

# JALBTCX AND THE USACE NATIONAL COASTAL MAPPING PROGRAM

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For 2018 NCMP New England Planning Meeting

06 March 2018

*“The views, opinions and findings contained in this report are those of the author(s) and should not be construed as an official Department of the Army position, policy or decision, unless so designated by other official documentation.”*



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# AGENDA

- JALBTCX and Airborne Lidar Bathymetry
- The USACE National Coastal Mapping Program (NCMP)
- NCMP and Emergency Response Operations
- NCMP Data Products and Web Services
- 2018 NCMP Planned Survey Areas
- US Federal Mapping Coordination



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# JOINT AIRBORNE LIDAR BATHYMETRY TECHNICAL CENTER OF EXPERTISE



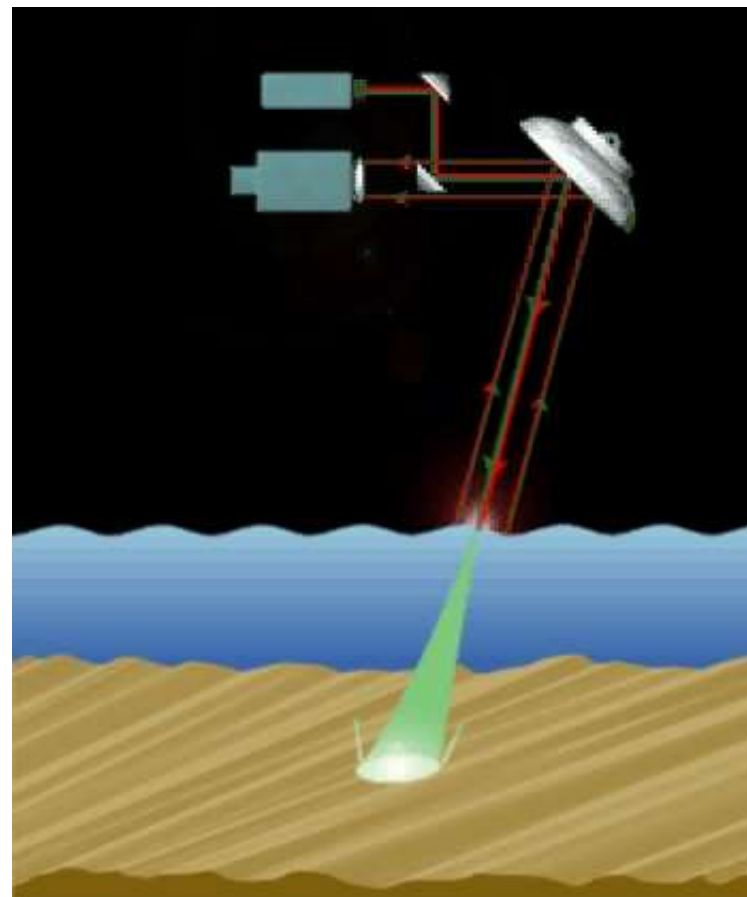
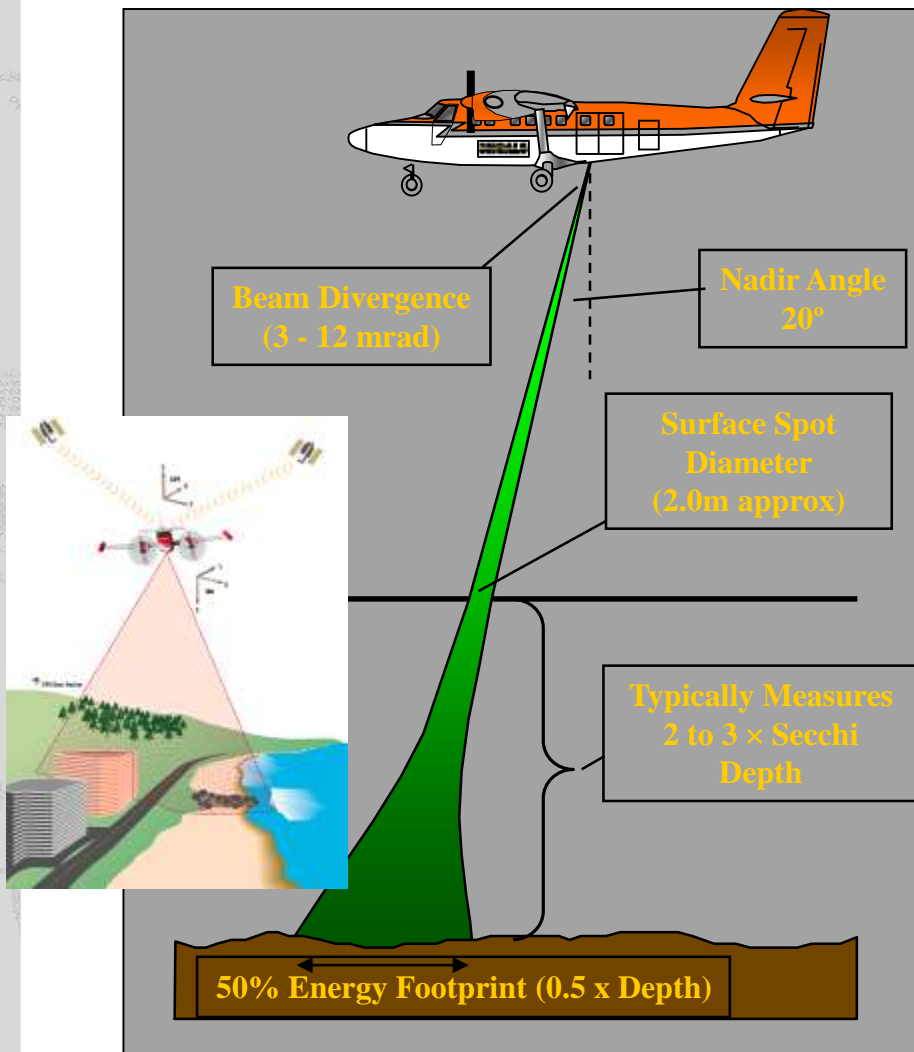
**Stennis International Airport  
Kiln, MS**



