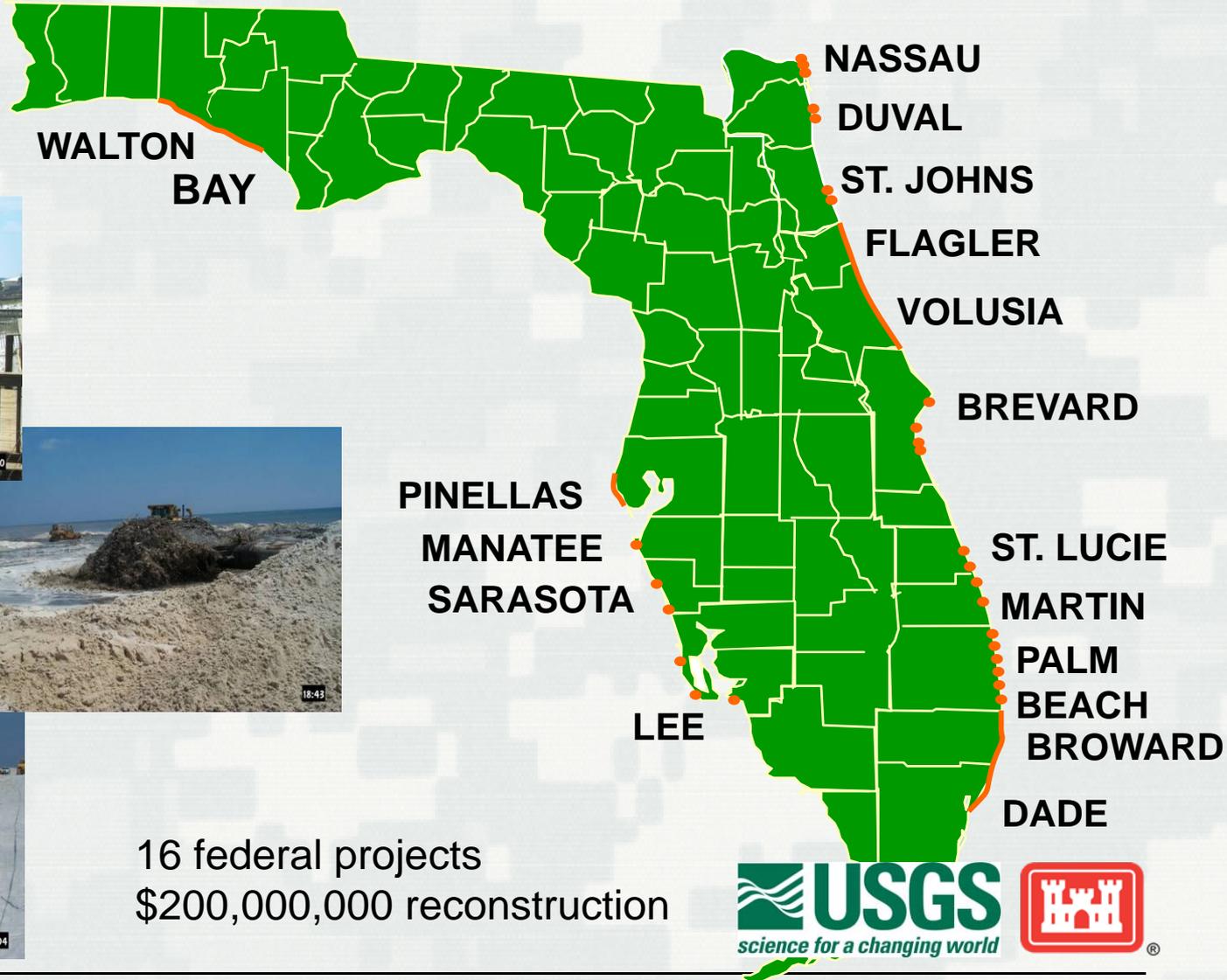
2. *Assimilation of Airborne Imagery with Lidar for Surf Zone Bathymetric Estimation* – Tom Lippmann, Ohio State University

3. *Quantifying the role of alongshore sediment-transport processes in regional patterns of shoreline change* – Brad Murray, Duke University

- USACE Spring 2004
- USGS Post Each Storm
- USACE Post Storm Fall 2004
- USGS / USACE Pre Dennis
- USGS/FEMA/USACE Post Dennis
- USGS Post Katrina
- USACE Post Storm Fall 2005



# Post-hurricane reconstruction



16 federal projects  
\$200,000,000 reconstruction



**BUILDING STRONG®**

# Data Access

- USACE District
- USGS St. Petersburg
- USGS EROS Data Center
- NOAA NGDC
- By Request

To date, 6477 data consumers have accessed 259 billion data points in 719 GB using this automated download tool



NOAA Coastal Services Center

## DIGITAL COAST

Home Data Tools Training In Action



### About the Digital Coast

"More than just data," the Digital Coast is a network of diverse partners working together to address coastal issues. Website content is growing with contributions and guidance from the partner network and the user community.

- [Digital Coast Details](#)
- [About the Partners](#)
- [How to Use this Site](#)
- [Submitting Content](#)

### Data

Learn more about the kinds of data available and download data.

### Tools

Use these tools to turn data into useful information your organization needs.

### Training

Update your skills by participating in one of these training programs.

### Digital Coast In Action

See how data and tools are used to address coastal management issues.

### Digital Coast Website

This website provides data required by coastal resource management professionals, as well as the tools, training, and information needed to turn these data into useful information.

to perform operations, research, at the coastal mapping and charting Oceanography Command, and the ers, scientists, hydrographers, and ), the USACE Engineer Research

al Survey (CHARTS) system and ability that includes an Optech, ger. CHARTS collects either 20 kHz and hyperspectral imagery. Survey al charting missions. Survey

y, and academics to advance ns currently include the US earch Program, NOAA NGS, e University of Southern and Duke University.

