

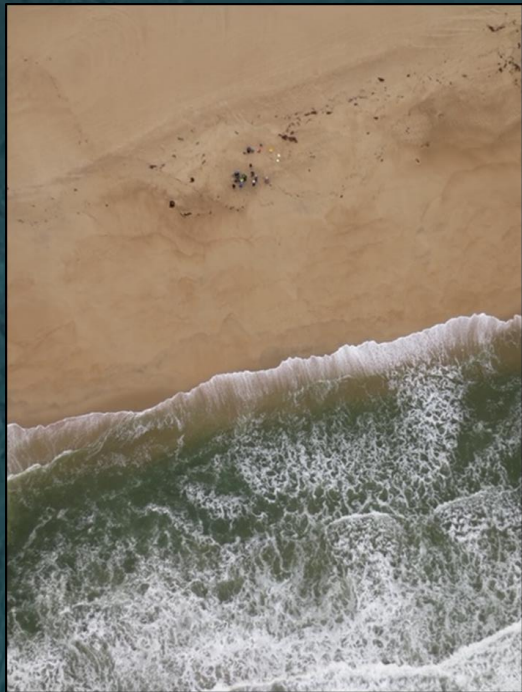
The National Bathymetric Source

Miya Pavlock
NOAA Office of Coast Survey

Navtech 2022
Session: Data Collection and Dissemination, High
Resolution Bathymetry, AIS Weather Gathering Project



About me

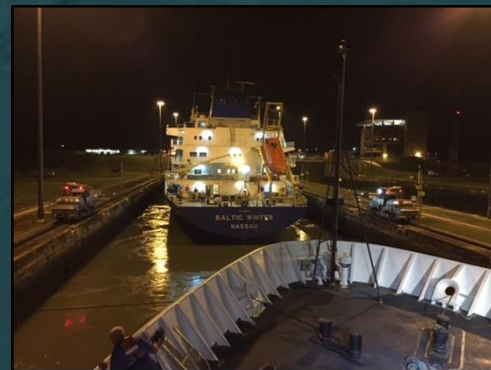


Title: Lead Physical Scientist, External Source Data team, NOAA Office of Coast Survey

Oceanographer by training, working in hydrography

B.S. Oceanography with Minor in Arctic Studies, University of Washington

M.S. Physical Oceanography, Moss Landing Marine Labs - California State University, Monterey Bay



Office of Coast Survey *The nation's nautical chartmaker*

Since 1807

Create and maintain over a thousand charts covering 95,000 miles of shoreline and 3.4 million square nautical miles of water.



Office of Coast Survey *The nation's nautical chartmaker*

Products



Data Collection



Product Distribution



Product Development

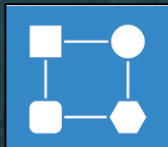
Services



Navigation Response



Regional Support



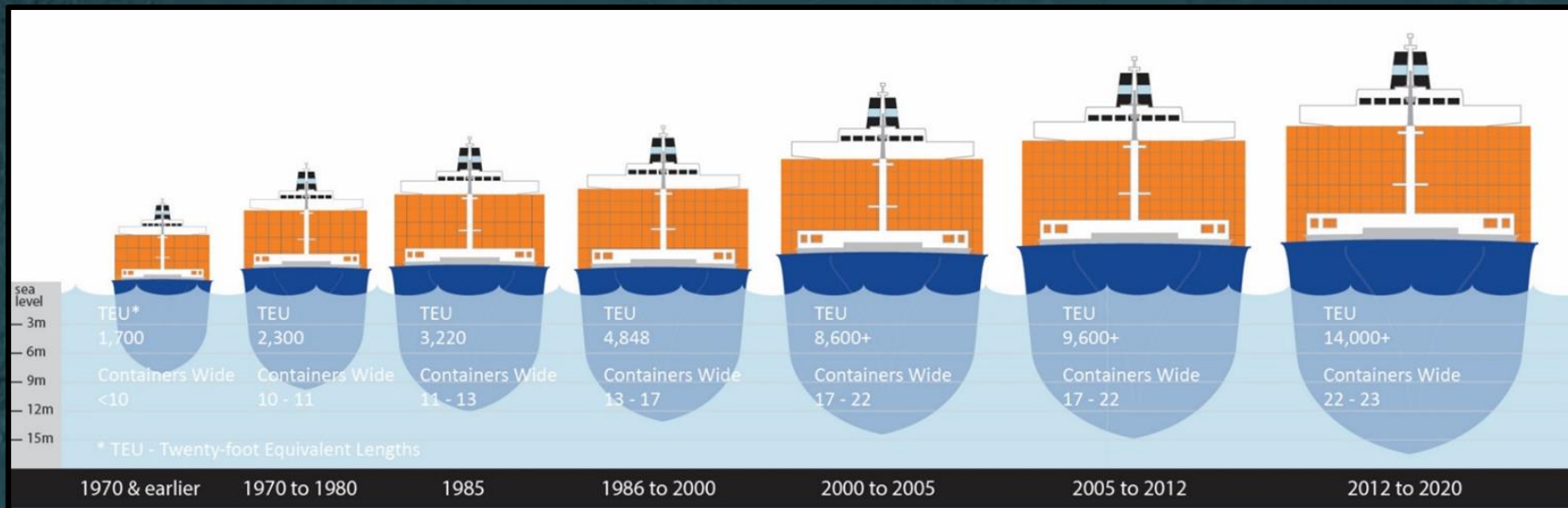
Model Development



Technology Research



Office of Coast Survey *The nation's nautical chartmaker*



1.3 billion metric tons of cargo valued at **\$1.8 trillion** comes in and out of U.S. ports every year.



