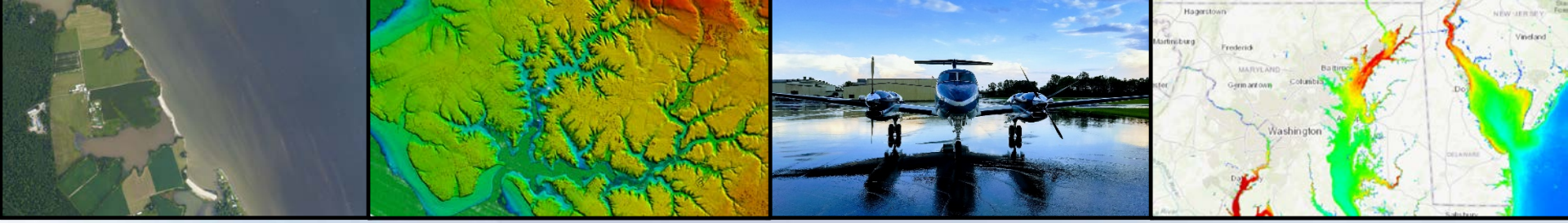


NGS Lidar Data in support of Chesapeake Bay needs

Gretchen Imahori

NGS IOCM Coordinator / RSD Staff Scientist

Remote Sensing Division

NOAA's National Geodetic Survey

Scientific, Technical Assessment & Reporting Team Meeting

Topic: Land-use Data, Forecasting, and Lidar

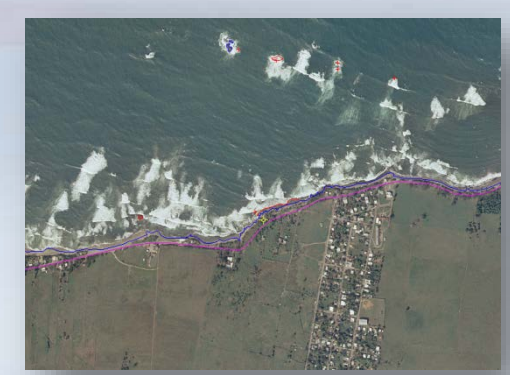
National Oceanic and Atmospheric Administration

Outline

- **Background**
- **Data collection**
- **FY18 & 19 - planning**
- **Gather requirements**

Background

- U.S. Department of Commerce
  - National Oceanic Atmospheric Administration (NOAA)
    - National Ocean Service
      - National Geodetic Survey
        - Remote Sensing Division
- Primary programs
  - Coastal Mapping Program
  - Aeronautical Survey Program
  - Emergency Response



National Oceanic and Atmospheric Administration

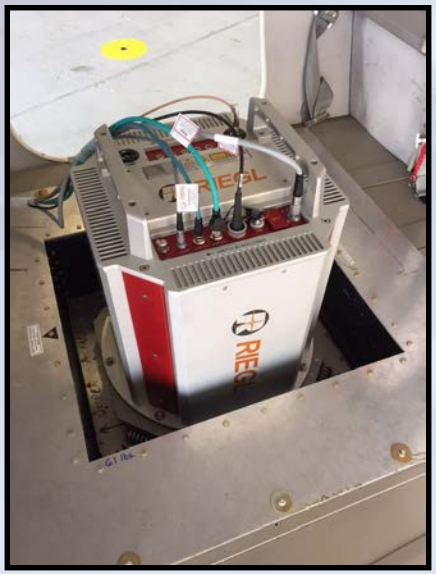
NOAA's Coastal Mapping Program

- Define the National Shoreline and nearshore elevation data
- NOAA nautical charts
- Other important applications:
  - Used in defining the United States' territorial limits
  - Coastal resource management
  - Storm surge and coastal flooding modeling
  - GIS analysis
  - Benthic habitat mapping
- Coastal Intelligence and Resiliency…

National Oceanic and Atmospheric Administration

How do we do it?

- **King Air 350ER Aircraft**
  - Extended Range: 8 hour endurance
  - 180kt survey & 250kt transit speed
- **DHC-6 Twin Otter**
  - Slow stable, low flying
  - 80-160kt survey speed
- **Trimble DSS580 Dual Cam & DSS500 Dual Oblique Cam**
  - RGB & NIR cameras (NIR in DSS580 only)
  - 35cm GSD at 10,500’ flying height
  - In-flight image processing
- **RIEGL LIDARs**
  - Topographic LIDAR (LMS-Q680i)
  - Topobathymetric System (VQ-880G)
- **Satellite Imagery**
- **Private sector contracts**



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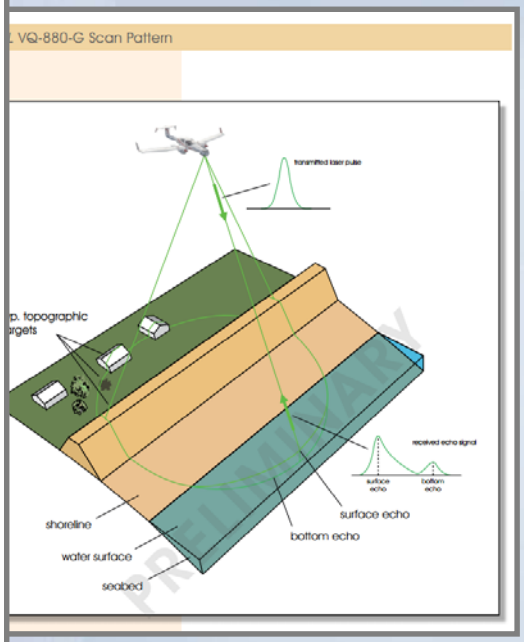
RSD Lidar Sensor Upgrade and Operations: VQ-880-G



Hydrography	
Typ. Measurement Range [1]	1.5 Secchi depth for bright ground (ρ≥80 %) [2]
Typ. Operating Flight Altitude [3] Above Ground Level (AGL)	600 m (1970 ft.)

- ***AGL:*** *1300 feet*
- **PRF:** 145 kHz
- **Nominal Point Density:** 9 pt/m²
- **Swath Width:** 287 meters
- ***Generic Operational Parameters:***
  - 50% sidelap of swaths
  - 40° Field of View

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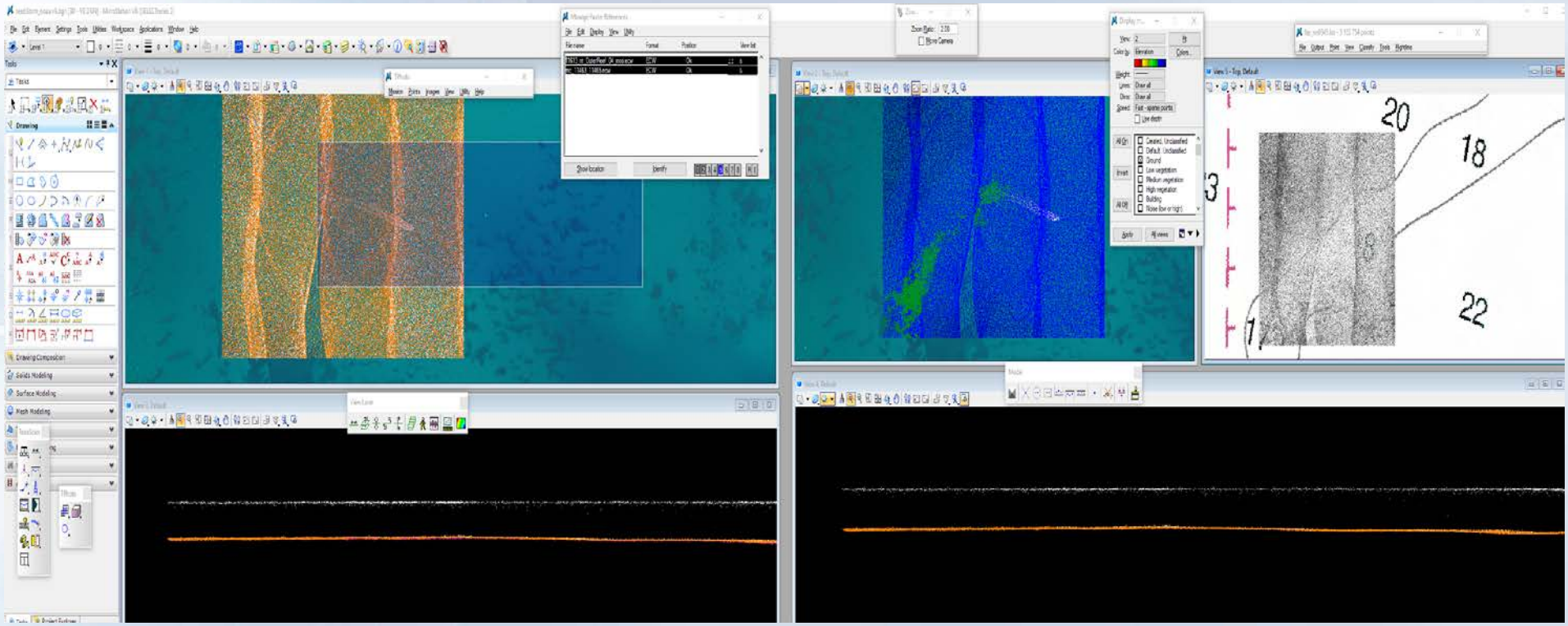
Point Cloud