Data Website  
J.S. Army Corps of Engineers

### GIS KML Overlays

To view CHARTS bathymetry/topographic data, select a state, then choose a link to open in Google Maps or the icon for downloading the file for opening in Google Earth.

Select a State

Please select a state.





## 5th Annual Coastal Mapping & Charting Workshop

sponsored by the  
Joint Airborne Lidar Bathymetry Technical Center of Expertise  
and the  
USGS Center for Coastal & Watershed Studies  
9 – 10 June 2004

### Wednesday

0800 – 0830 Welcome / Agenda  
0830 – 0900 PHILLS  
0900 – 0930 Topography and digital camera imagery in the Florida panhandle  
0930 – 1000 Bottom Classification from Clustering & Segmentation of SHOALS Data  
1000 – 1030 Break  
1030 – 1100 Pseudoreflectance  
1100 – 1130 Data Fusion – Hyper spectral, topo lidar, and high resolution imagery  
1130 – 1200 CASI 1500 Development

1200 – 1330 Lunch & Networking

1330 – 1400 US Army Corps of Engineers  
1400 – 1430 US Naval Oceanographic Office  
1430 – 1500 OCS' Hydrographic Requirements  
1500 – 1530 Break  
1530 – 1600 Japanese Coast Guard Field Tests  
1600 – 1630 Office of Naval Research

### Thursday

0800 – 0830 USGS Center for Coastal & Watershed Studies  
0830 – 0900 Coastal Vulnerability During Hurricanes  
0900 – 0930 Processing & filtering “Bare Earth” Topographic Data Acquired by NASA EAARL  
0930 – 1000 EAARL  
1000 – 1030 Break  
1030 – 1100 Raman signals in shallow water  
1100 – 1130 Lidar Product Format Challenges  
1130 – 1200 Coastal Area Tactical – mapping System

1200 – 1330 Lunch & Networking

1330 – 1400 SHOALS 1000 Acceptance Test Results  
1400 – 1430 JALBTCX Coastal Mapping Spec's  
1430 – 1500 Closing & JALBTCX List of Challenges

Lillycrop & Sallenger  
Dr. Paul Bissett / FERI  
Dr. Steve Raber / NOAA CSC  
Dr. Gareth Elston / UNH

Dr. Grady Tuell / Optech Int  
Chris Parrish / NOAA/NGS  
Dr. Tyler Ivanco / Itres

Jeff Lillycrop / USACE  
Bob Pope / NAVO  
Jeff Ferguson / NOAA/OCS

Dr. Grant Cunningham / Optech  
Dr. Joan Cleveland / ONR

Dr. Abby Sallenger / USGS  
Hilary Stockdon / USGS  
Dr. Nayegandhi / USGS  
Drs. Brock & Wright

Dr. Chi-Kuei Wang / Cornell  
Darren Stephenson / LADS  
Dr. Clint Slatton / Univ of FL

David Millar / Fugro  
Eddie Culpepper / JALBTCX  
Lillycrop & Pope / JALBTCX

## JALBTCX initiatives supporting

### IWG-OCM:

- Common specifications for airborne coastal mapping and charting data
- Metadata template
- QA/QC recommendations
- Waveform lidar exchange format

## National Ocean and Coastal Mapping Strategic Action Plan

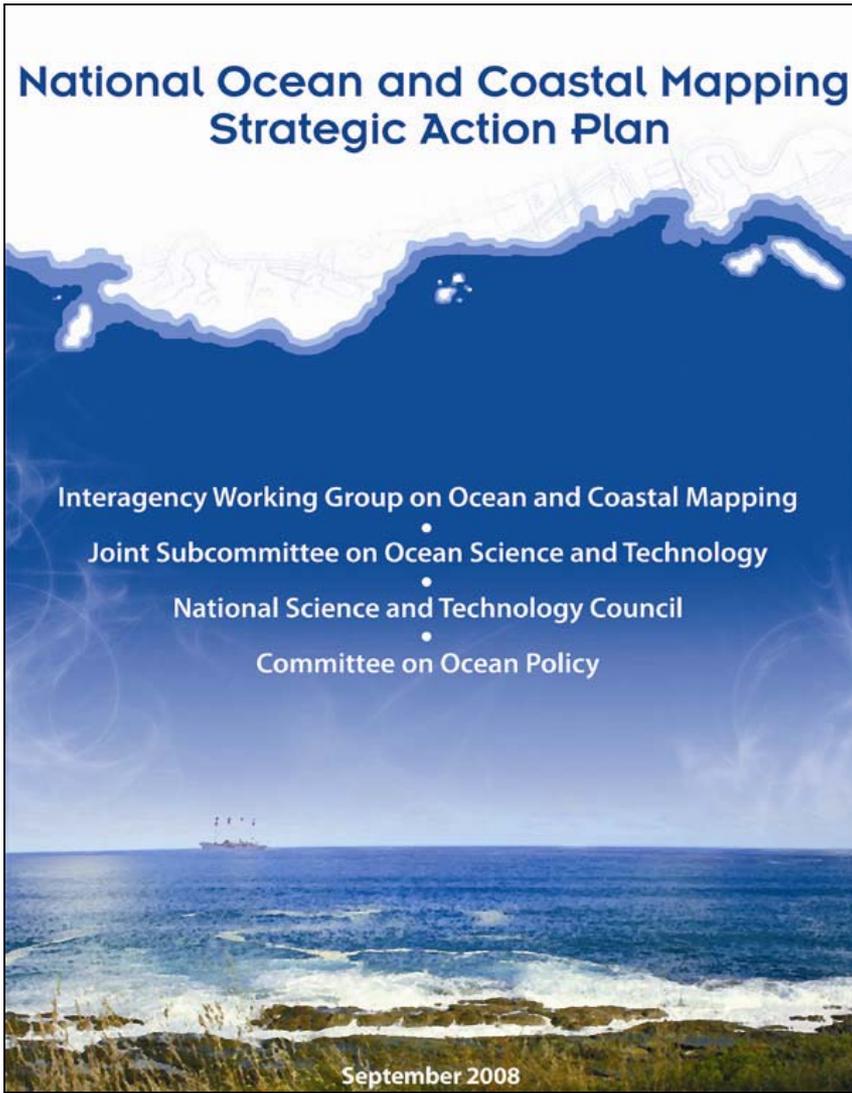
Interagency Working Group on Ocean and Coastal Mapping