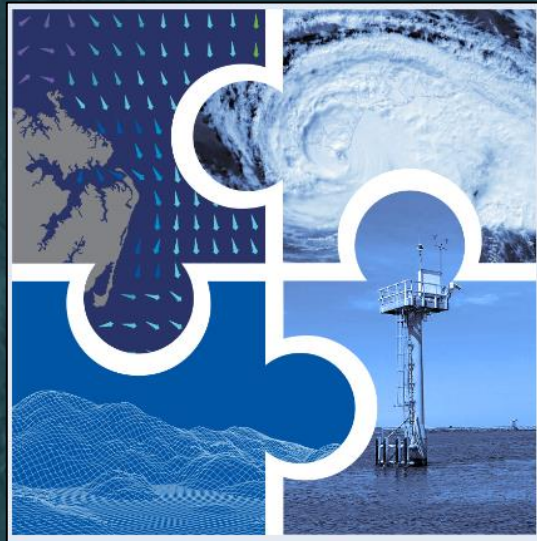
Precision Navigation



Precision marine navigation is the ability of a vessel to safely and efficiently navigate within the U.S. Exclusive Economic Zone and operate in close proximity to the seafloor, narrow channels, or other hazards.



S-100 Data Framework *An international standard*



What S-100 data products and services is NOAA working on?

+ S-102

Bathymetric Surface

+ S-111

Surface Current Forecast Guidance

+ S-104

Water Level Forecast Guidance

+ S-412

Wave And Weather Hazard

S-100 is known as the Universal Hydrographic Data Model. It is a hydrographic geospatial data standard that can support a wide variety of hydrographic-related digital data sources, and aligns with mainstream international geospatial standards



S-102 Bathymetric Surface *In development*

NOAA Precision Marine Navigation Data Gateway *Prototype* Discover → Visualize → Download

Map showing bathymetric data (S-102) overlaid on a nautical chart. The map displays depth contours and various navigational markers (lights, buoys) in the New York Harbor area, including Staten Island, Jersey City, Brooklyn, and Long Island. The bathymetric surface is color-coded, ranging from -250 meters (dark blue) to 50 meters (yellow). The map includes a legend for selecting basemaps and data layers, and a scale bar (5 miles).

Website Not Certified for Navigational Use | Privacy Policy | Disclaimer | Contact | Take our Survey | Website Owned By: Office of Coast Survey



National Bathymetric Source *Workflow*

Ingest

Qualify

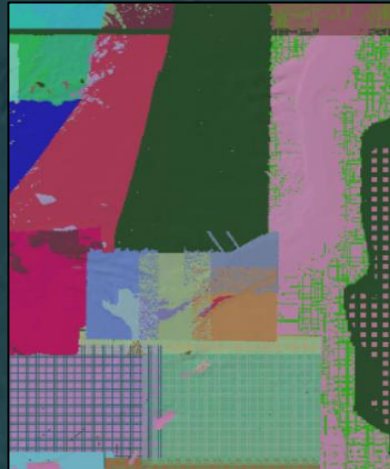
Combine

Confirm

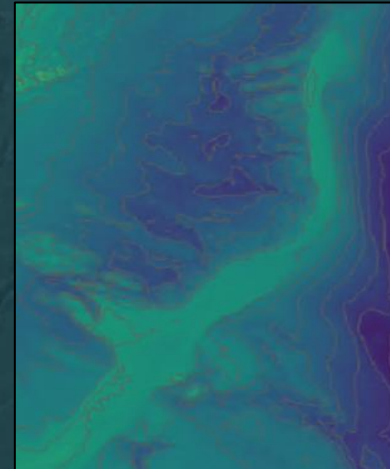
Extract

National bathymetric source outputs a high resolution model of the seafloor comprised of the best available data

Creates several outputs including S-102



Data sources



Compiled bathymetry



NOAA

Internal Source Data

- Data received under contract or collected by NOAA
- NOAA has full copyright control
- Dedicated to public domain via [CC0](#)

Federal
Agencies
(e.g. USACE,
USCG, USGS,
etc.)

External Source Data (since 2017)

- Data otherwise provided to or obtained by NOAA
- Provider assigns [Creative Commons](#) license
- NOAA handles the data per the license terms

Universities

Port data is critical for S-102!

Other
External
Source
Data

Do you know of any
External Source Data?

Contact me!