Format: .las (.laz is compressed las) – open source binary file format

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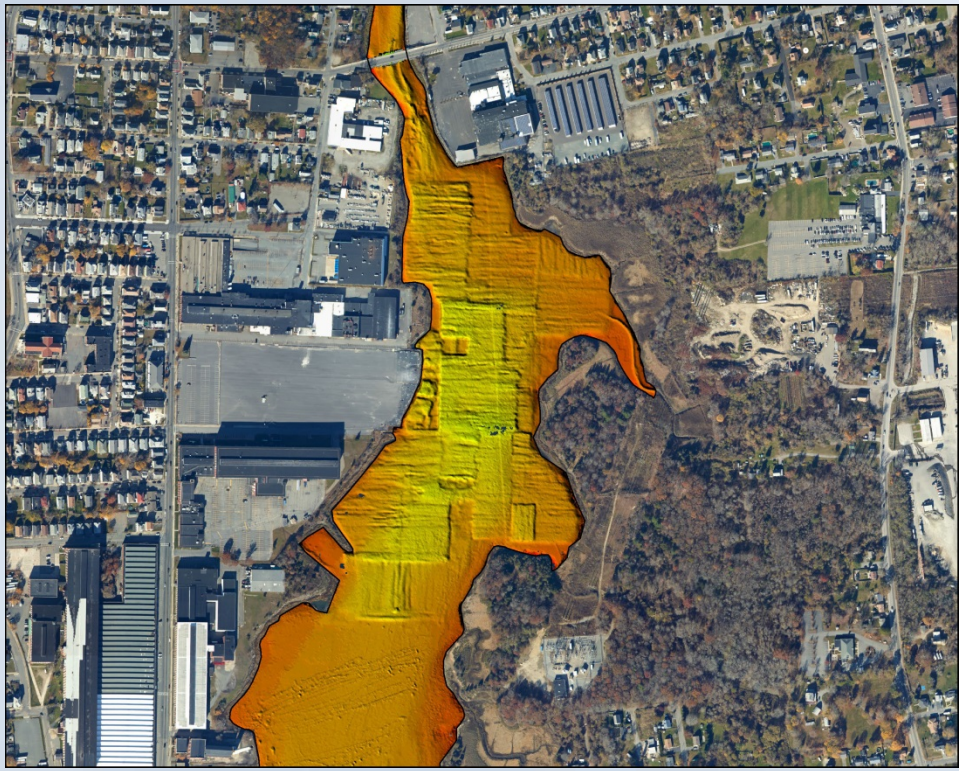
Buzzards Bay: New Bedford Harbor