•  
Joint Subcommittee on Ocean Science and Technology

•  
National Science and Technology Council

•  
Committee on Ocean Policy

September 2008

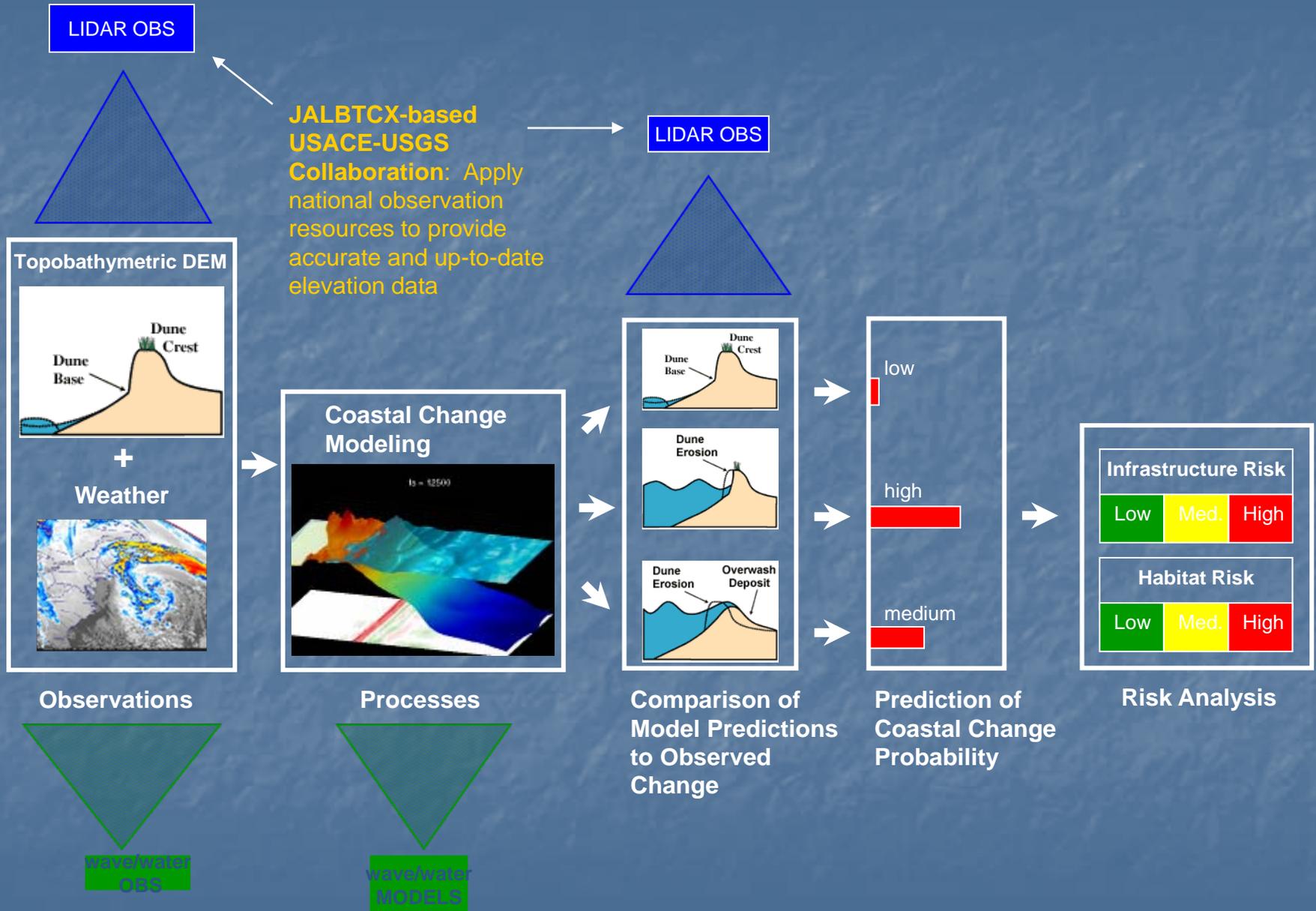


# USGS Studies of Complex Coastal Systems + Complex Responses: Comprehensive, Integrated Research:

- Multiple human and natural drivers spanning multiple time scales
- Diversity of systems – glaciated coasts to tropical atolls, wetlands, and barriers responding dynamically
- Approach typically involves observations, process research, and modeling
- Serves needs of policy-makers and resource managers that span from national and regional scales
- Predictive modeling and assessment needs range from simple to complex



