

A graphic of a compass rose and a scale. The scale is a semi-circle with markings from 0 to 360 degrees. The compass rose is a four-pointed star with a smaller star inside, and an arrow pointing towards the 0-degree mark. The word "MAGNETIC" is written below the scale.

U.S. S-100 IMPLEMENTATION UPDATE - May 2024



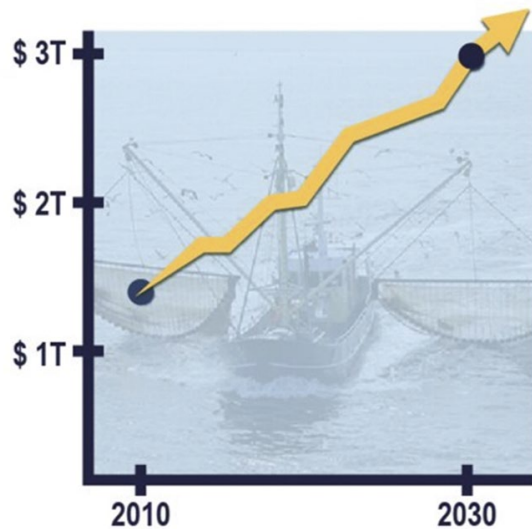
Darren Wright
**Precision Marine Navigation
Program Manager**

What is Precision Marine Navigation?

...the ability of a vessel to safely and efficiently navigate and operate in close proximity to the other vessels, seafloor, bridges, narrow channels, or other marine hazards.



Projected Global Growth by 2030



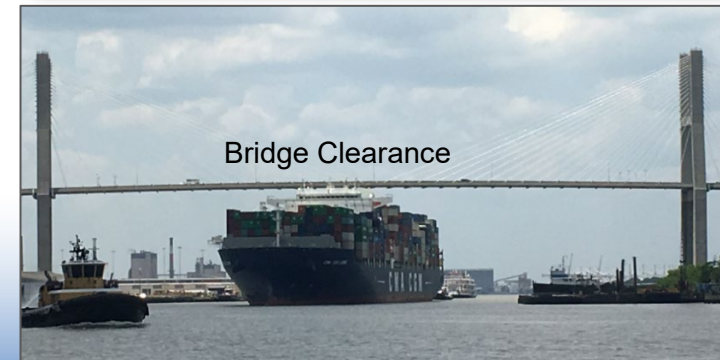
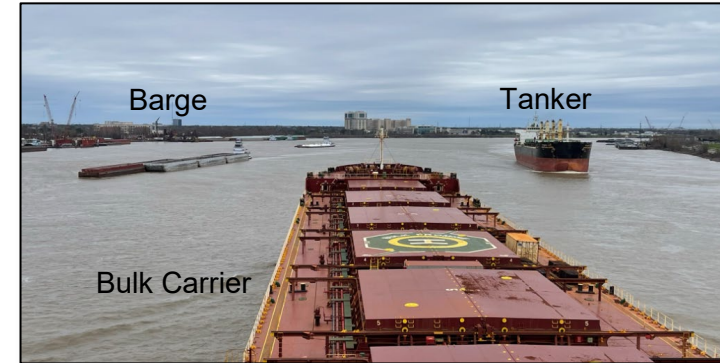
Source: OECD (2016) *The Ocean Economy in 2030*



Ship Sizes Continue to Increase!

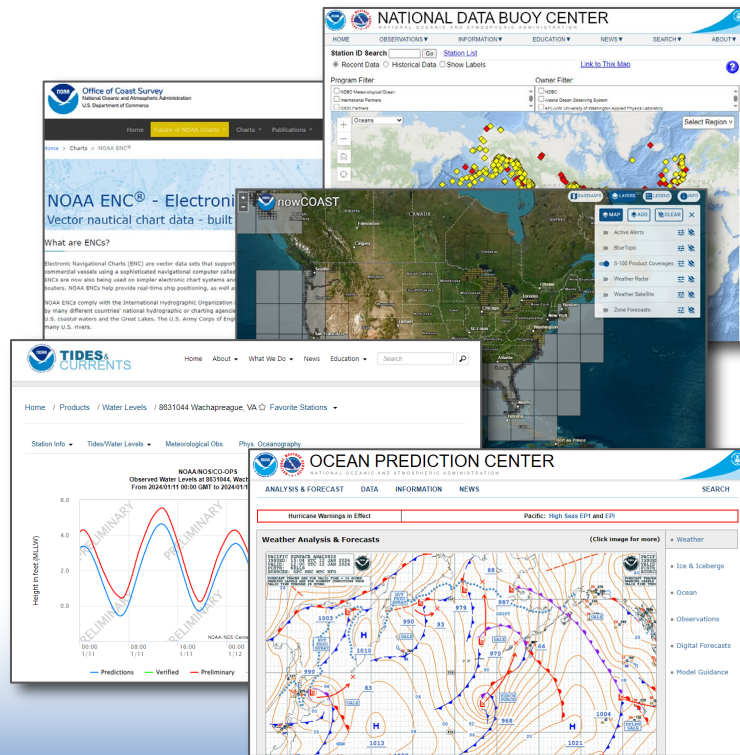
Increased Congestion and Clearance Issues