VQ-820

VQ-880



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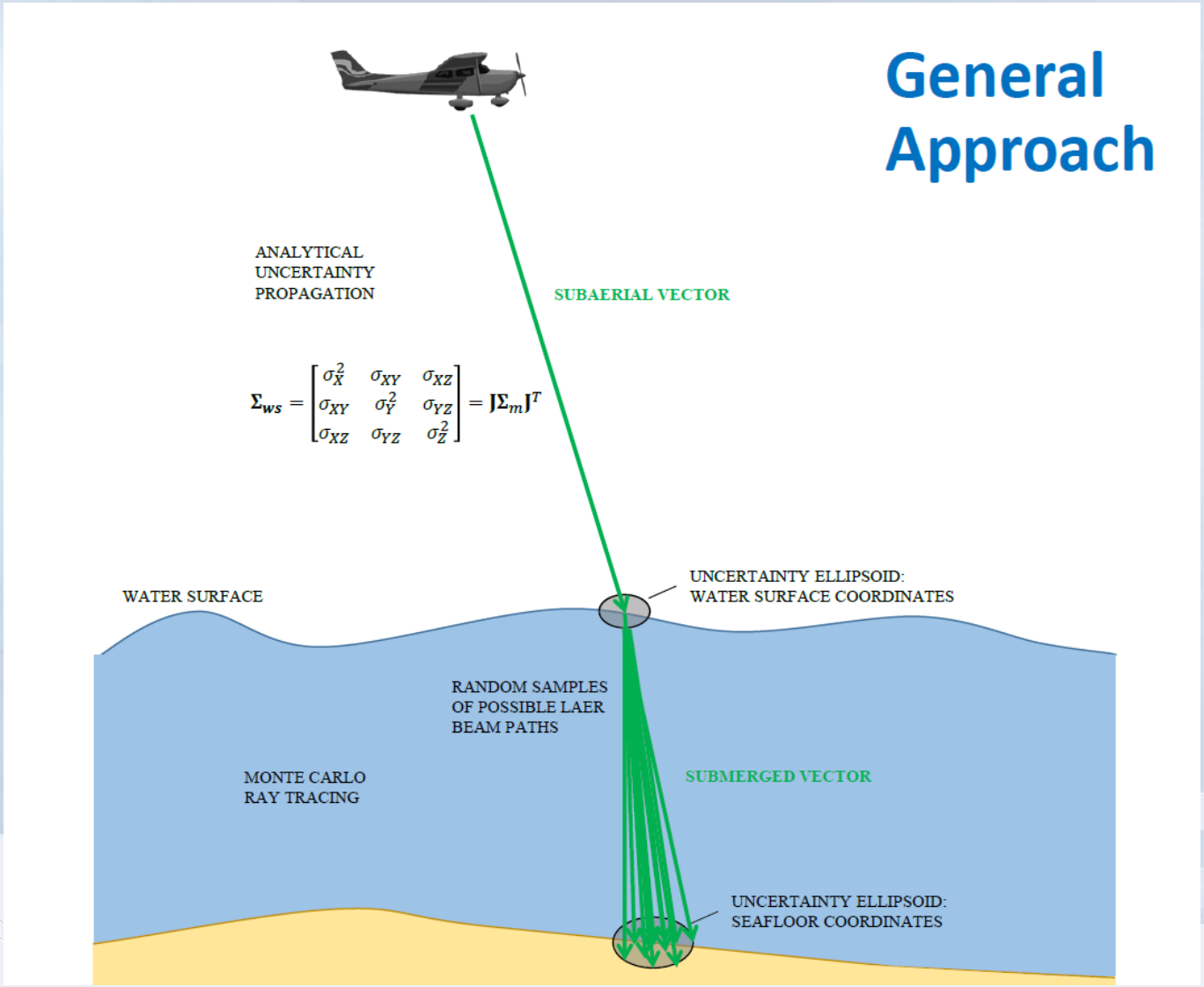
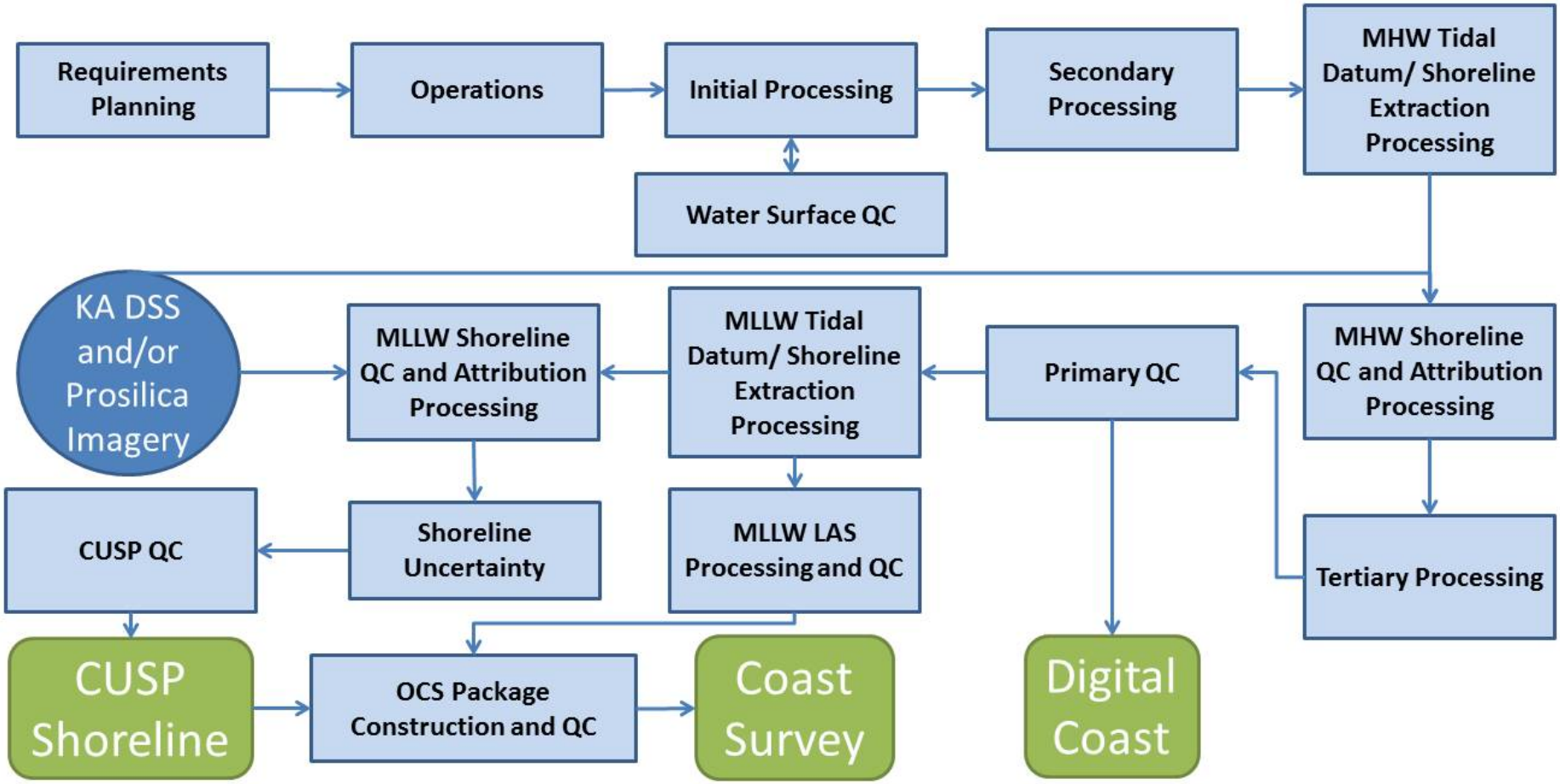
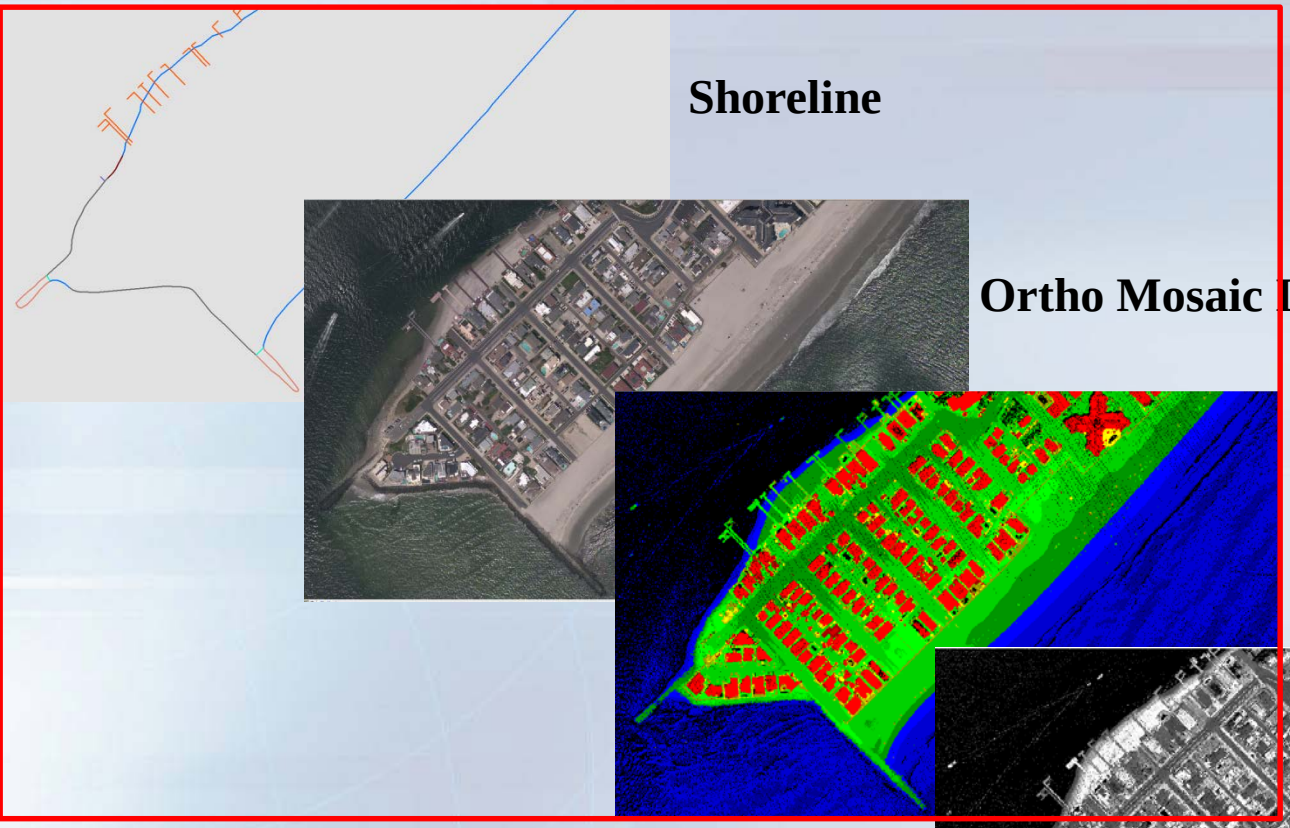
Total Propagated Uncertainty



TopoBathy Program



Products NGS delivers and derivatives



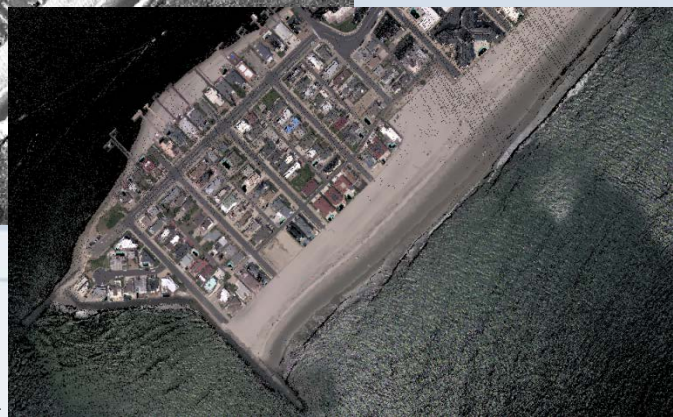
Shoreline

Ortho Mosaic Imagery

Lidar Point Cloud and DEMs (elevation)

Lidar Point Cloud (intensity)

Map once use many times!