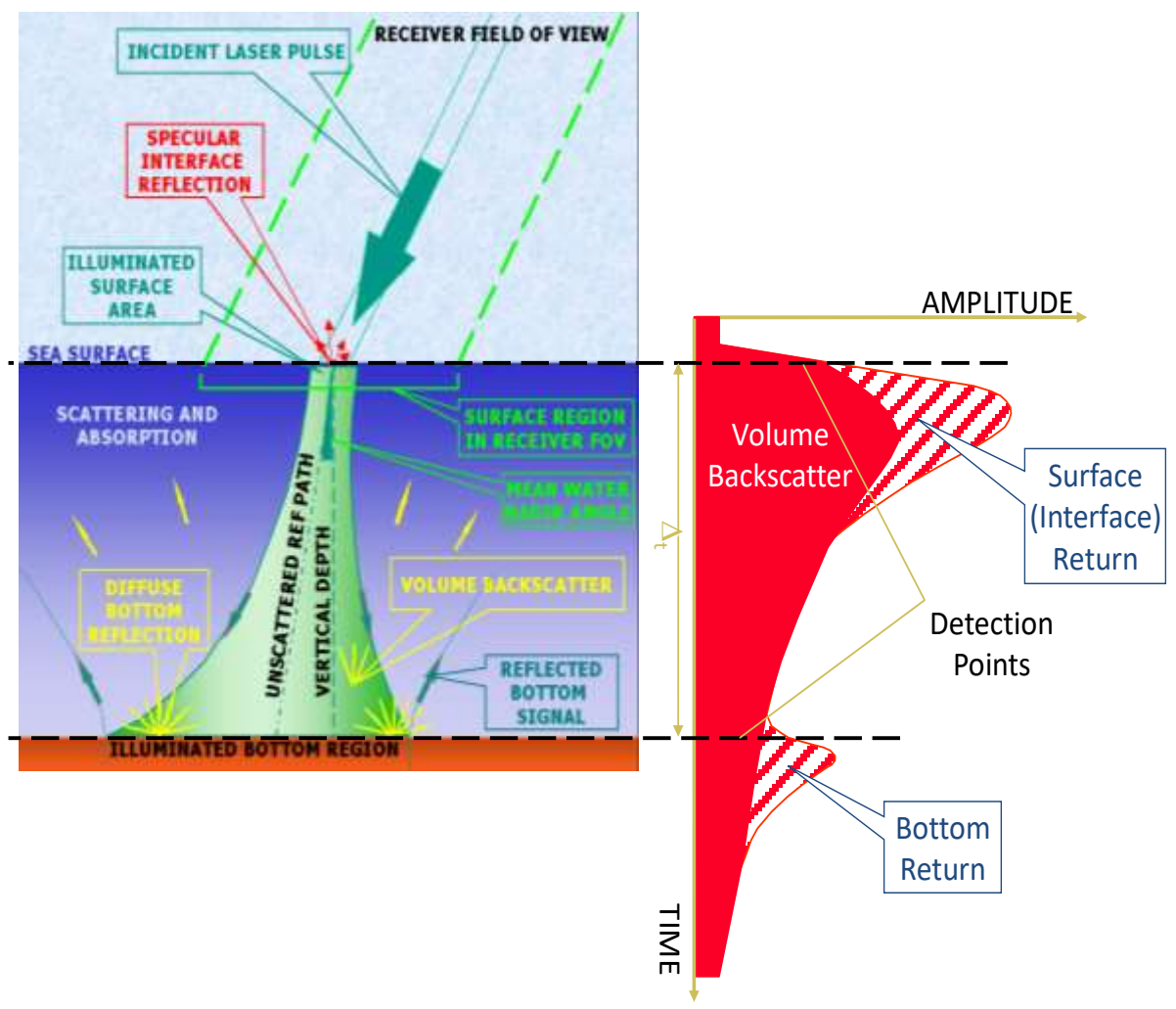
**19<sup>th</sup> Annual JALBTCX Airborne Coastal  
Mapping and Charting Technical Workshop**  
26-28 June 2018  
Providence, RI