- Difficult navigation of deep draft ships in highly congested waterways
- Very tight harbors/berths
- Clearance Issues under bridges
- Demand for integrating environmental information into formats mariners can utilize to safely operate very high and very deep draft ships

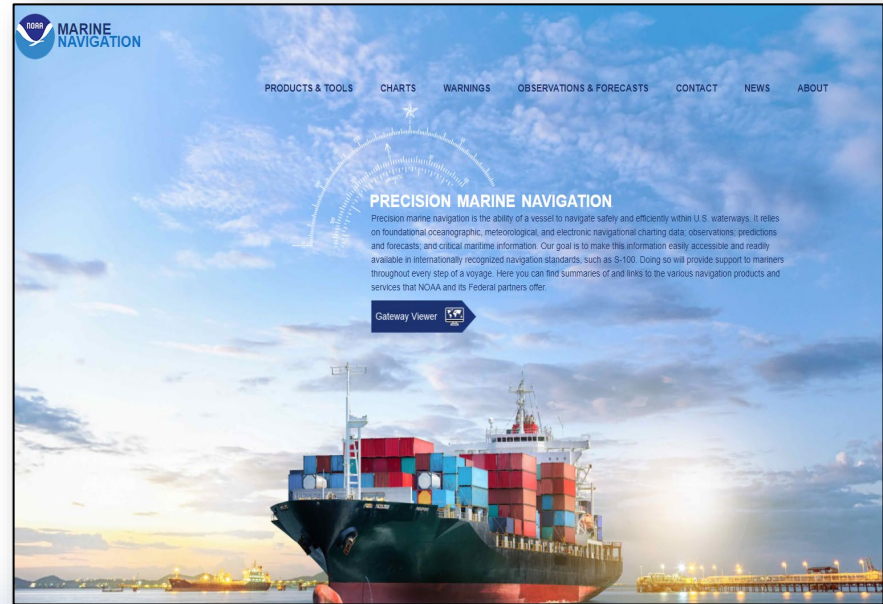


Difficult to access and process NOAA's navigation data, due to:

- Multiple devices and systems required to access the data
- Datasets spread across various websites and data servers
- Datasets are encoded in different formats that are not navigation standards



- Leveraging International Standards (S-100)
- Machine to Machine capability
- Precision Marine Navigation Data and Dissemination Services - AWS Cloud
- marinenavigation.noaa.gov Website



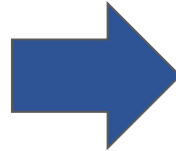
Phase 1/Route Monitoring

Phase 1 Route Monitoring Mode

- S-101 ENC
- S-102 Bathymetry
- S-104 Water Levels
- S-111 Surface Currents
- S-124 Navigational Warnings
- S-129 UKC Management

Critical Framework

- IHO Geospatial Information Registry
- S-98 Interoperability Specification
- S-100 Universal Hydrographic Data Model
- S-128 Catalogue of Nautical Products
- S-164 Test Data Set for S-100 and ECDIS Type Approval