RGB Colorized Lidar Point Cloud

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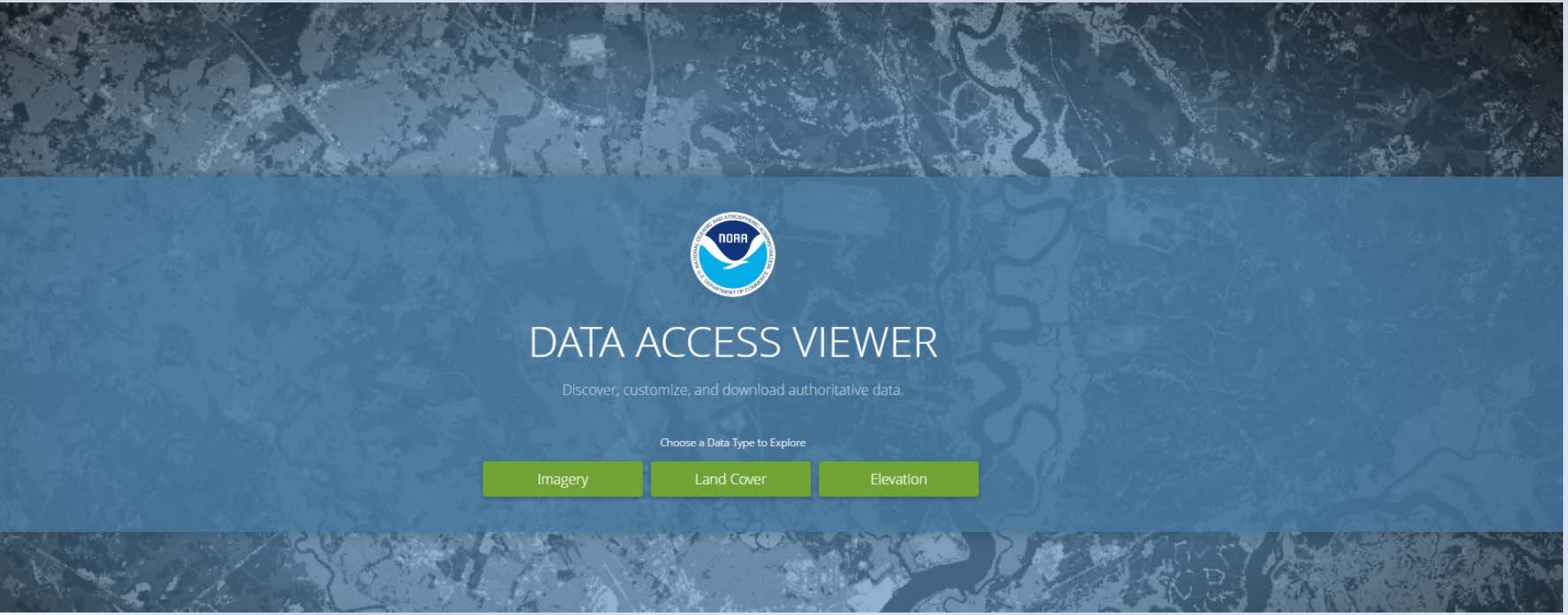
Digital Coast



- Can get the full point cloud and then use other tools to pick out classes.
- Or have the DAV do it for them – allows you to pick exactly which classes you want to keep and they can pick all the return, just the first returns, or just the last returns.
- Intensity will be in the LAS file with each point and you can also request a tif version of the intensity. You can also change things like the projection, datum, units etc.