# Role of Elevation Mapping in USGS Coastal Change Research

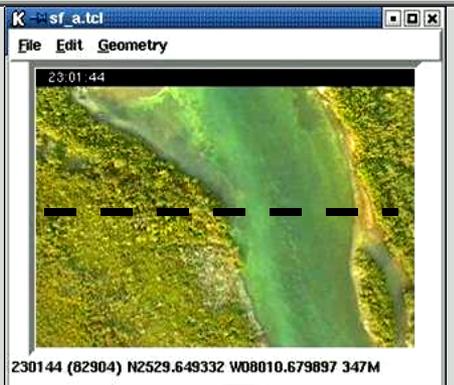


# Lidar Fosters Interdisciplinary Collaborative Coastal Science (especially "green waveform lidar")

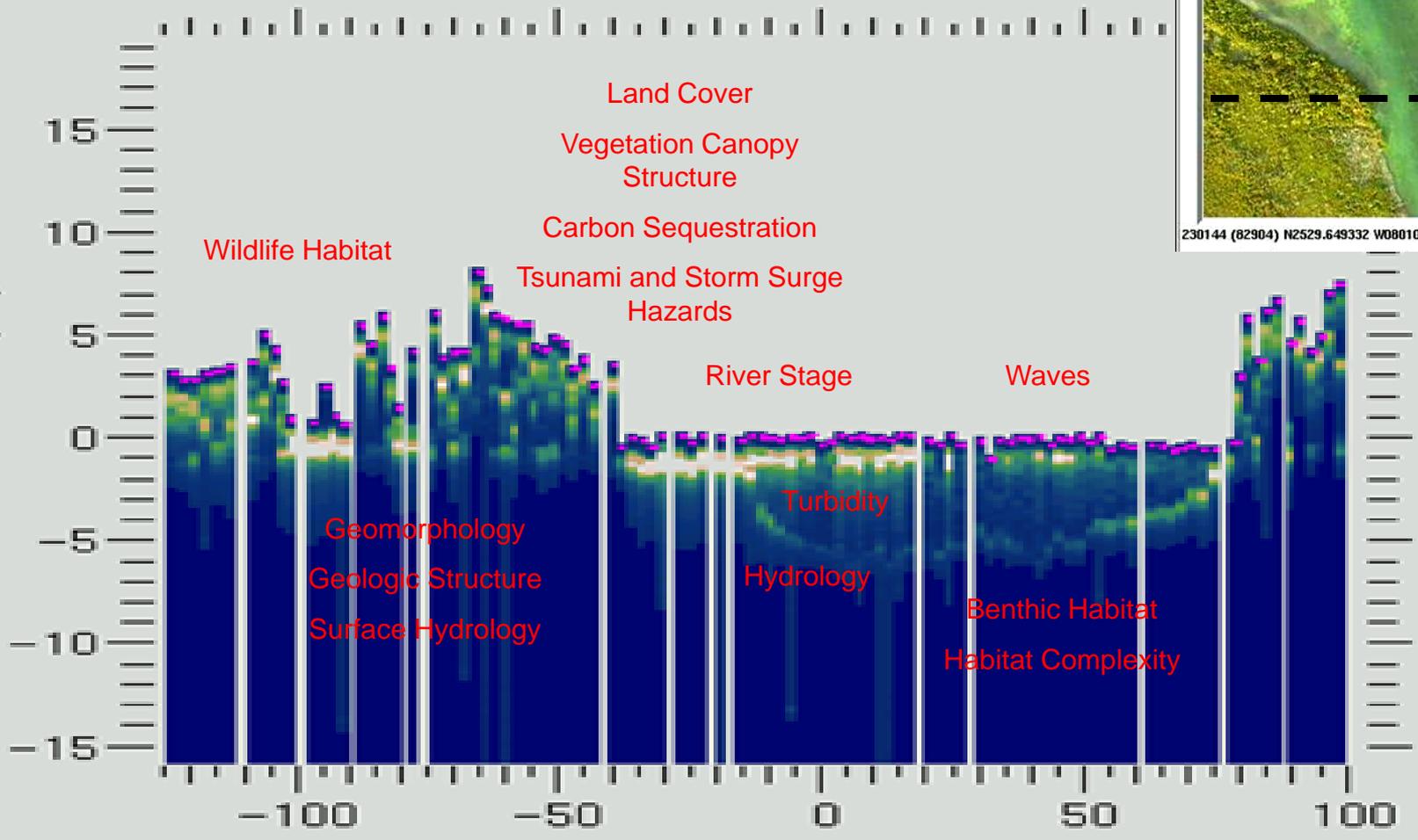
Yorick 2

System : 1 ( 53.9828, 19.5189)

7/12/01 Raster 125205



Elevation (M)



Cross Track (M)



# **USGS Accepted an Invitation to Join JALBTCX at the Annual Meeting, in Mobile, AL, on May 28, 2010:**

## **Resulting USGS Action Items:**

- Addition of the USGS as a signing partner to the JALBTCX General Collaborative Agreement.**
- Creation of a webtool to enable survey collaboration and coordination among partnering agencies.**
- Devise a strategy of multi-agency coastal elevation data integration, archiving, and distribution.**



A GENERAL COLLABORATIVE AGREEMENT

AMONG THE

U.S. ARMY ENGINEER CORPS ENGINEERS

AND THE

NAVAL METEOROLOGY AND OCEANOGRAPHY COMMAND

AND THE

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION  
NATIONAL OCEAN SERVICE

AND THE

U.S. GEOLOGICAL SURVEY

Formatted: Highlight

TO CONTINUE THE  
JOINT AIRBORNE LIDAR BATHYMETRY TECHNICAL CENTER OF  
EXPERTISE

The JALBTCX General Collaborative Agreement has been amended to include the USGS and is ready for submission for legal review and approving signatures.