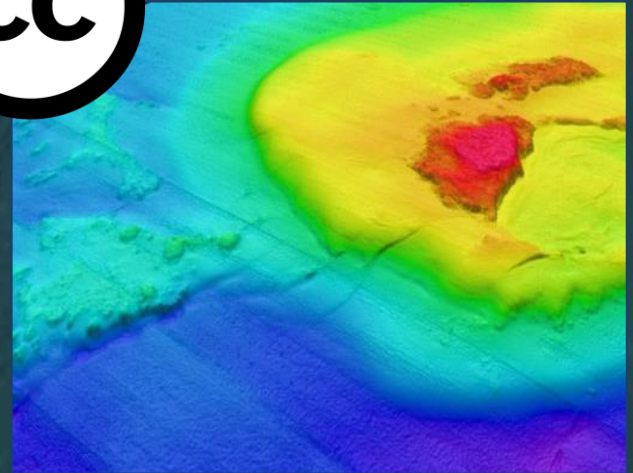
Evidence Act of 2018

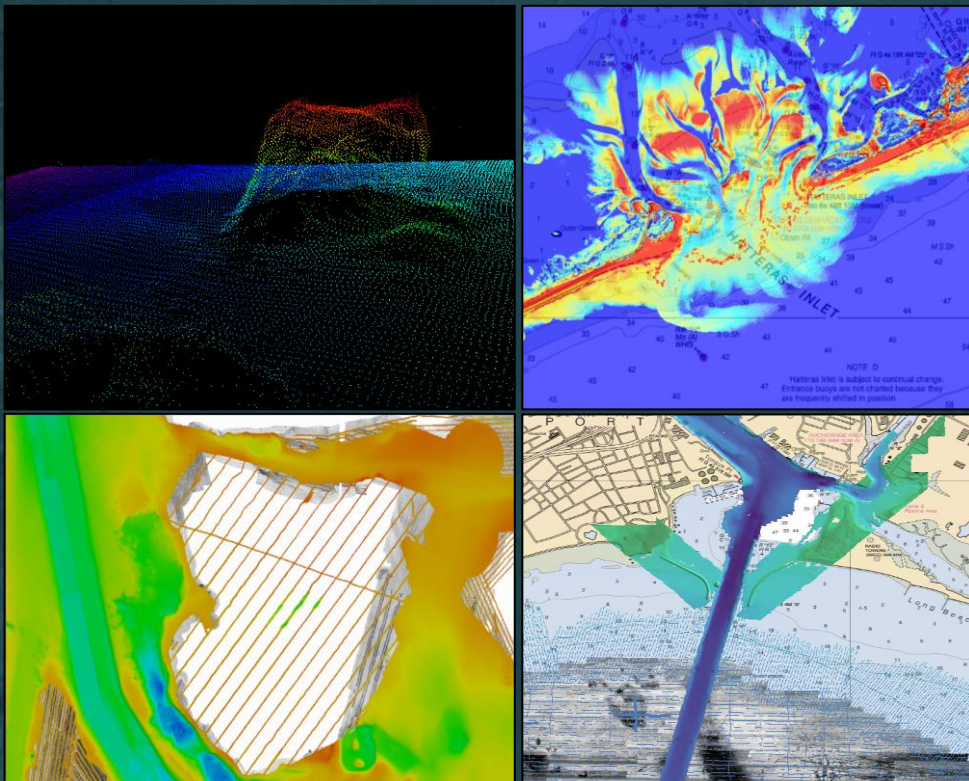
- U.S. government data shall be as free, open, and accessible as possible

Federal Open Data Policy

- Mandates open licenses
- Creative Commons Zero recommended

Enables automation and increased production!