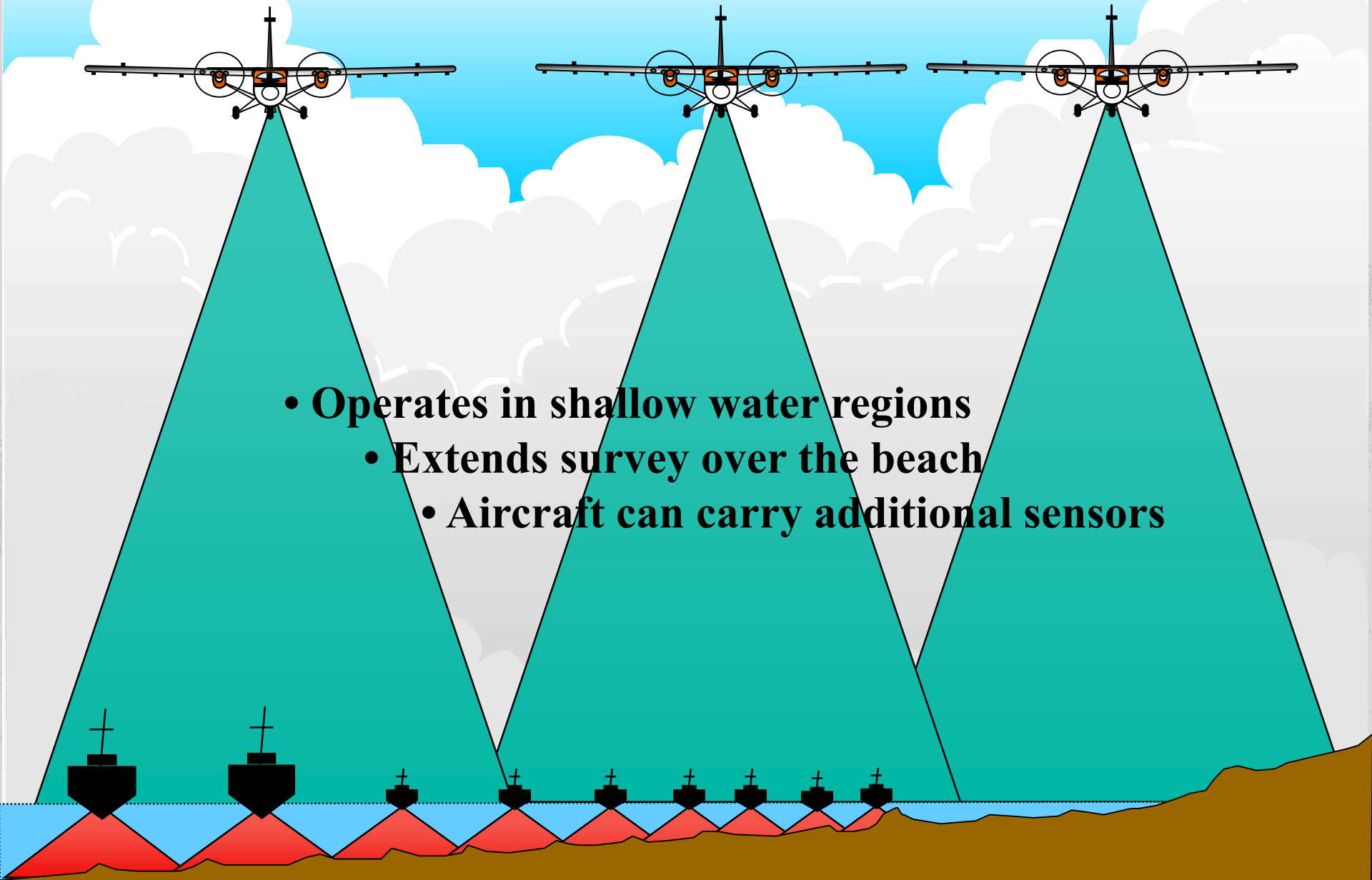
# HOW LIDAR WORKS



# HOW LIDAR WORKS

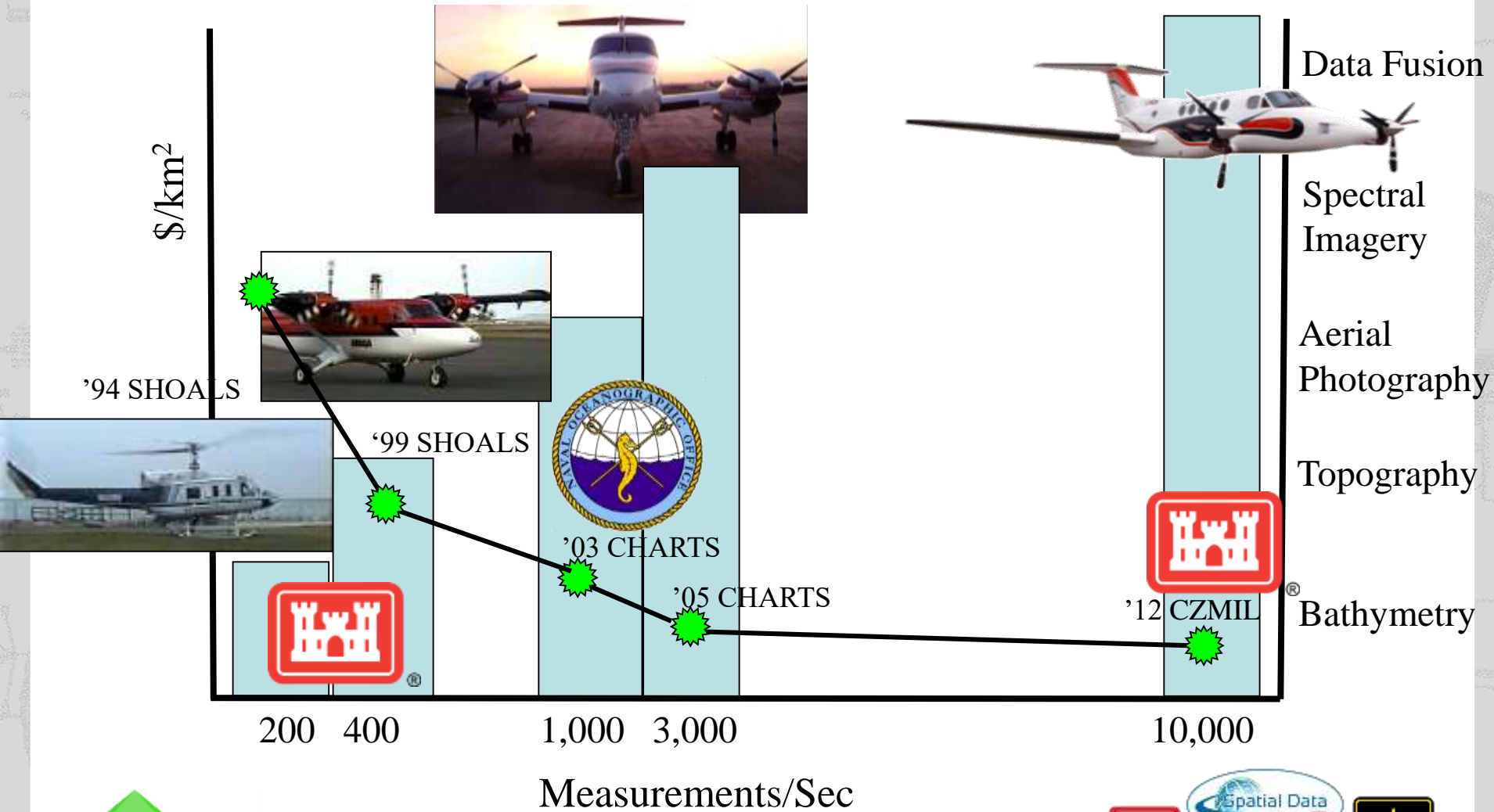


# ADVANTAGES OF AIRBORNE LIDAR



Shallow water Lidar vs. Multibeam

# JALBTCX SENSOR DEVELOPMENT HISTORY

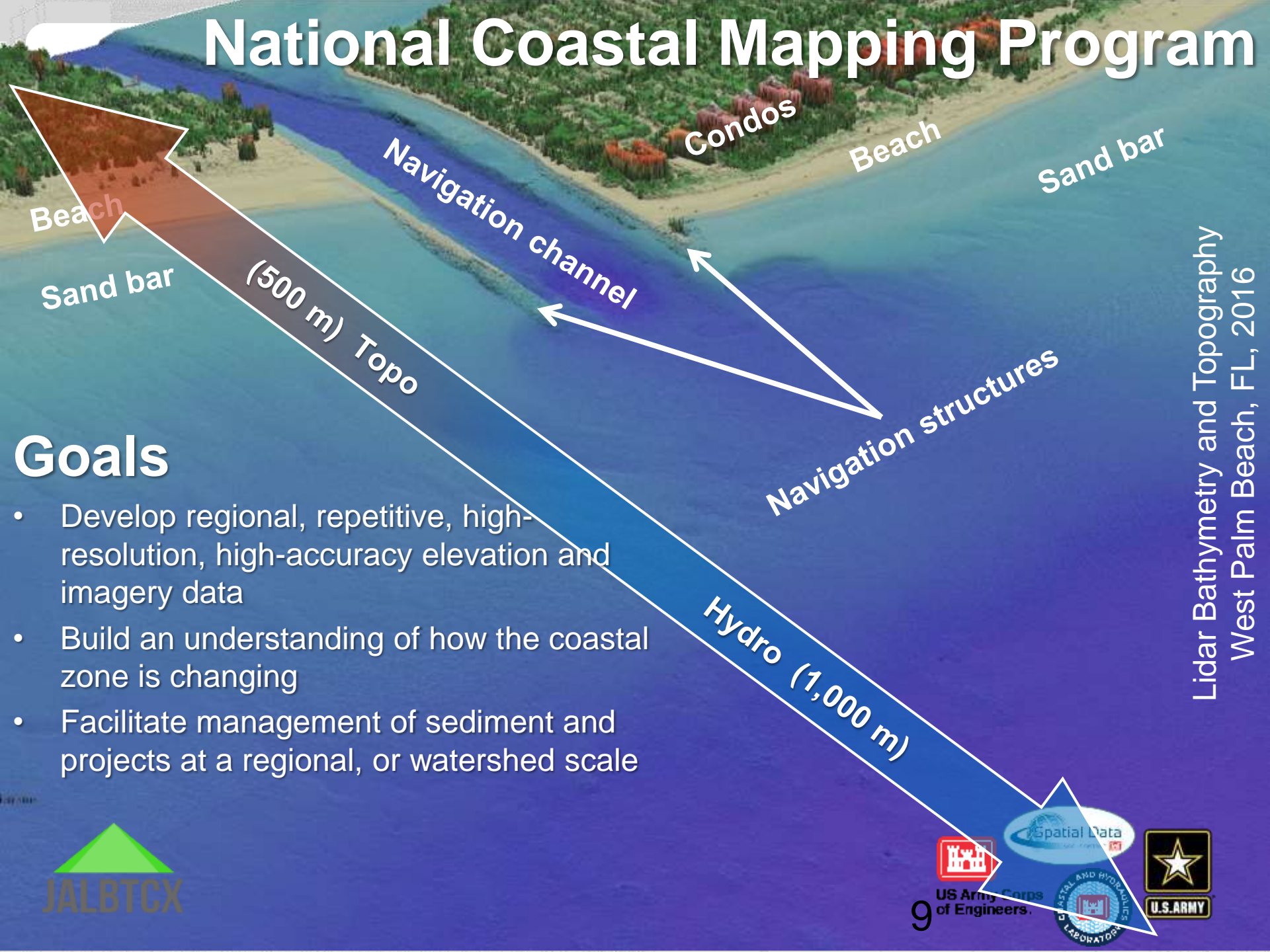




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# National Coastal Mapping Program



## Goals

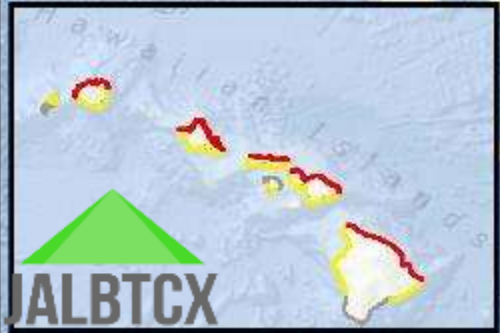
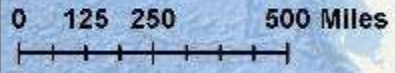
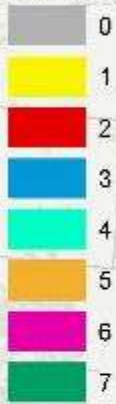
- Develop regional, repetitive, high-resolution, high-accuracy elevation and imagery data
- Build an understanding of how the coastal zone is changing
- Facilitate management of sediment and projects at a regional, or watershed scale

Lidar Bathymetry and Topography  
West Palm Beach, FL, 2016



# National Coastal Mapping Program Progress

Number of surveys since 2004



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Service Layer Credits: Esri, DeLorme, Swire, Source: Esri, GEBCO, NOAA, Swire