# Webtool for the Identification and Coordination of Recent and Pending Multi-Agency Lidar Coverage:



[USGS Home](#)  
[Contact USGS](#)  
[Search USGS](#)

## Northern Gulf of Mexico (NGOM) Ecosystem Change and Hazard Susceptibility

[Home](#) | [Task 4](#) | [TopoBathy Coordination](#)

Subtask 4.2 **TopoBathy Coordination**

NGOM TopoBathy Coordination Tool



**NGOM**

- Planned**
  - [USGS Atchafalaya](#)
  - [NOAA Mobile Bay](#)
    - Overlay
  - [USACE Mobile Coast](#)
    - Overlay
  - [USGS/USACE Acoustic](#)
  - [USGS Mobile Bay](#)
    - Overlay
  - [Tuck Mapping Mobile](#)
  - [NGOM Survey 2010](#)
- Requested ARRA**
- Requested EAARL**

[Accessibility](#) [FOIA](#) [Privacy](#) [Policies and Notices](#)

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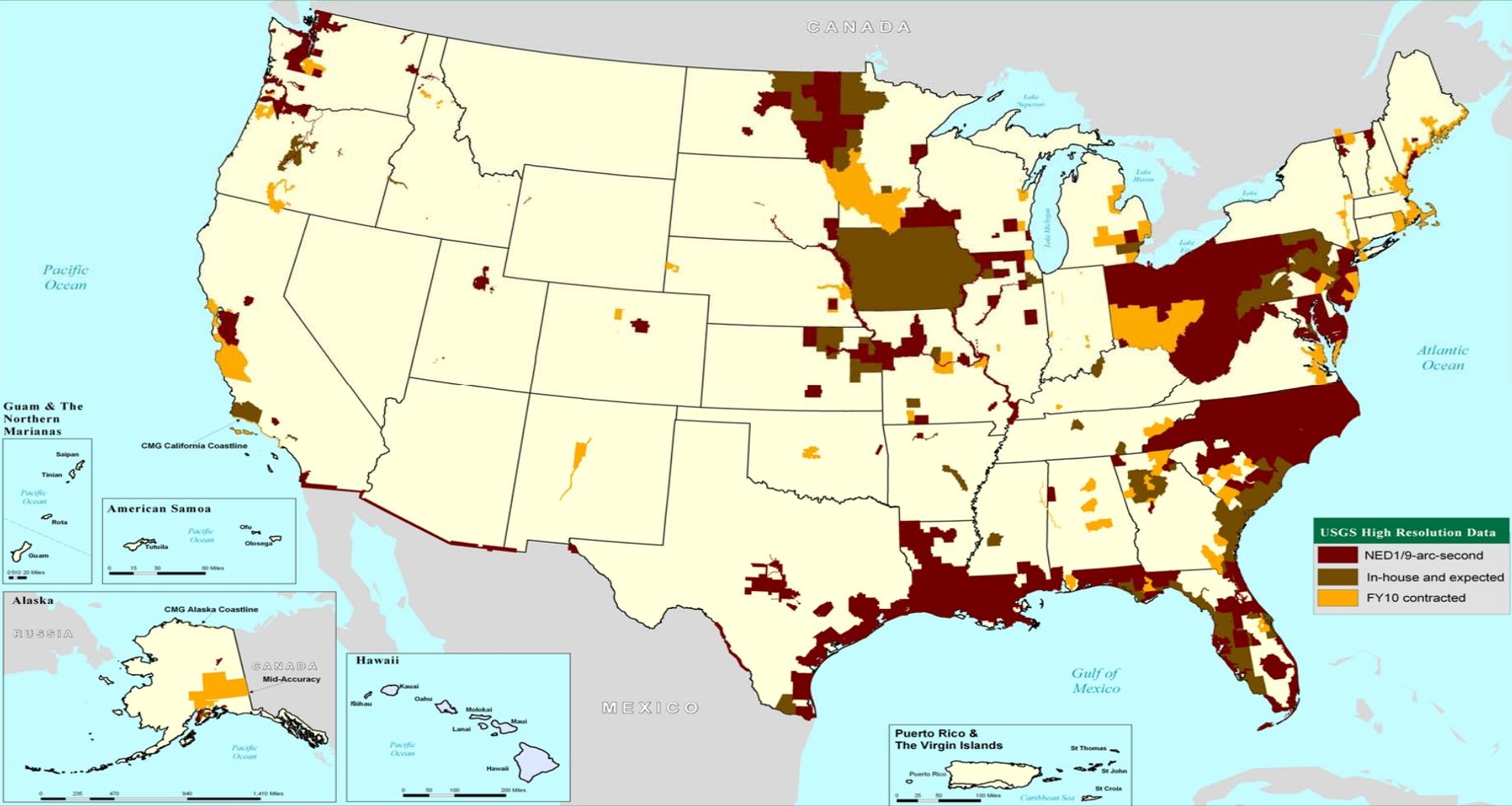


Devise a strategy of multi-agency coastal elevation data integration, archiving, and distribution: Extension of the USGS National Elevation Dataset (The National Map's Topography Layer) to include USACE - USGS coastal topobathymetric mapping.