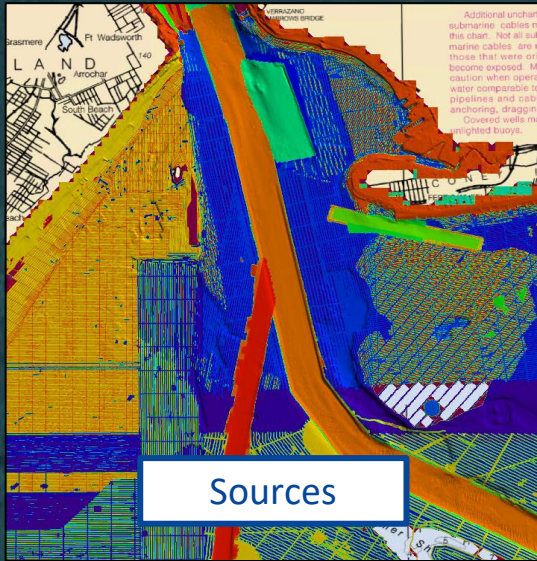




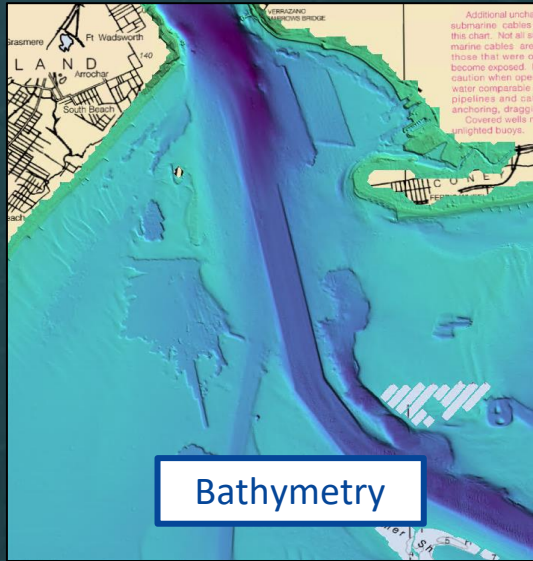
- ❖ Vertical Uncertainty
- ❖ Horizontal Uncertainty
- ❖ Survey Date Range
- ❖ Full Coverage Achieved
 - Bathymetric Coverage
- ❖ Features Detected
 - Least Depth Measured
- ❖ Size of Features Detected

National Bathymetric Source *Compiled Bathymetry*

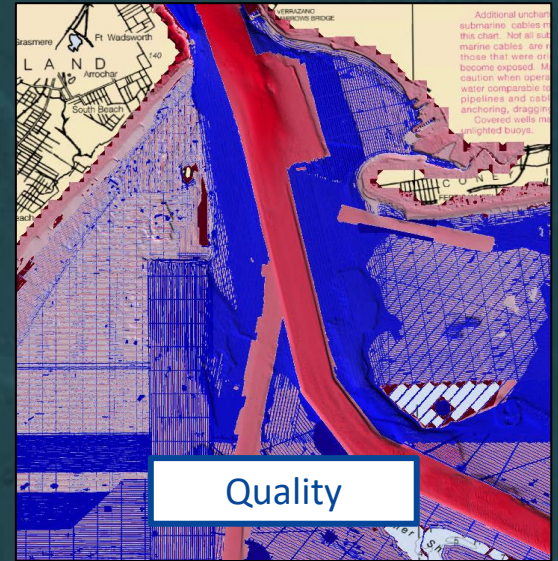
Combine



Sources



Bathymetry



Quality

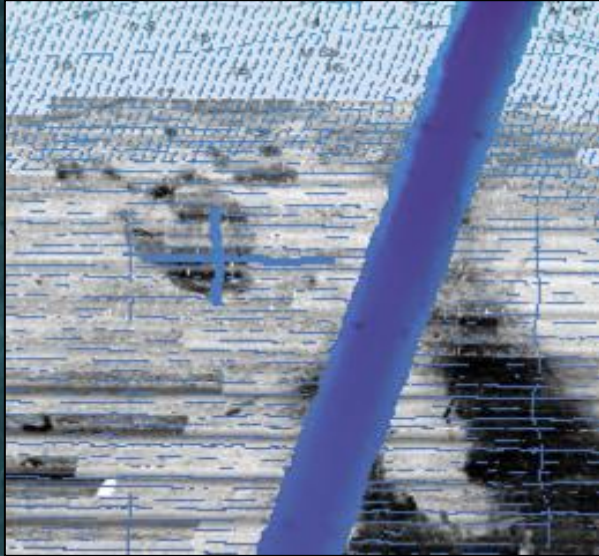
NBS_US4MA1GD_20201019_0_generalized_p_source_information.tiff

feature_size	full_coverage	bathy_coverage	horizontal_uncert_fixed	horizontal_uncert_var	License_Name	License_URL	Source_Survey_ID	Source_Institution	survey_date_start	survey_date_end
1000000	1	1	1	5	0.05	cc0-1.0	https://creativecommons.org/public/2018_ncmp_ma_19tcg5774_bareearth_1mgrid.csar	DOD/USACE/JALBTCX -- Joint Airborne Lidar Bathymetry Technic	2018-05-09	2018-08-27
1000000	1	1	1	5	0.05	cc0-1.0	https://creativecommons.org/public/2018_ncmp_ma_19tcg6851_bareearth_1mgrid.csar	DOD/USACE/JALBTCX -- Joint Airborne Lidar Bathymetry Technic	2018-05-09	2018-08-27
1000000	1	1	1	5	0.05	cc0-1.0	https://creativecommons.org/public/2018_ncmp_ma_19tcg5988_bareearth_1mgrid.csar	DOD/USACE/JALBTCX -- Joint Airborne Lidar Bathymetry Technic	2018-05-09	2018-08-27
1.5	1	1	1	5	0.05	cc0-1.0	h00545_mb_75cm_milw_1of1.bag	DOC/NOAA/NGS/OCS -- Office of Coast Survey	2007-06-13	2007-09-14
4	1	1	1	5	0.05	cc0-1.0	h11636_mb_2m_milw_1of1.bag	DOC/NOAA/NGS/OCS -- Office of Coast Survey	2007-06-25	2007-07-13
1000000	1	1	1	5	0.05	cc0-1.0	2018_ncmp_ma_19tcg6360_bareearth_1mgrid.csar	DOD/USACE/JALBTCX -- Joint Airborne Lidar Bathymetry Technic	2018-05-09	2018-08-27
1000000	1	1	1	5	0.05	cc0-1.0	ma_32_gre_20191212_cs_098_full.csar	DOD/USACE -- US Army Corps of Engineers New England District	2019-12-12	2019-12-12
1000000	1	1	1	5	0.05	cc0-1.0	2018_ncmp_ma_19tcg6361_bareearth_1mgrid.csar	DOD/USACE/JALBTCX -- Joint Airborne Lidar Bathymetry Technic	2018-05-09	2018-08-27
1000000	1	1	1	5	0.05	cc0-1.0	ma_33_dux_20160128_ad_20_full.csar	DOD/USACE -- US Army Corps of Engineers New England District	2016-01-28	2016-01-28