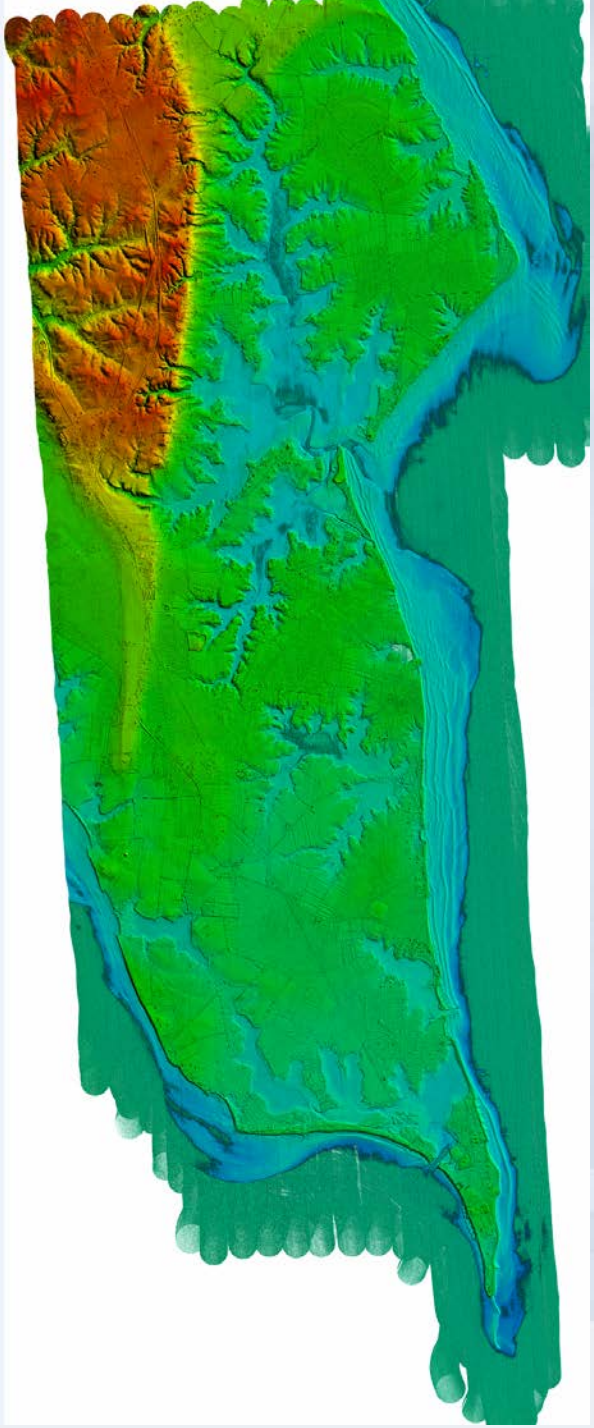
DATA COLLECTION 2017

National Oceanic and Atmospheric Administration

Quick DEMS

Saint Jerome Creek, MD

* Lidar collected with Twin Otter and Imagery collected with King Air



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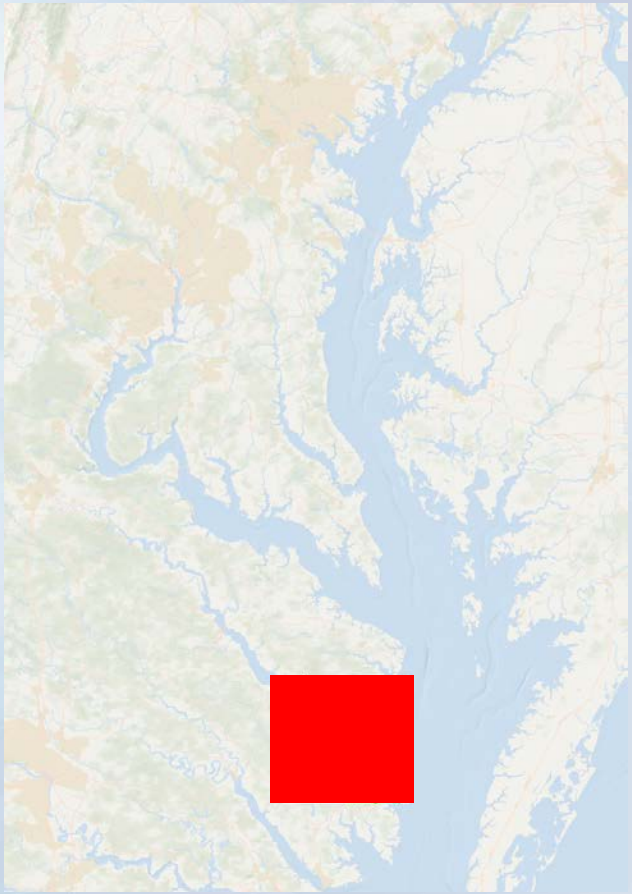
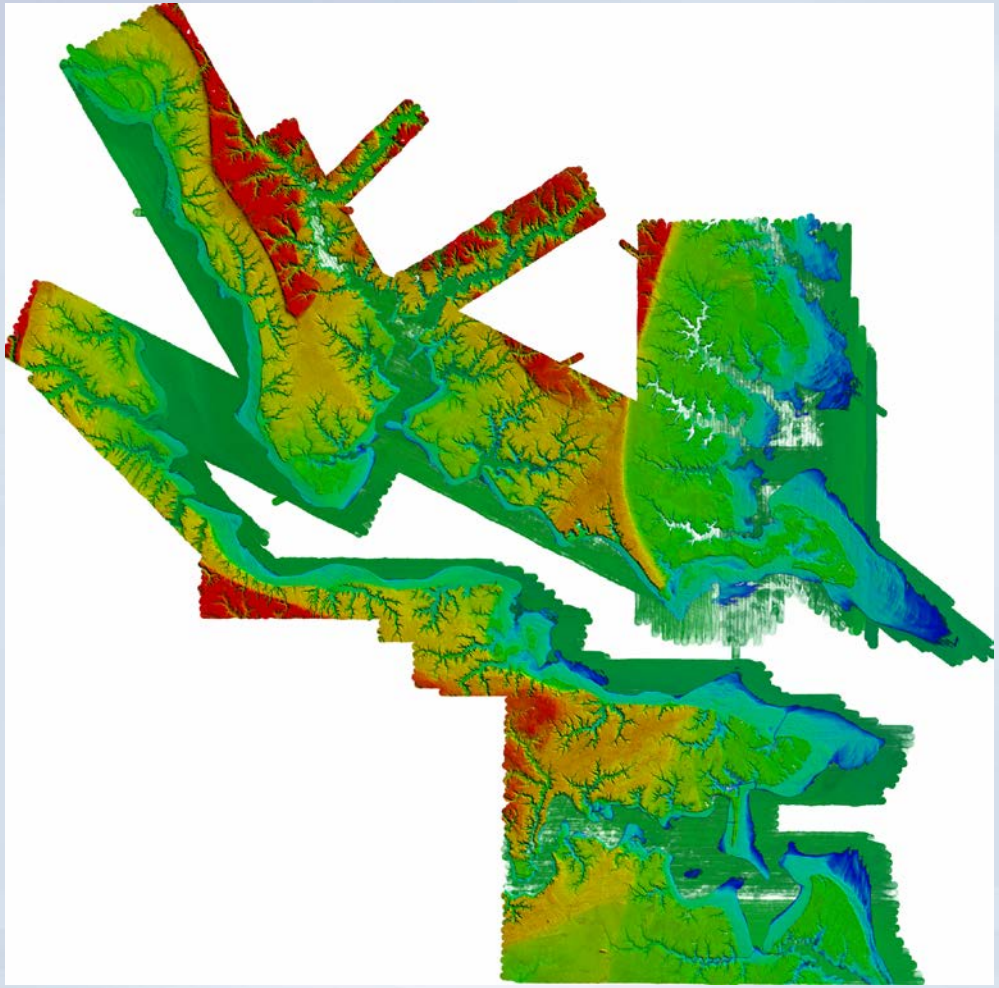
Quick DEMS



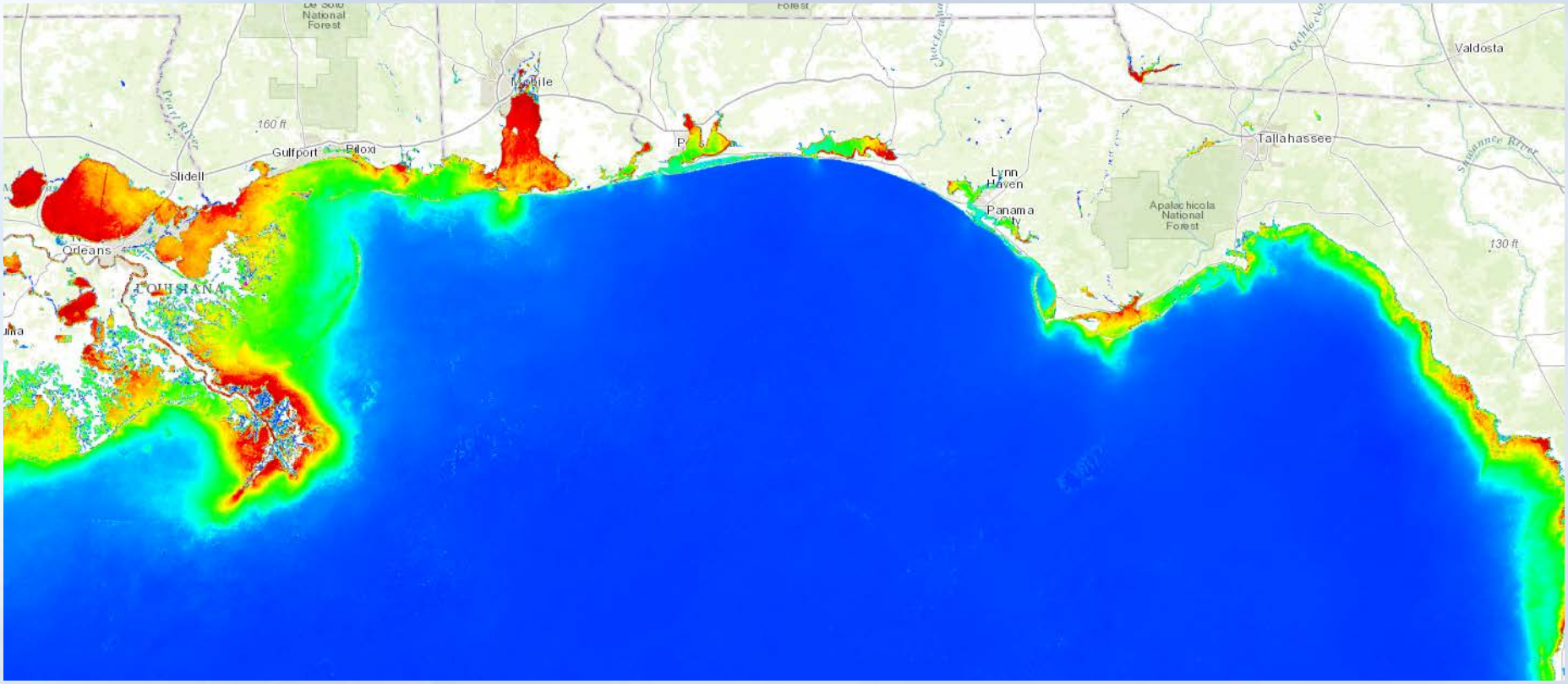


Tabbs Creek, VA

National Oceanic and Atmospheric Administration

FY18 & 19

NGS/NCCOS Water Clarity viewer



Kd Viewer: East and Gulf Coast

Requirements Discussion

NGS's Requirements and Goal

- RSD has a requirement for safety of navigation to support Nautical Charting (first priority).
- If there are other requirements that blend in with ours requirements so we can maximize the use of our data we will try to accommodate those requests (but it is not a guarantee if additional funding is not available)
- **Goal:** to build a coalition of both requirements and funding
- NGS intends to use internal and contract resources to perform work