# NED High Resolution Elevation Data

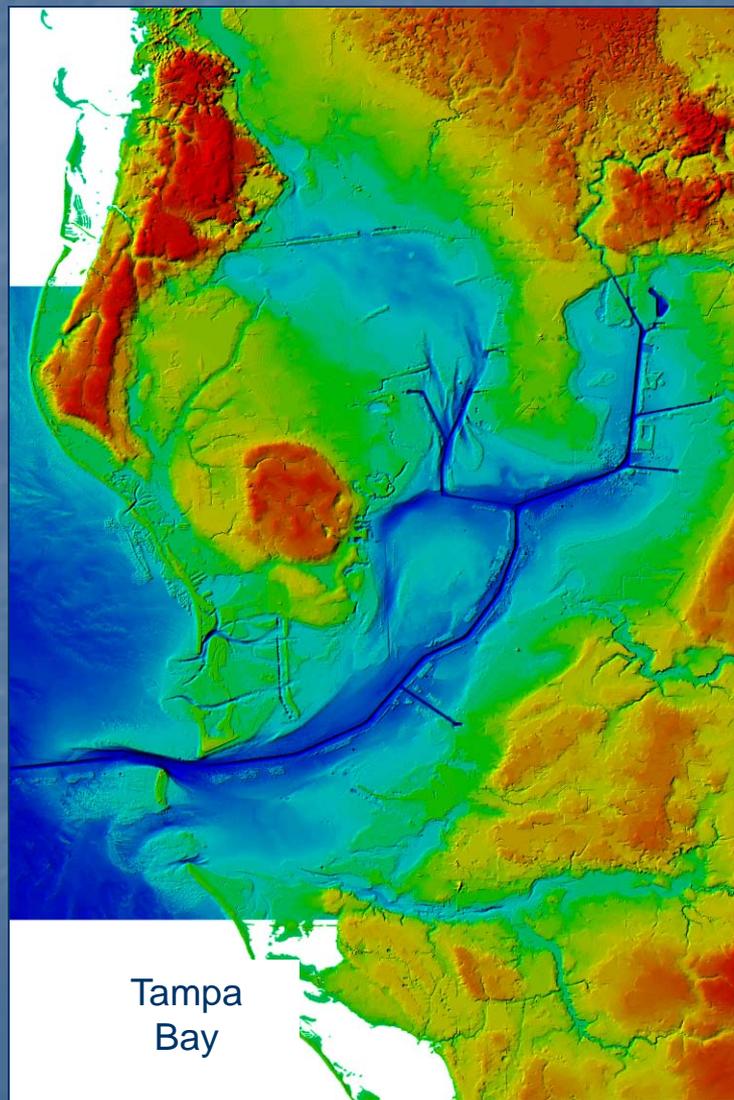
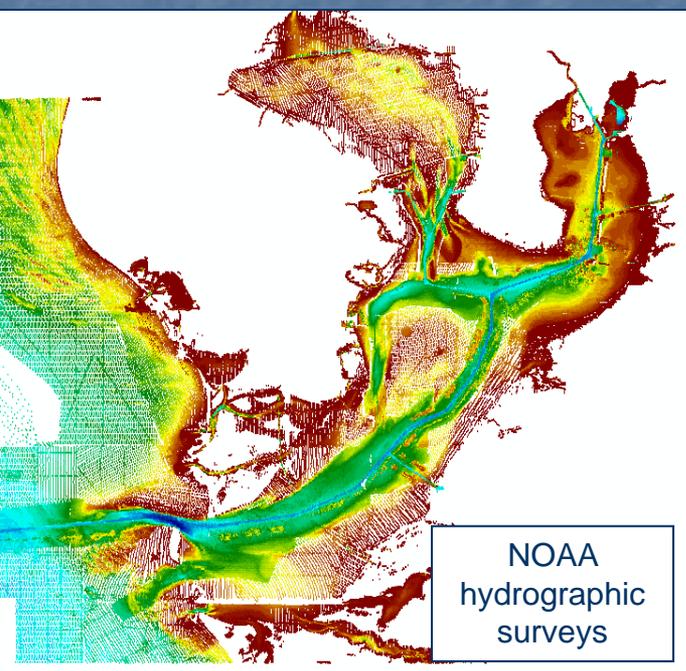
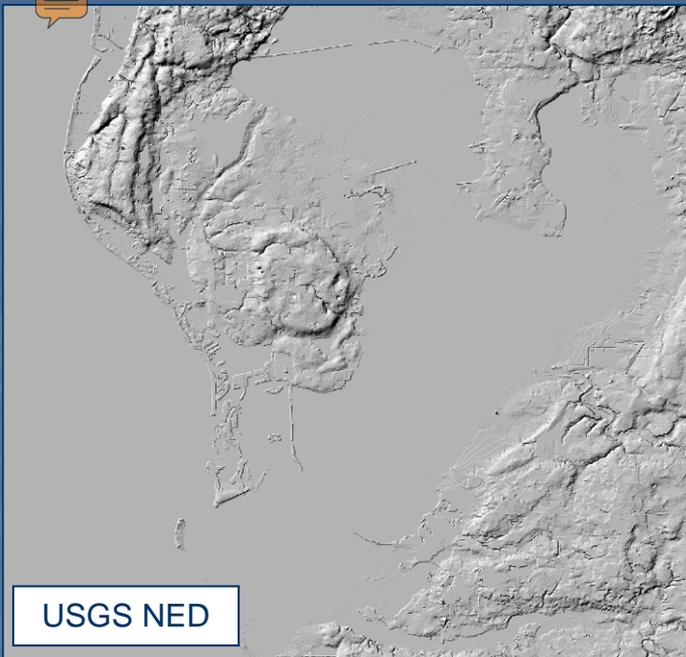
Projected as of August 2010