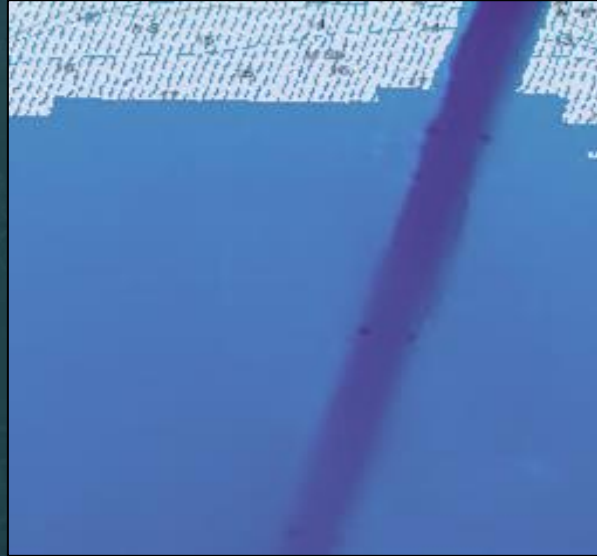


National Bathymetric Source *Quality of Bathymetry*

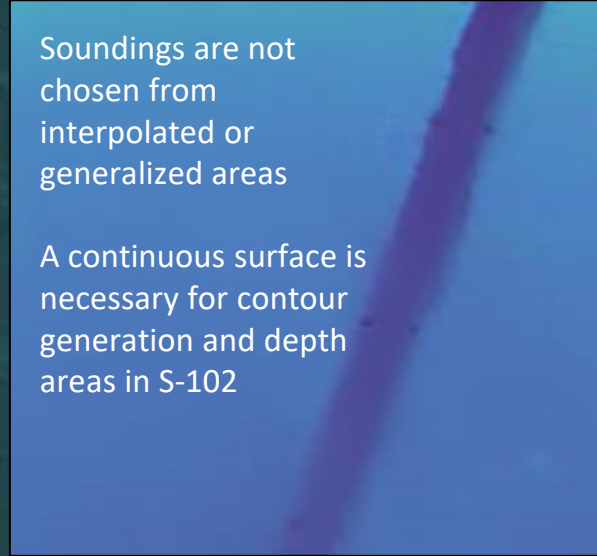
Confirm



Source
Bathymetry



Interpolated
Bathymetry



Soundings are not
chosen from
interpolated or
generalized areas

A continuous surface is
necessary for contour
generation and depth
areas in S-102