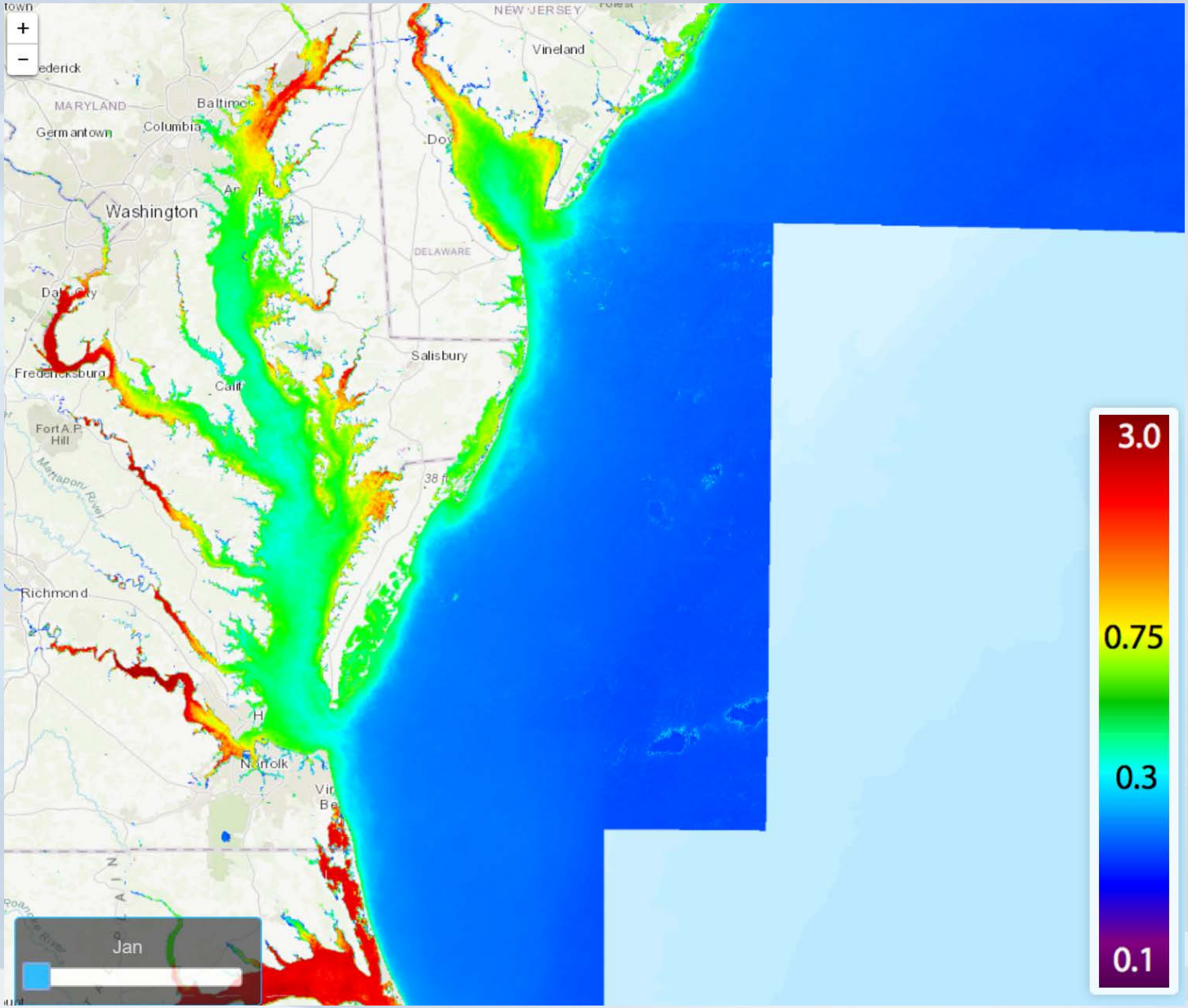
Additional Requirements

- Identify data gaps - where do you need data?
  - is there a consensus on areas that multiple partners need?
- Products: will Quick DEMs, 1m/5m DEMs and/or .las files suffice?
- Frequency?

Questions

- Constraints?
- Cost sharing/additional funding possible?
- Beneficiaries – direct/indirect?
- Data Timeline variability flexibility ? (acquisition and processing and deliverables)

Thank you



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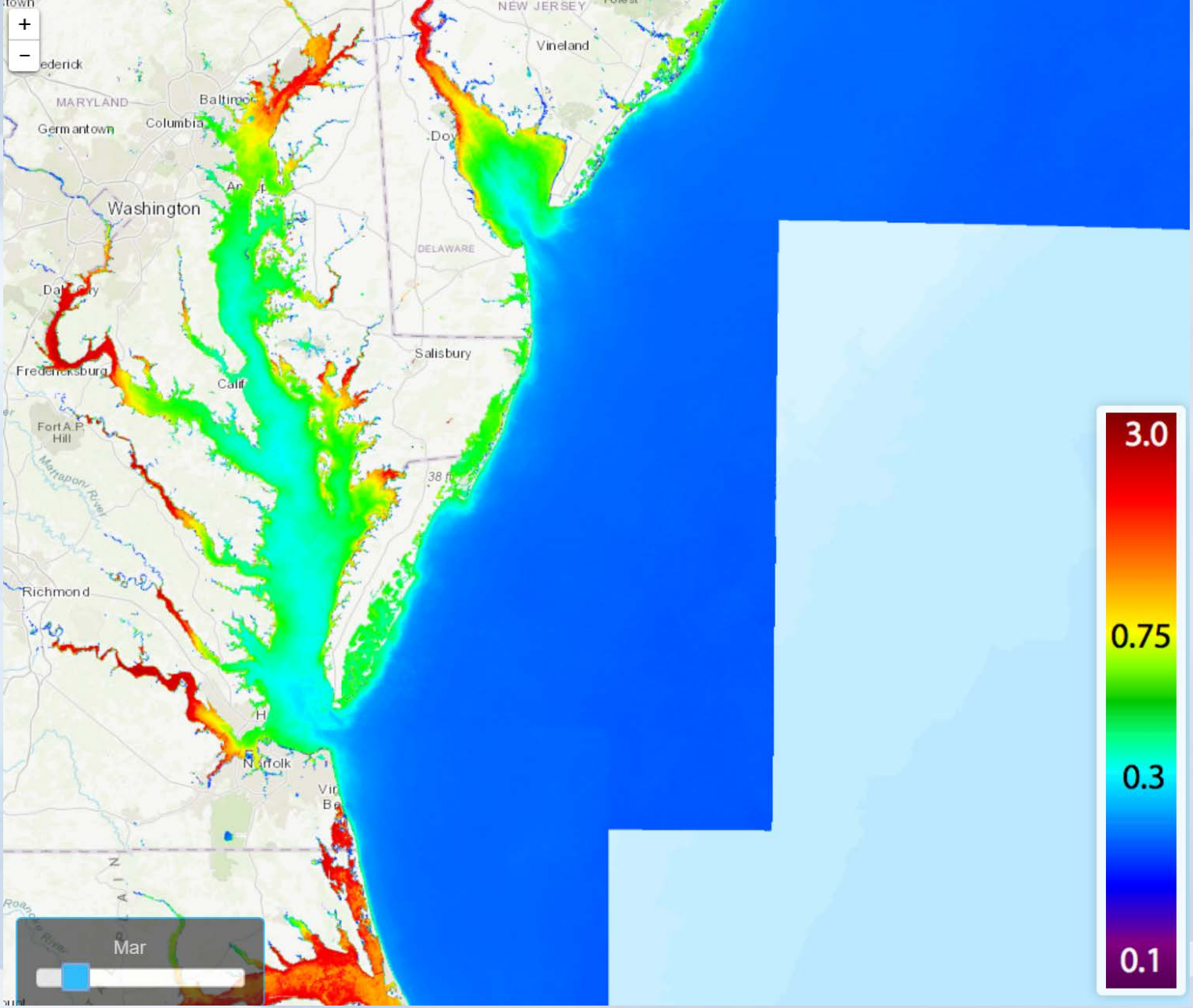