# 2017 NCMP AND FEMA POST-IRMA OPERATIONS

## Legend

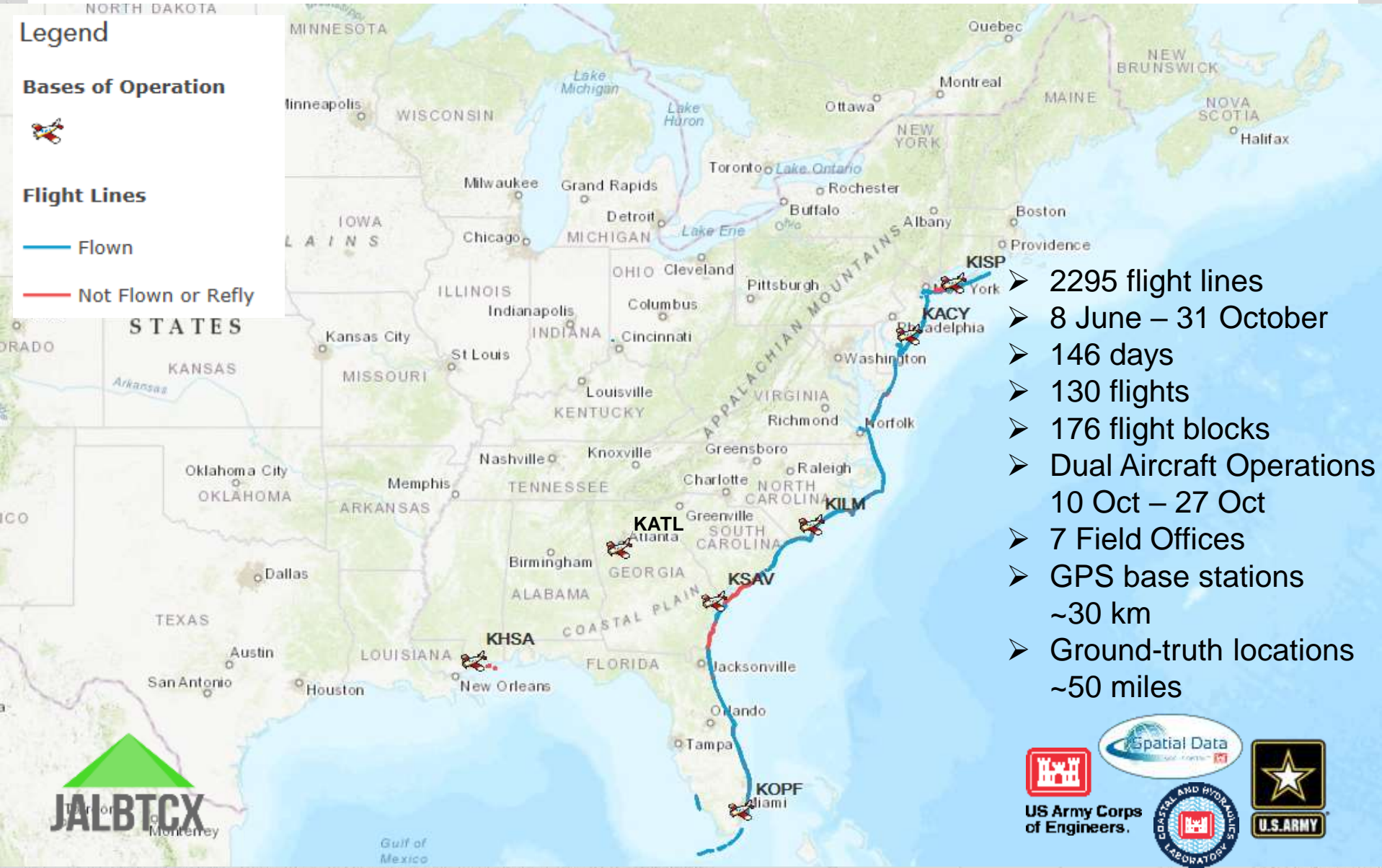
### Bases of Operation



### Flight Lines

— Flown

— Not Flown or Refly



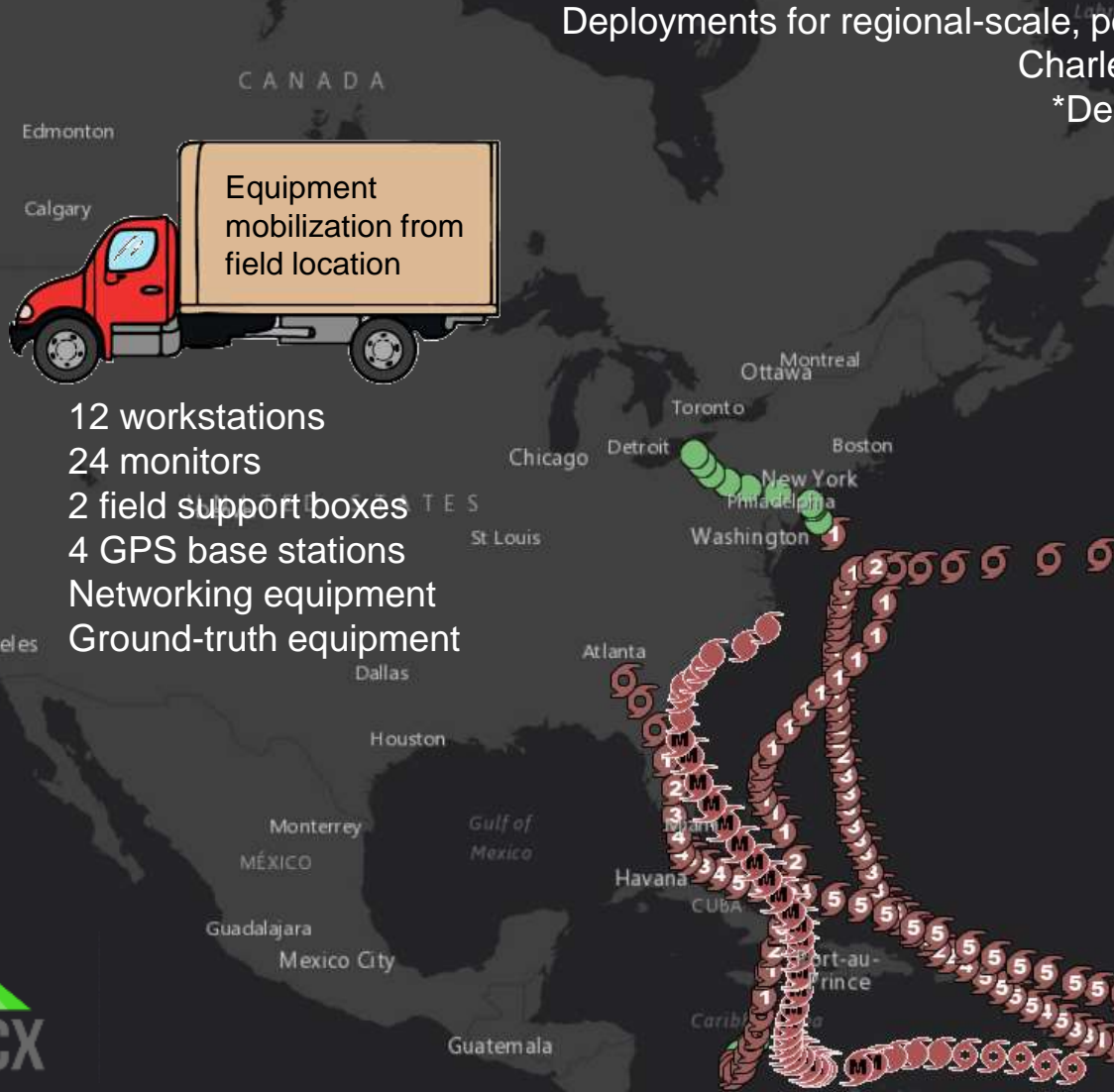
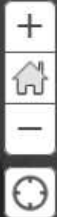
- 2295 flight lines
- 8 June – 31 October
- 146 days
- 130 flights
- 176 flight blocks
- Dual Aircraft Operations  
10 Oct – 27 Oct
- 7 Field Offices
- GPS base stations  
~30 km
- Ground-truth locations  
~50 miles



US Army Corps of Engineers.



# EMERGENCY RESPONSE OPERATIONS AND RAPID DATA PRODUCT PRODUCTION



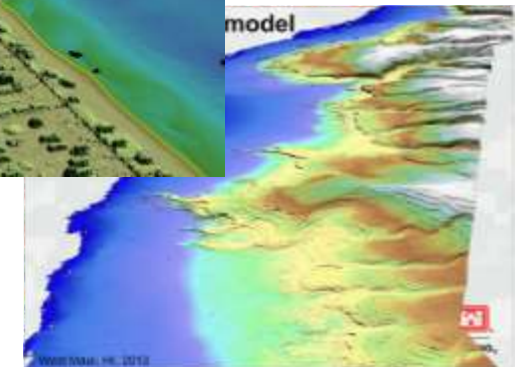
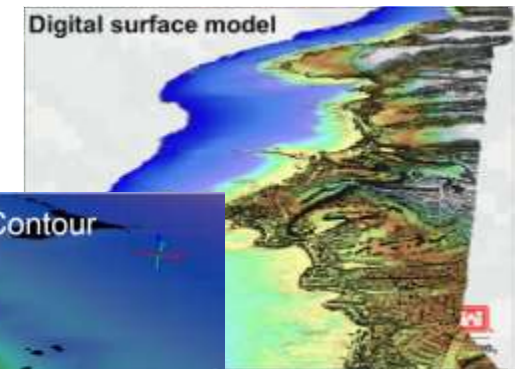
Deployments for regional-scale, post-storm damage assessments:  
 Charley, Frances, Ivan, Jeanne (2004)  
 \*Dennis, Katrina, Rita, Wilma (2005)  
 Ike (2008)  
 Sandy (2012)  
 Matthew (2016)  
 \*Irma (2017)

7 – 20 people / 24-hr ops



# BASIC NCMP DATA PRODUCTS

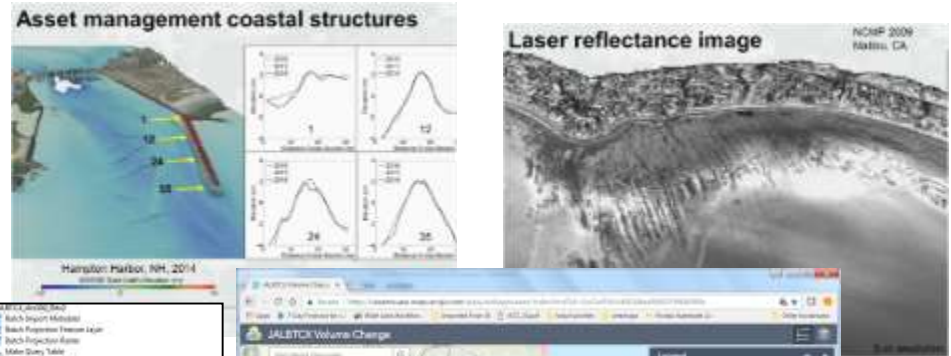
- Standard product suite
- Born in 2004 and have evolved since
- Workflows promote ease of use and re-use
- Horiz: GCS NAD83 (2011); Vert: NAVD88