Generalized
Bathymetry

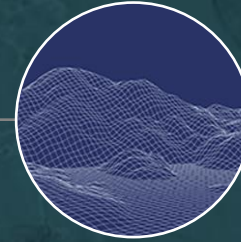


An authoritative national bathymetric database

Extract



The National
Bathymetric
Source



Navigation

- ENC
- S-102



Internal

- Planning

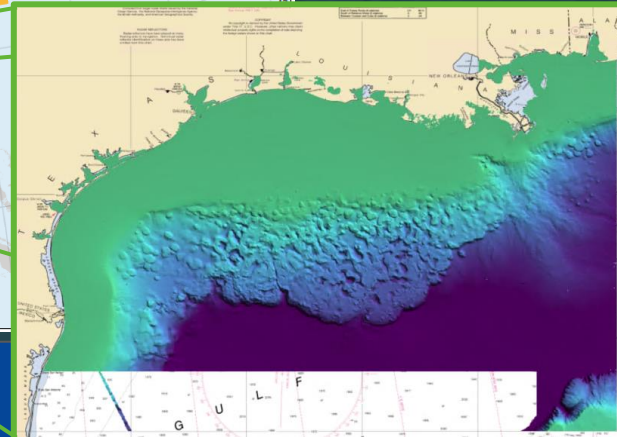
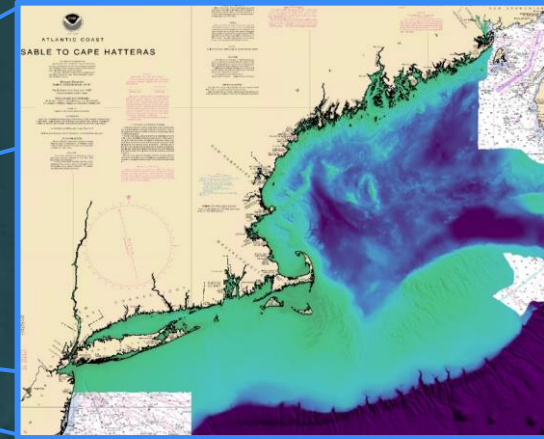
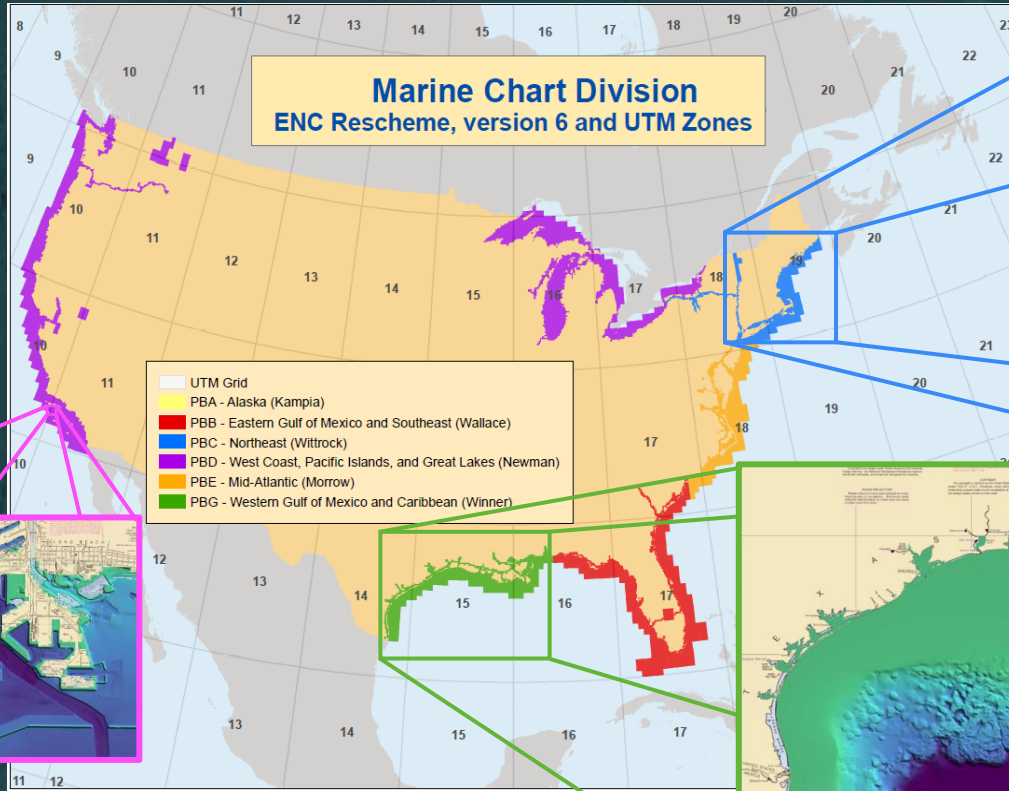