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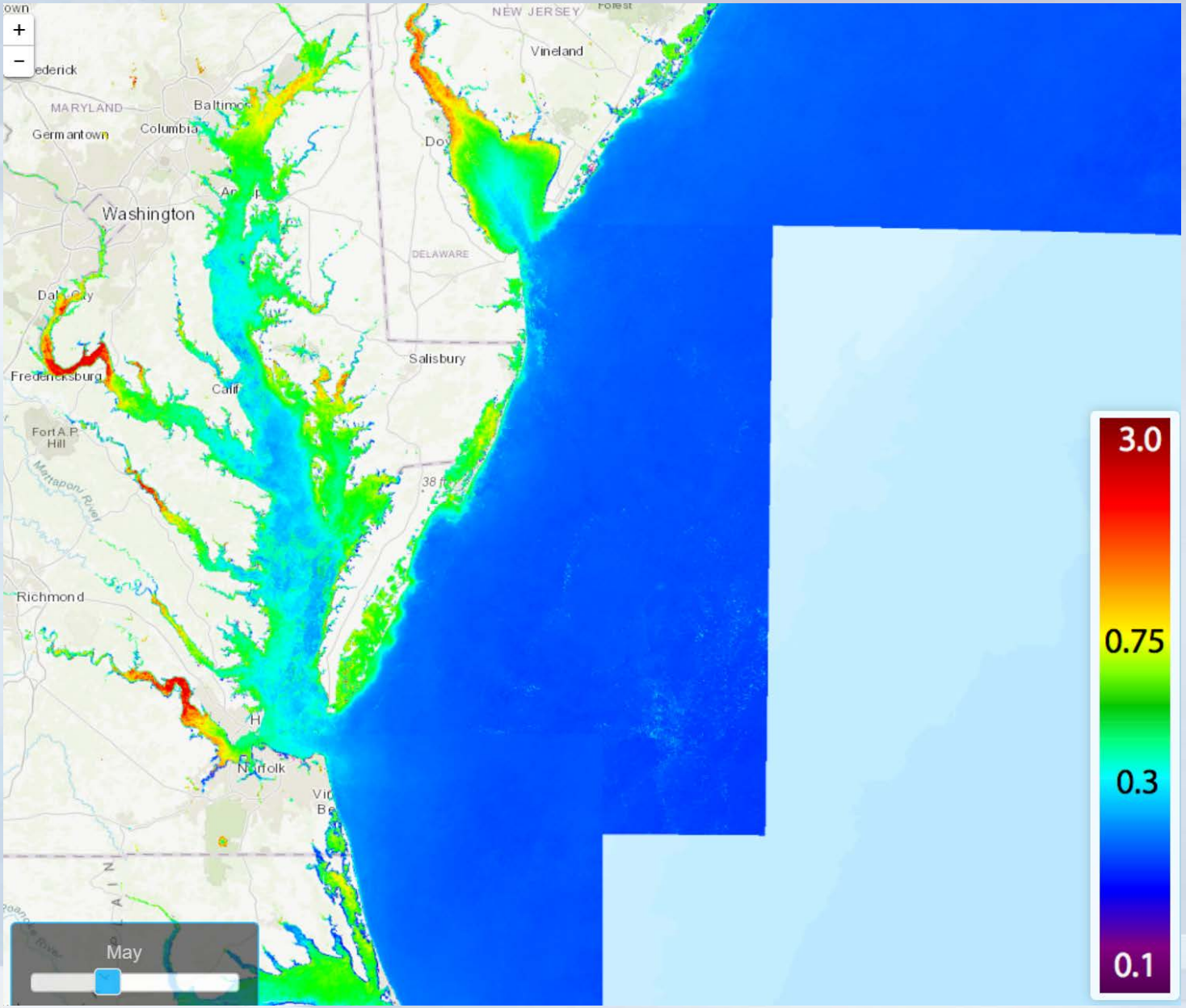
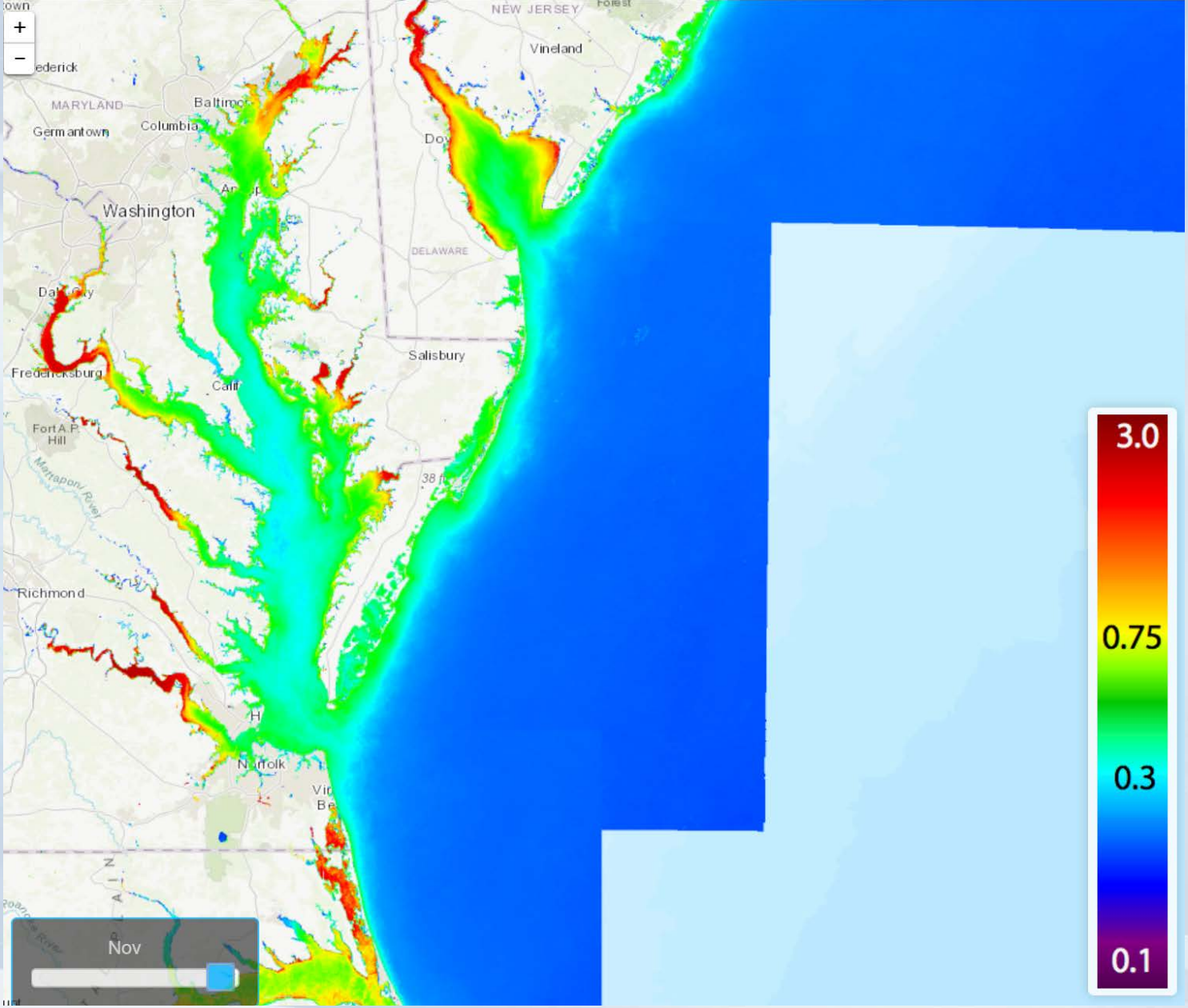