**USGS High Resolution Data**

- NED1/9-arc-second
- In-house and expected
- FY10 contracted

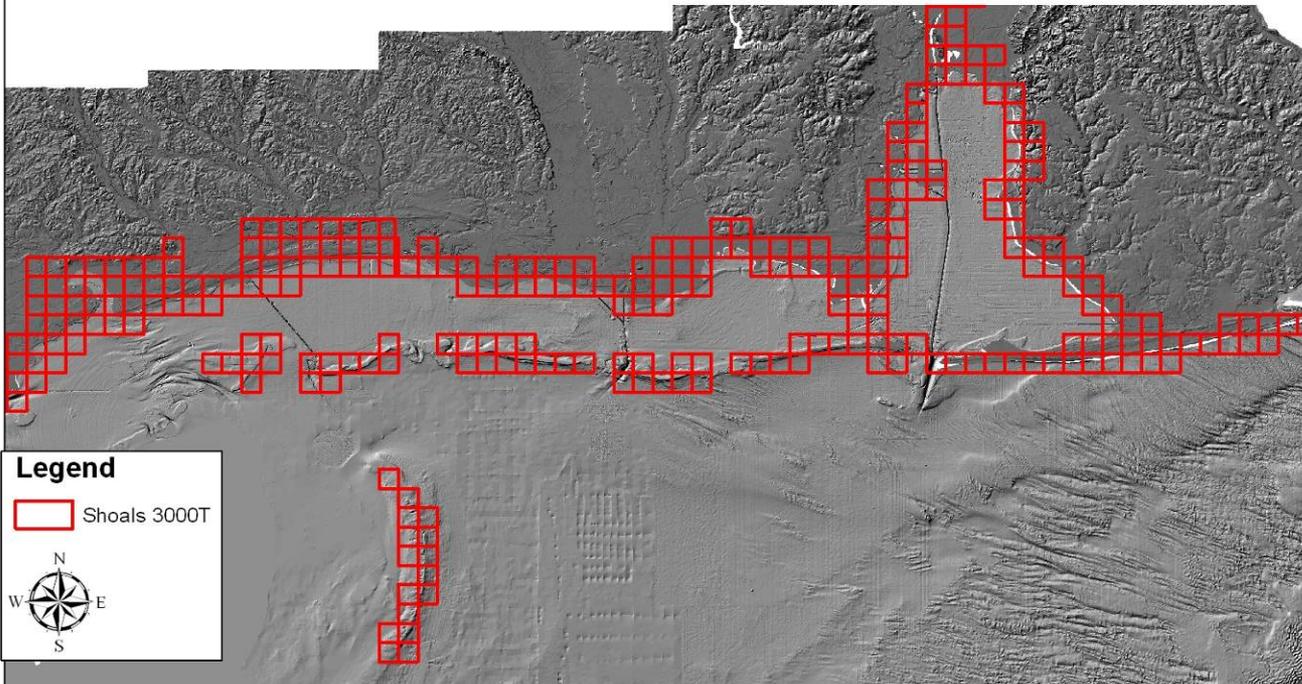
# USGS Topobathymetric DEM Creation for Coastal Change and Hazards Research:



# USGS Topobathymetric DEM Creation for Coastal Change and Hazards Research:

USACE SHOALS/CHARTS mapping along the land / water interface is a major enabling contribution.

**Northern Gulf of Mexico (NGOM)**  
**USACE: Topo/Bathy Coverage - Land/Water Interface**  
**Sensor: Shoals 3000T**  
**Vertical Datum: NAVD88**  
**Resolution: 1 Meter**  
**Acquired: NOAA, Digital Coast**

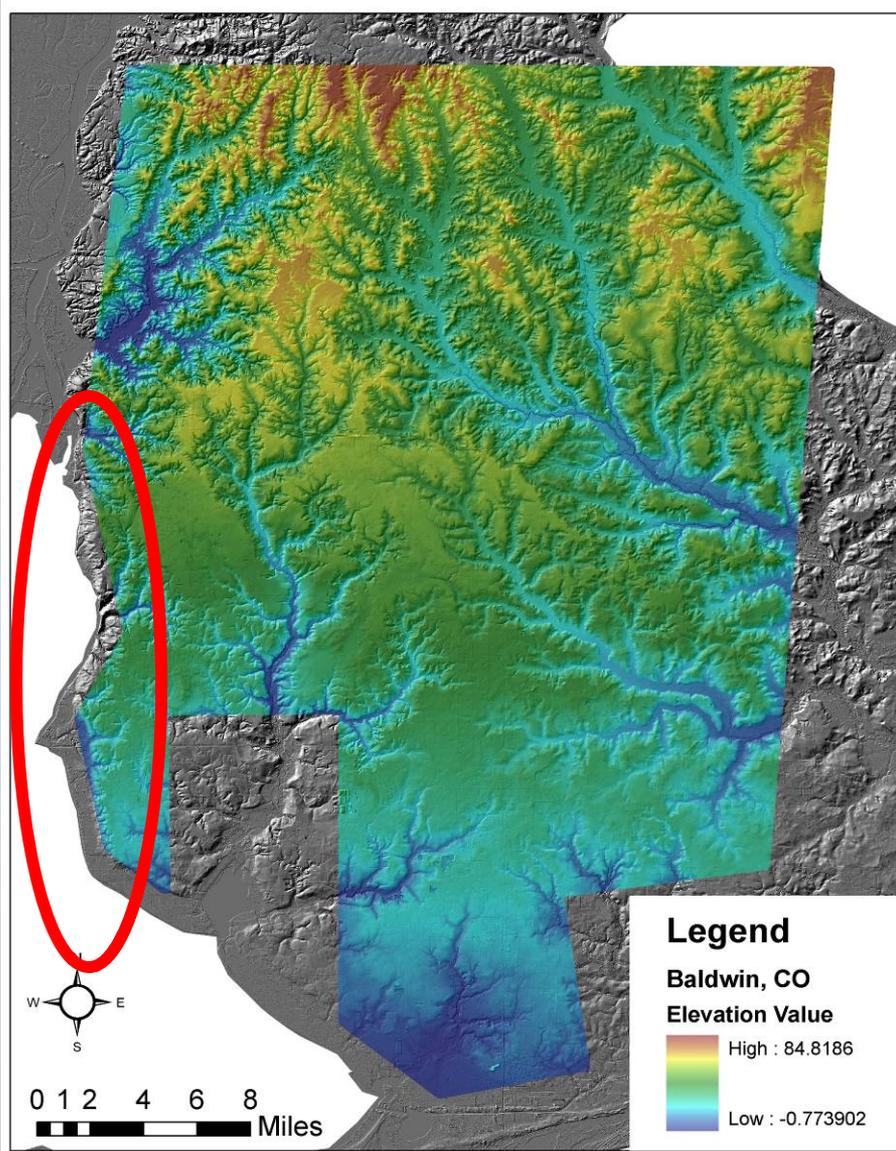


Shoals Tiles:

NGOM Area = 285

Mobile Bay = 124

# Example: Recent ARRA Lidar Collection, East of Mobile Bay, AL

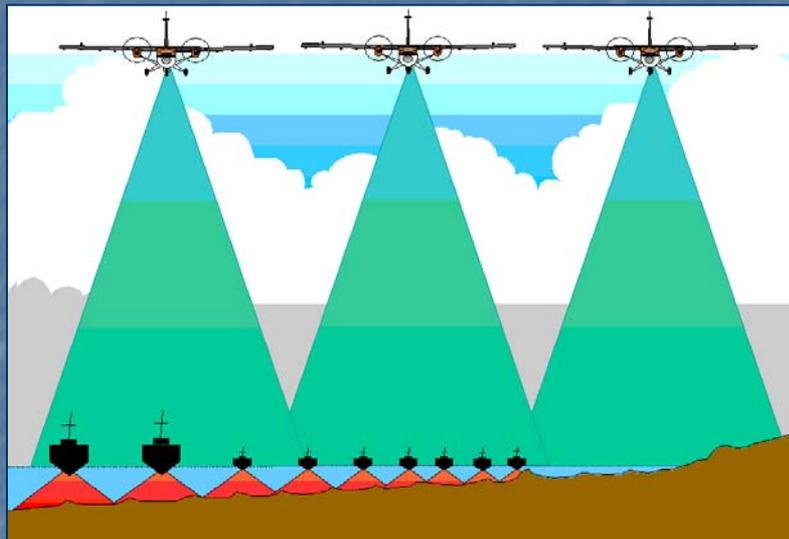
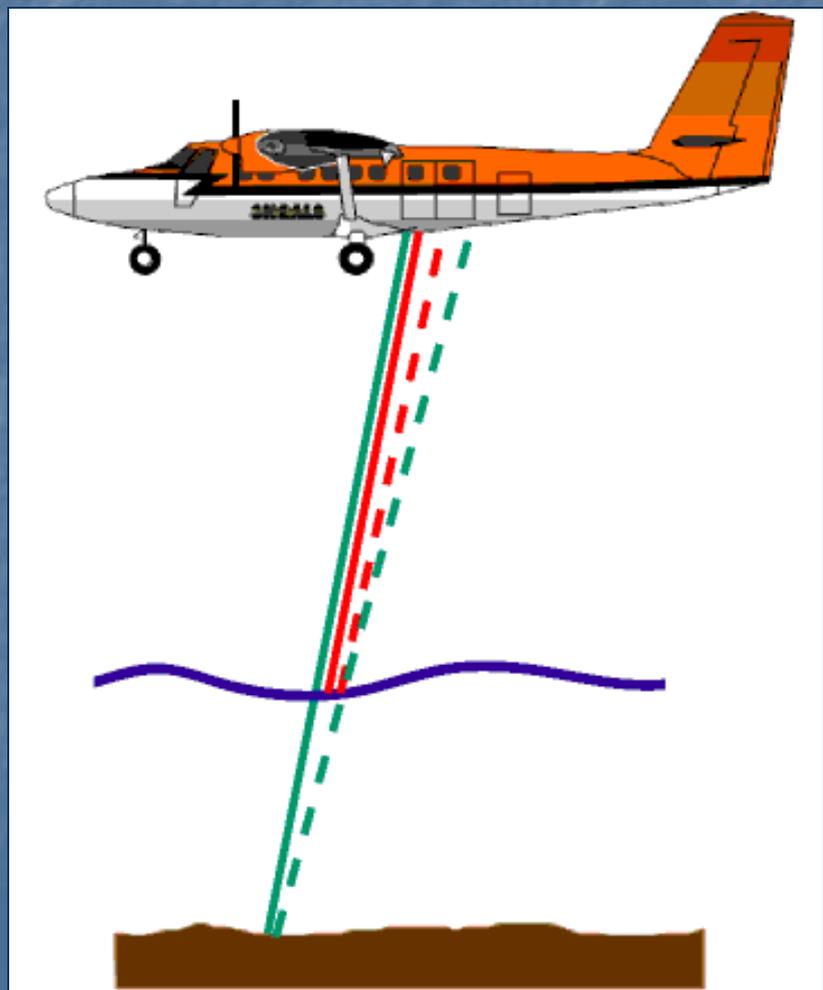


## Characteristics:

- Sensor = Optec Gemini LiDAR Scanner
- Resolution = 2 Meters
- Acquired: 2/20/10 thru 2/25/10

USACE topobathymetric lidar elevation data was used to tie USGS ARRA land lidar coverage to NOAA acoustic bathymetric data.

Conclusion: Mapping the US coastal land / water interface with topobathymetric lidar (SHOALS, CHARTS, CZMIL, EAARL) is a major emerging topic for USACE – USGS collaboration:



Because:

New topobathymetric lidar surveys along the land/water interface provide up-to-date, high-resolution elevations in the scientifically critical inter-tidal zone.

USACE topobathymetric lidar data becomes the integrating buffer between the best available offshore bathymetry and land surface topography

## Future opportunities

### USGS joins JALBTCX General Collaborative Agreement

- Strategic collaborative research to advance sensor technology, coastal science, and operational products
- Increased pool of sensors and staff for collaborative operations and research
- Collaborative experimental data collections to expand sensor suite, improve processing techniques, application of data to coastal issues
- Transition USGS science into operational products to support USACE missions in the coastal zone