Public

- BlueTopo™
- Modelers

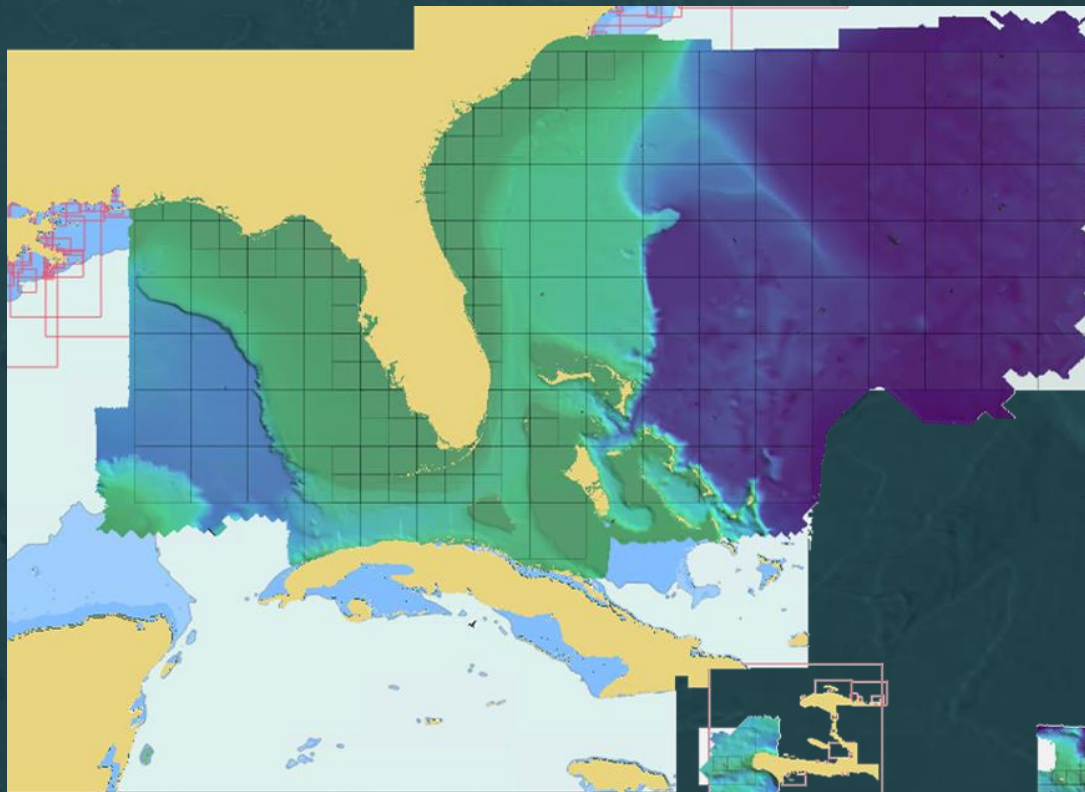


National Bathymetric Source *Build Out & Maintenance*



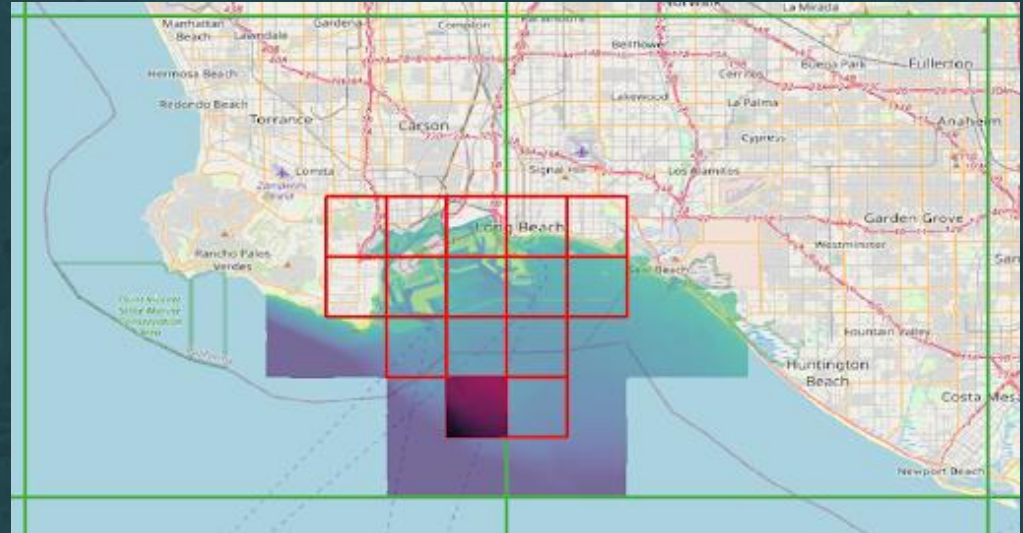
National Bathymetric Source *Build Out & Maintenance*