# ADVANCED LIDAR PRODUCTS

- Extraction of coastal geomorphology metrics for regional coastal engineering indices and asset management

## Leveraging ERDC R&D Expertise



- Step 1: Batch Import Metadata
- Step 2: Batch Response Feature Layer
- Step 3: Batch Projection Raster
- Step 4: Make Query Table
- Step 5: Merge Feature Classes
- Step 6: Test
- Step 7: Label Beachline
- Step 8: Generate Volume
- Step 9: Update Feature Coordinates (if necessary)
- Step 10: Generate Area Difference Vectors
- Step 11: Generate Top Mask
- Step 12: Calculate Difference Using by Edge Mask
- Step 13: Calculate Difference Grid Values
- Step 14: Generate Beachline
- Step 15: Label Beachline and Shell with MHW Value
- Step 16: Generate Area Difference Vector about MHW
- Step 17: Calculate MHW Volume
- Step 18: Calculate Volume Difference about MHW (Net Volume)
- Step 19: Calculate Volume Change
- Step 20: Calculate MHW Volume Difference
- Step 21: Calculate Volume Difference about MHW (Net Volume)
- Step 22: Generate Final Table
- Step 23: Generate Final Table



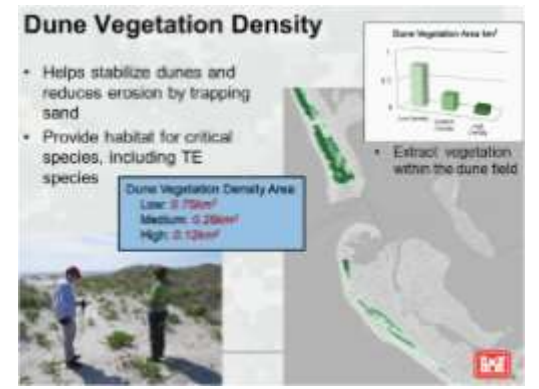
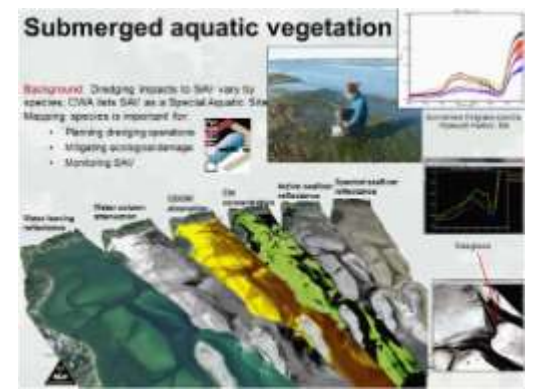
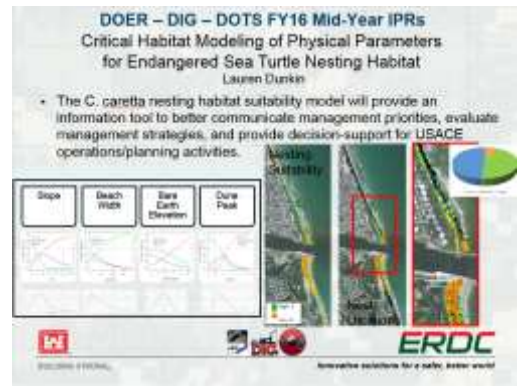
- ❖ Dune height
- ❖ Beach width
- ❖ Shoreline change
- ❖ Volume change

# FUSION DATA PRODUCTS

- Fusion of lidar-derived metrics with spectral information to inform habitat characterization, monitoring, and modeling and address emerging environmental concerns



## Leveraging ERDC R&D Expertise

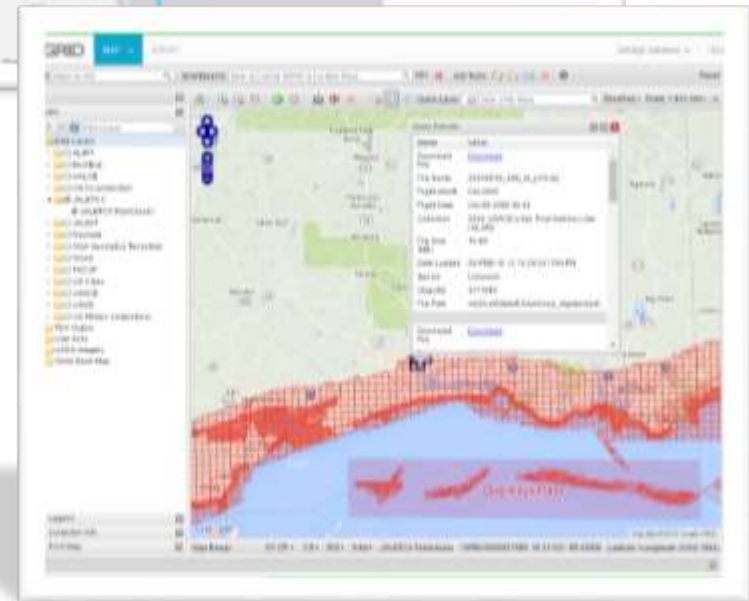
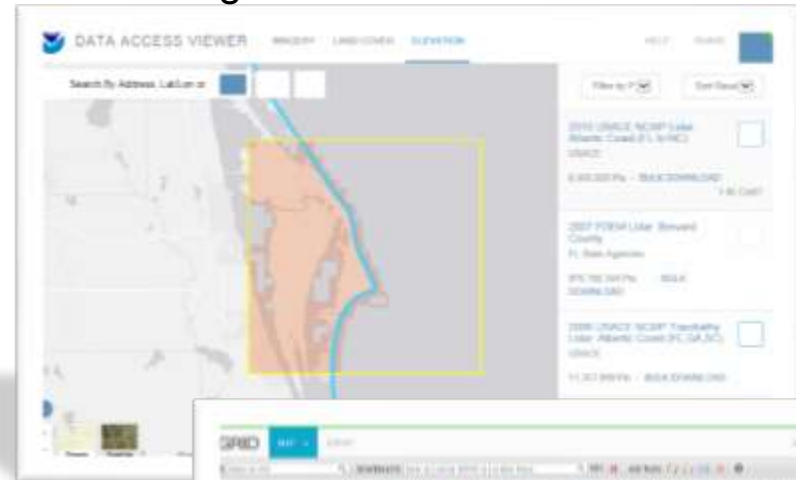