National Oceanic and Atmospheric Administration



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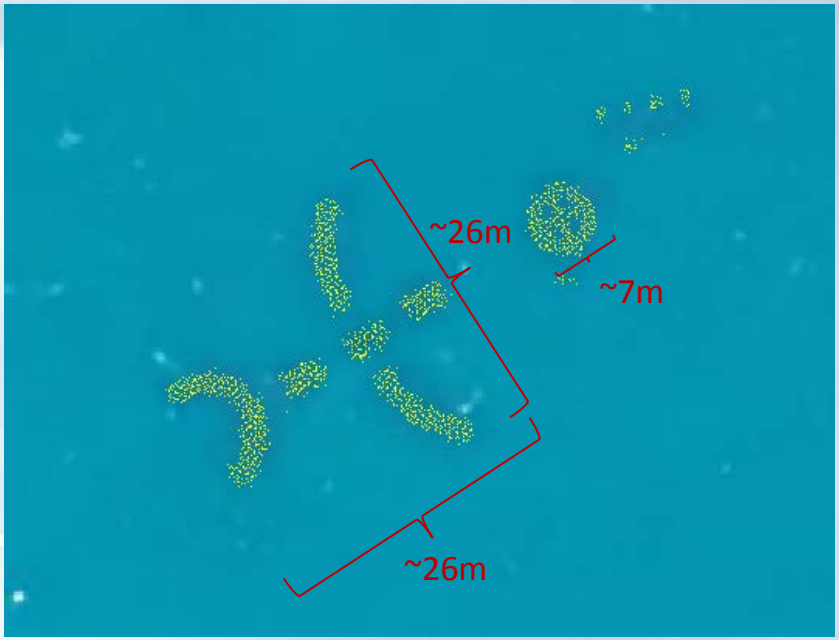
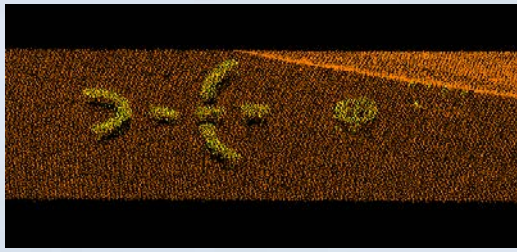
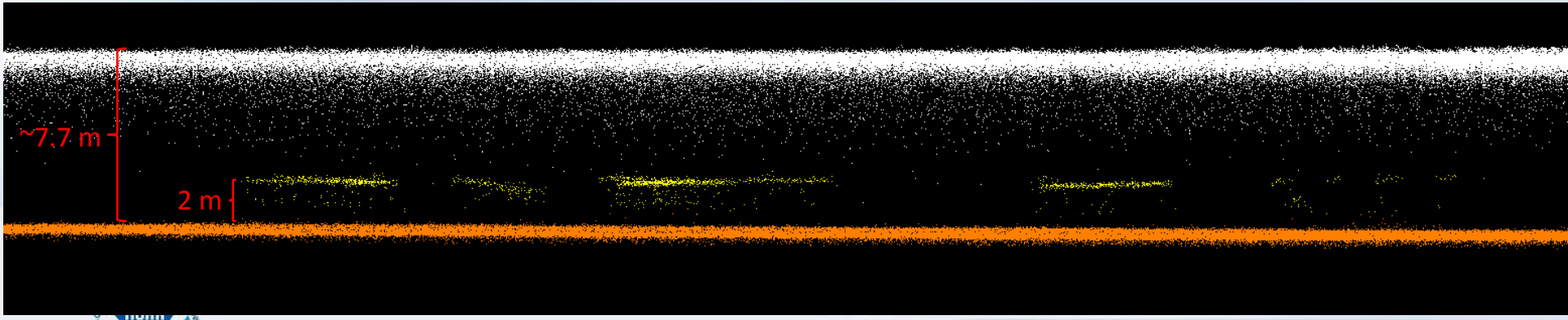
Feature found with lidar

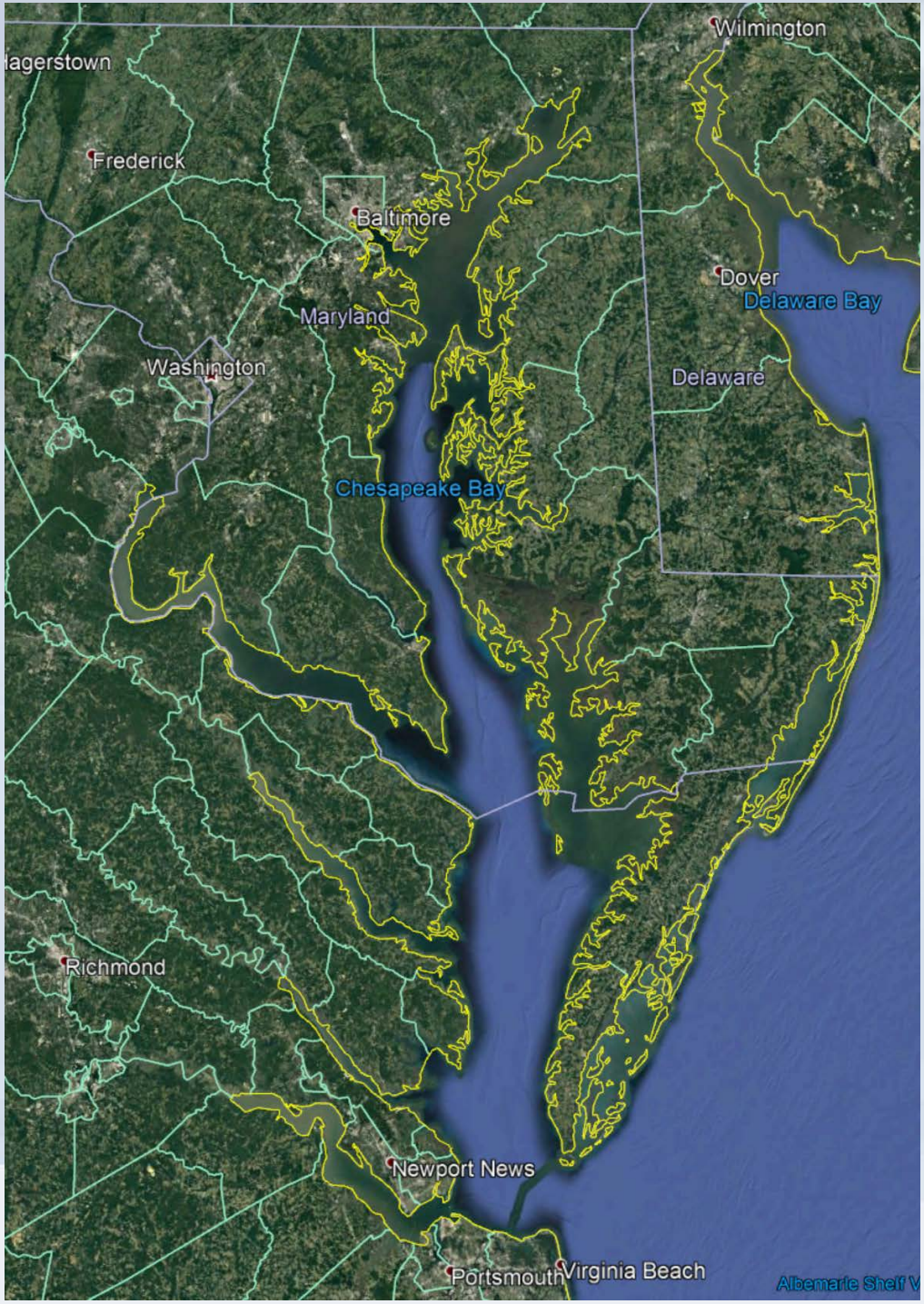


- Point density of the object ranged from ~12.5 to 13.5 pts per m^2
- Water depth: ~7.7m
- Object height: 2m





For Requirements Discussion



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