Southeast and
U.S. Caribbean
built in 2022

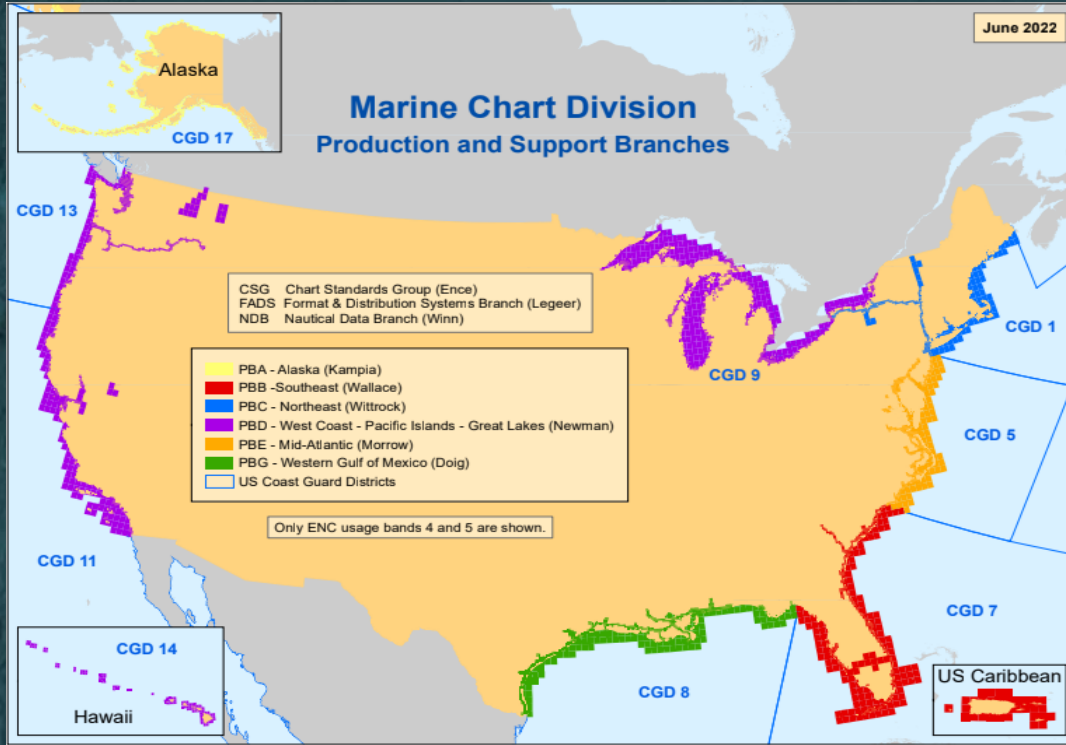


National Bathymetric Source *Maintenance*

- Compiled bathy updated as new sources become available
- Port of LA/LB feedback: Overviews at a lower resolution would be helpful
 - 2m grids had too much data when zoomed out
 - 8m overviews supported the use of PMN when zoomed out
 - Not part of S-102 spec yet, but working toward incorporating
- Precision Navigation calls for high resolution bathymetry data, specs are still developing, feedback helps us make our products better



National Bathymetric Source *Build Out Plan*



1. ~~New England (PBC)~~
2. ~~Gulf of Mexico (PBG)~~
3. ~~Caribbean (PBB)~~
4. ~~Southeast Atlantic (PBB)~~
5. Mississippi River (PBG)
6. Mid Atlantic (PBE)
7. Great Lakes (PBD)
8. West Coast (PBD)
9. Alaska (PBA)
10. Pacific Islands (PBD)



S-102 Bathymetric Surface *In development*

Precision Marine Navigation Data Gateway *Prototype* Discover → Visualize → Download

Select a Basemap

- Electronic Navigational Chart Services
- ECDIS Display
- NOAA Chart Display

Select a Map Tile to Download Available S100 Data

- Nautical Product Tile Scheme
- Use the Dropdown Menus to Display S100 Products

Bathymetric Surface (S-102)

1200 -100 -100 -75 -50 -25 -14 -12 -10 -8 -6 -4 -2 0 5 25 50 METERS

Select Region

- Water Levels (S-104)
- Weather and Wave Hazards (S-412)

S-102	S-111
S-100 Product	S-102 (Bathymetric Surface)
Agency	NOS
Spatial Resolution	4m
Cell Name	US4NY1AQ
Band Number	5
Get Data	S-102 HDF-5 Files

Website Not Certified for Navigational Use | Privacy Policy | Disclaimer | Contact | Take our Survey | Website Owned By: Office of Coast Survey

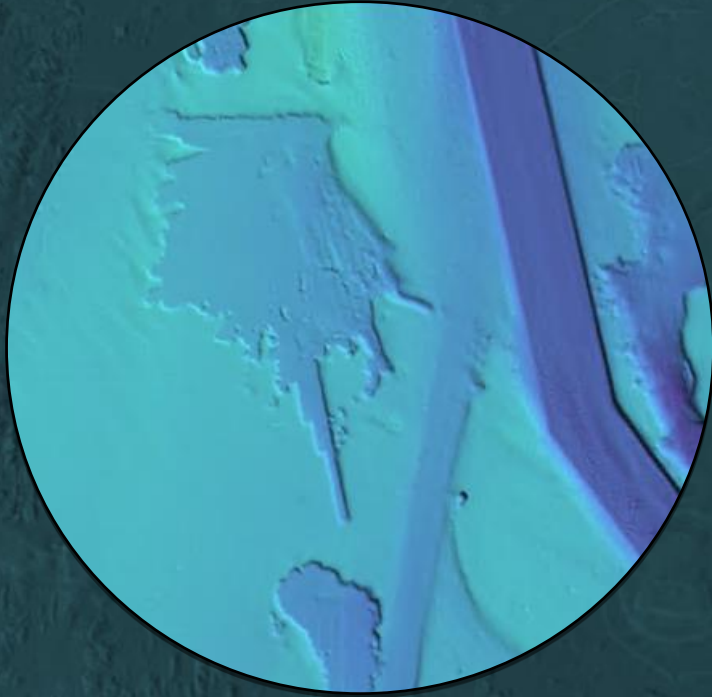


Takeaways

- ❖ S-102 in early development, working on a national scale under international standards
 - First focus areas: New York & New Jersey Harbor, Approaches to New York, Hudson River, Port of LA/Long Beach
 - Next up: Mississippi River
- ❖ National Bathymetric Source authoritative bathymetric database that combines a variety of bathymetric sources to update both the traditional charting products but also to create S-102 high resolution bathymetry data sets for navigation that are certified by NOAA
 - Built & maintained in Northeast, Gulf of Mexico, Southeast, and U.S. Caribbean



Thank you!



**Please contact me
about External
Source Data!**

Miya Pavlock

External Source Data Team Lead
NOAA Office of Coast Survey

miya.pavlock@noaa.gov