- ❖ Dune vegetation
- ❖ SAV
- ❖ Land cover
- ❖ Water quality indicators

# NATIONAL COASTAL MAPPING PROGRAM DATA ACCESS

<https://coast.noaa.gov/dataviewer/>

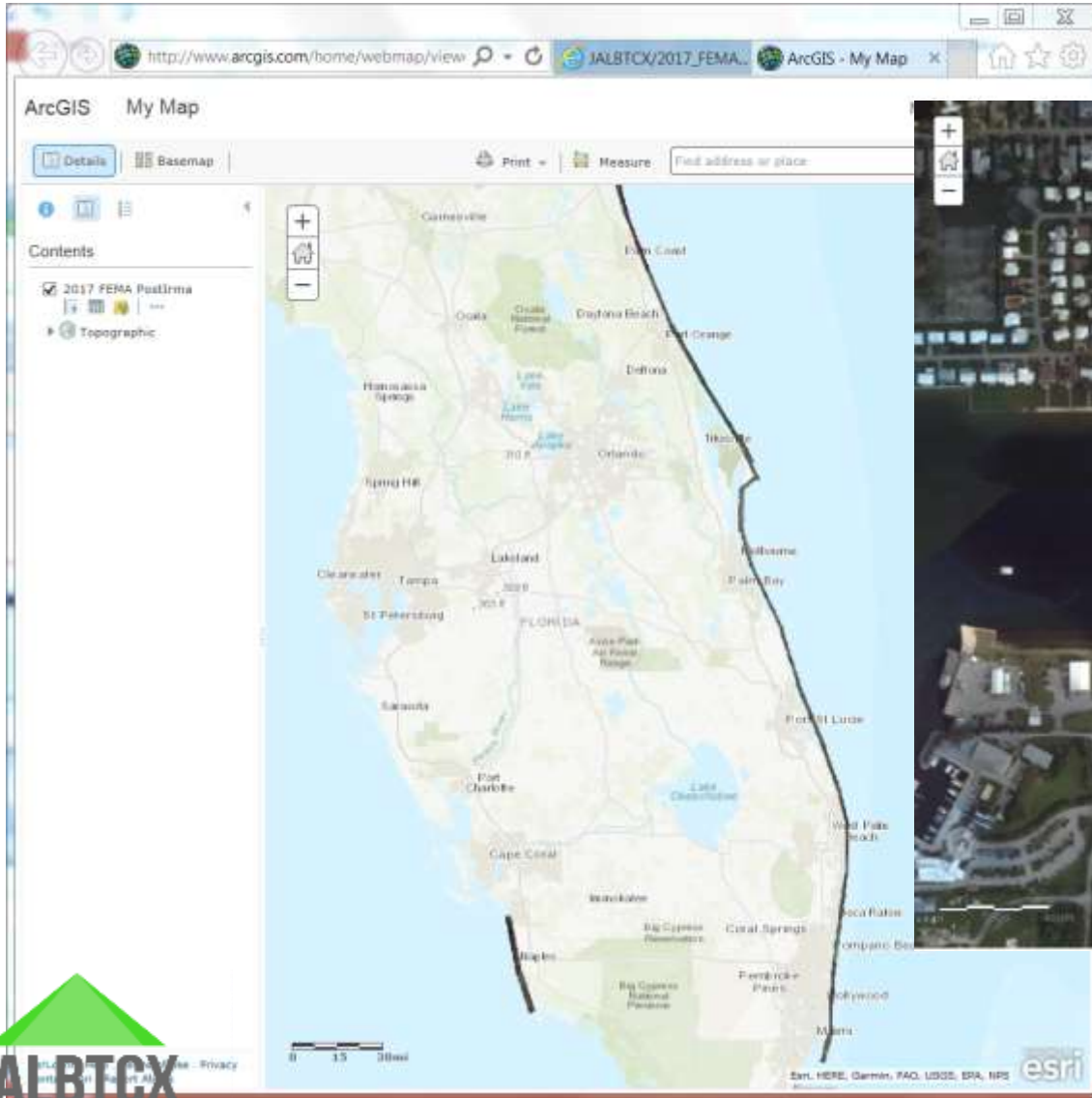
- USACE District Office
- USACE Geospatial Repository and Data Management System (GRiD)
- NOAA OCM (Digital Coast) and NCEI (Boulder)
- USGS St. Petersburg, FL and Sioux Falls, SD
- By request to [jalbtcx@usace.army.mil](mailto:jalbtcx@usace.army.mil)



<https://griduc.rsgis.erd.c.dren.mil/griduc/corpsmap/>

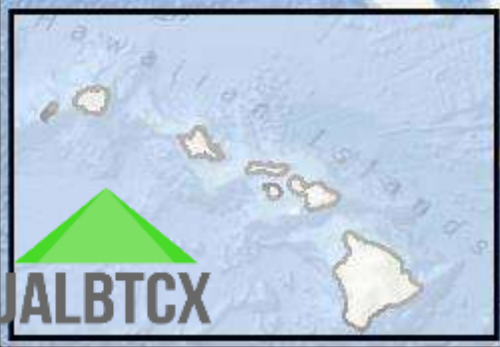
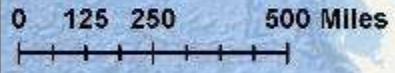
# NATIONAL COASTAL MAPPING PROGRAM WEB SERVICES – IMAGERY MOSAICS

<https://arcg.is/1Sf90G>





# National Coastal Mapping Program Future Flights



US Army Corps of Engineers



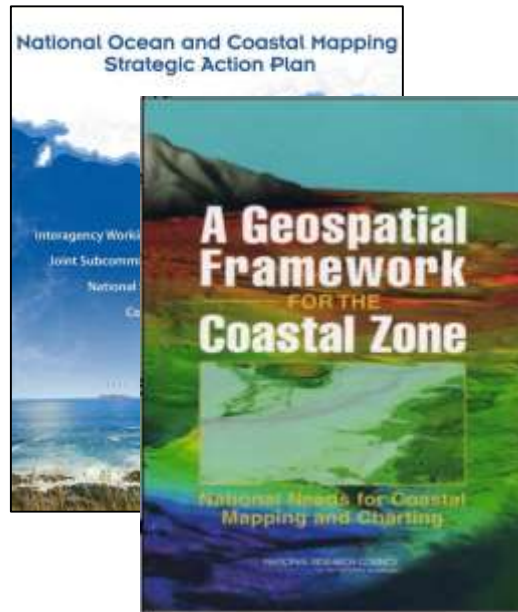
U.S. ARMY

Service Layer Credits: Esri, DeLorme, GeoEye, ...  
Source: Esri, SDSC, NOAA, ...

# The Interagency Working Group on Ocean and Coastal Mapping (IWG-OCM)

## WHO:

- NOAA
- USGS
- USACE
- NAVO
- BOEM
- NSF
- NGA
- USCG
- EPA
- FEMA
- NASA
- *and other appropriate Federal agencies involved in ocean and coastal mapping*



- Co-chaired by NOAA, USGS, and USACE
- Charged with facilitating “the coordination of ocean and coastal mapping activities and avoid[ing] duplicating mapping activities...”
- Ocean and Coastal Mapping Integration Act of 2009: develop an “Ocean and Coastal Mapping Plan”
- National Ocean Policy: develop a topobathy lidar plan, National Coastal Mapping Plan

# U.S. Federal Mapping Coordination SeaSketch

## JALBTCX Planned Lidar

The screenshot displays the SeaSketch web application interface. The main map shows the United States with planned lidar survey areas highlighted in various colors: 2017 (light blue), 2018 (orange), 2019 (yellow), 2020 (red), 2021 (green), and 2022 (blue). A legend titled "USACE Planned Lidar" is overlaid on the map, listing the years and their corresponding colors. The right sidebar shows the "Data Layers" panel, which includes a search bar and a list of mapping projects. The "JALBTCX Planned and Ongoing Topobathymetric Lidar" project is selected, and its description is visible. The description states that the USACE National Coastal Mapping Program (NCMP) acquires high-resolution topographic/bathymetric lidar elevation and imagery on a recurring basis along the sandy shorelines of the US. The typical survey footprint includes an approximately 1-mile wide swath of topography, bathymetry, and imagery 500 m onshore and 1000 m offshore. Planned survey areas and timelines provided in this service are based on the 5-year NCMP update cycle, which follows counter-clockwise along the US West Coast, Gulf Coast, East Coast and Great Lakes. Surveys to support USACE project-specific missions and external partners beyond the standard NCMP footprint are included contingent to requests from project managers. This survey work is coordinated with Federal mapping partners through the Interagency Working Group on Ocean and Coastal Mapping and the 3D Elevation Program.



<https://www.seasketch.org/#projecthomepage/5272840f6ec5f42d210016e4>

# U.S. Federal Mapping Coordination SeaSketch

## JALBTCX In Progress Lidar

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SeaSketch - Better decisions

seasketch.org/#projecthomepage/5272840f6ec5f42d210016e4

U.S. Federal Mapping Coordination  
A Collaboration Site for Federal and Partner Mapping Data Acquisition

seasketch

Map of the East Coast of the United States showing lidar data layers. Key locations include New York, Philadelphia, and Delaware Bay. A legend titled "USACE In Progress Lidar" is overlaid on the map, listing various stages of lidar acquisition.

**USACE In Progress Lidar**

- Not Flown
- Flown
- Process
- Clean
- Classification
- Initial QC
- Final QC
- Production
- Delivered

**Data Layers** | My Plans | Participate

Search layers by name or keyword

Mapping Projects: Planned (Funded) and Ongoing

- Topographic Lidar
- Topobathymetric Lidar
  - NOAA
  - USACE
    - JALBTCX Planned and Ongoing Topobathymetric Lidar
      - The USACE National Coastal Mapping Program (NCMP) acquires high-resolution topographic/bathymetric lidar elevation and imagery on a recurring basis along the sandy shorelines of the US. The typical survey footprint includes an approximately 1-mile wide swath of topography, bathymetry, and imagery 500 m onshore and 1000 m offshore. Planned survey areas and timelines provided in this service are based on the 5-year NCMP update cycle, which follows counter-clockwise along the US West Coast, Gulf Coast, East Coast and Great Lakes. Surveys to support USACE project-specific missions and external partners beyond the standard NCMP footprint are included constituent in requests from project managers. This survey work is coordinated with Federal mapping partners through the Interagency Working Group on Ocean and Coastal Mapping and the 3D Elevation Program.
    - JALBTCX NCMP Acquisition Status Web Service
      - USACE Planned Lidar
      - USACE In Progress Lidar
- USGS
  - Acoustic/Sonar (Hydro, Bathy, Water Column, etc)
  - Digital Imagery
  - Other (eg. HTEM, DEM, CSCAP, EPA NCCA)
  - NOAA FY16-20 Fleet Allocation Plans
  - NOAA NMFS Plans 2017 through 2019

Alaska and Arctic Projects (All Stages)

Powered by Esri and SeaSketch



<https://www.seasketch.org/#projecthomepage/5272840f6ec5f42d210016e4>

# U.S. Federal Mapping Coordination SeaSketch

## JALBTCX Recently-Completed Lidar Layer

23

SeaSketch - Better decisions

seasketch.org/#projecthomepage/5272840f6ec5f42d210016e4

U.S. Federal Mapping Coordination  
A Collaboration Site for Federal and Partner Mapping Data Acquisition

seasketch

United States

Charlotte

Atlanta

Orlando

Tempe

Miami

Florida Keys

Florida Valley

Blake Plateau

Blake Ridge

Savannah Ridge

Florida Escarpment

USACE Recently-Completed Lidar website

- 2015 USACE NCMF Topobathy Lidar: Dark (NC)
- 2015 USACE NCMF Topobathy Lidar: West Point Lake (CA)
- 2016 USACE NCMF Topobathy Lidar: Florida East Coast (FL)
- 2016 USACE NCMF Topobathy Lidar: Gulf Coast (FL, AL, MS, TX)
- 2016 USACE NCMF Topobathy Lidar: Post-Hurricane: Matthew (VA, FL)
- 2016 USACE NCMF Topobathy Lidar: Puerto Rico
- 2016 USACE NCMF Topobathy Lidar: Starg Sands (MI)
- 2017 USACE FEMA Topobathy Lidar: Florida Reef Tract, Florida Keys and Collier County

Powered by Esri and SeaSketch

Data Layers

My Plans

Participate

Data Layers Basemap Legend & Ordering

Search layers by name or keyword

United States Mapping Services

Hurricane Season 2017 Impact, Response, and Recovery Mapping Priorities post-Harvey, Irma, Maria for collaboration

- NOAA
- NPS Hurricane AOIs 2017
- USGS
- State
- USFWS
- USACE
  - JALBTCX\_Recently\_Completed\_Lidar
    - Data coverage polygons for USACE lidar data that have been recently acquired and delivered from 2016 to present.
    - USACE Recently-Completed Lidar

Demo Layers

- Texas Seagrass Viewer
- Presentation Layers
- theserverhp

Seabed 2030

- NOAA Bathymetry Gap Analysts for Seabed 2030

The United States Bathymetry Gap Analysts is a map service providing visual access to the local sounding density derived from all modern bathymetric data holdings at NOAA's National Centers for Environmental Information (NCEI) and Office for Coastal Management (OCM).

Layer metadata, order, and opacity settings are found in the legend



<https://www.seasketch.org/#projecthomepage/5272840f6ec5f42d210016e4>

# QUESTIONS?

24<sup>24</sup>



Time-lapse of a night flight, Long Island, NY, September 2017



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[Charlene.S.Sylvester@usace.army.mil](mailto:Charlene.S.Sylvester@usace.army.mil)

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NCMP Operations



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