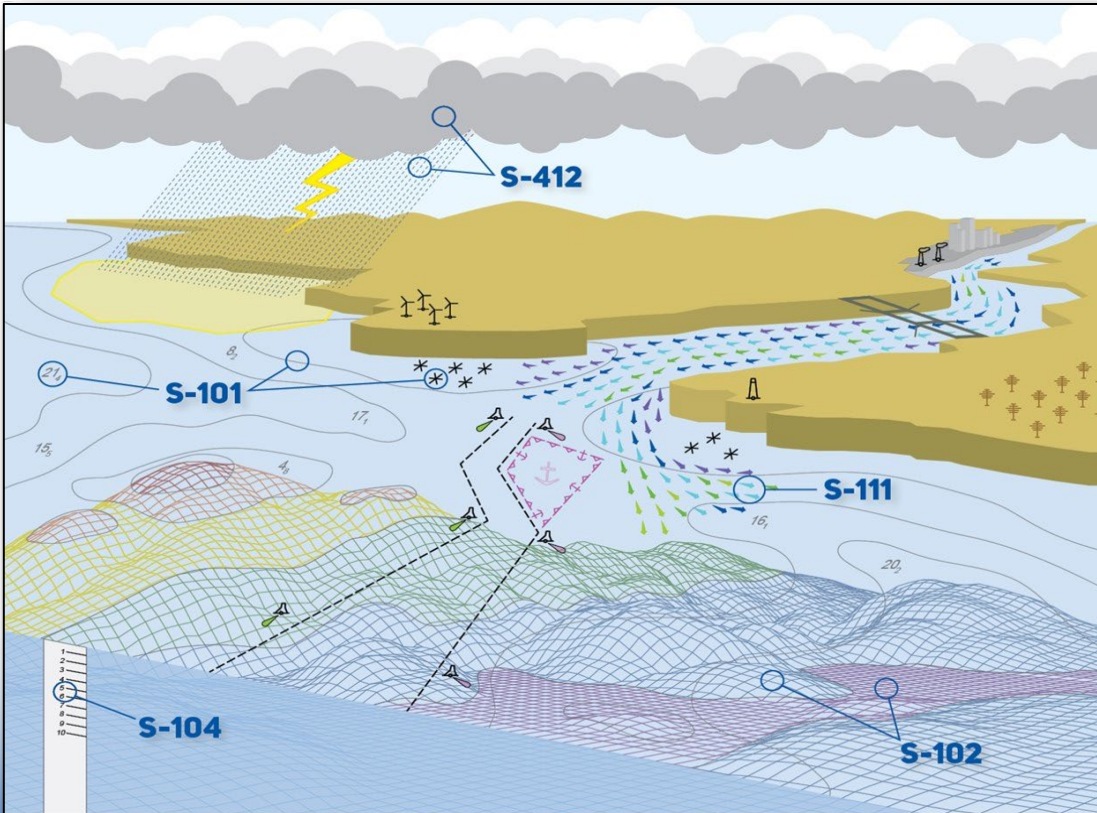


Phase 2/Route Planning

Phase 2 Route Monitoring Mode

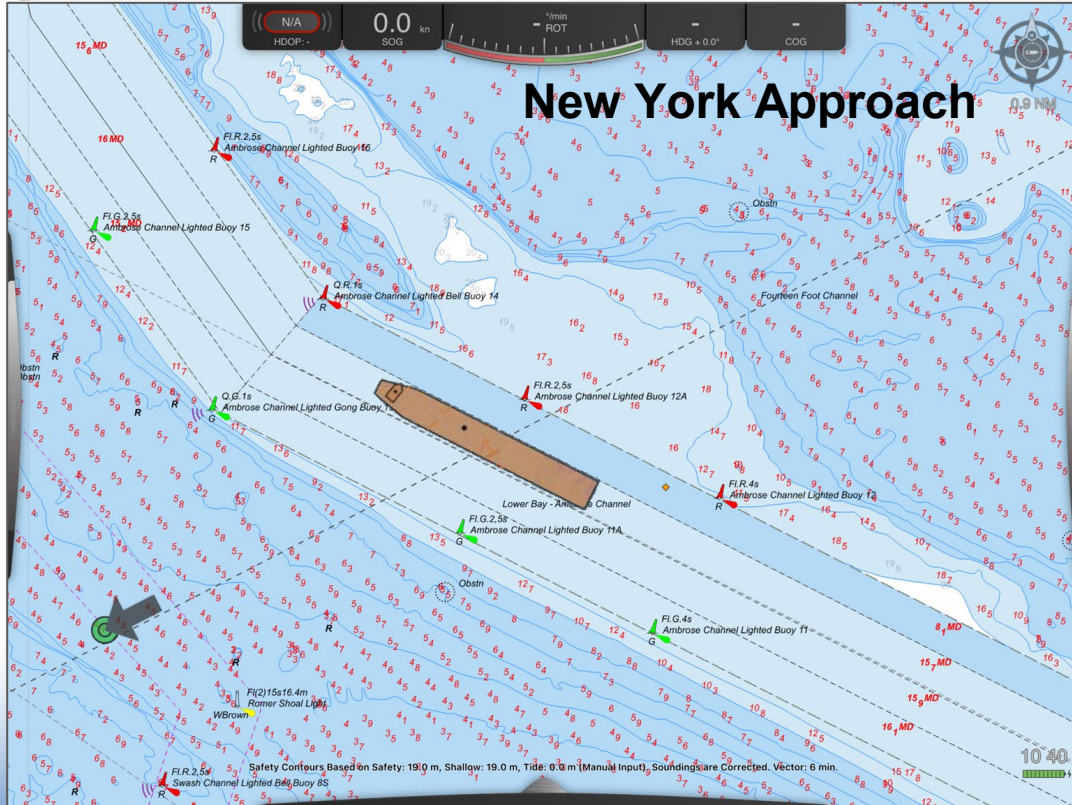
- S-122 Marine Protected Areas
- S-123 Marine Radio Services
- S-125 Marine Aids to Navigation (AtoN)
- S-126 Marine Physical Environment
- S-127 Marine Traffic Management
- S-131 Marine Harbour Infrastructure
- S-411 Ice Information (WMO)
- S-412 Weather and Wave Hazards (WMO)

+ S-100 Products used in Monitoring Mode



NOAA S-100 Data Products

- **S-101:** Electronic Navigational Charts (ENC)
- **S-102:** Bathymetric Surface
- **S-104:** Water Level Information
- **S-111:** Surface Currents
- **S-41X:** Weather Overlays



Trelleborg SafePilot - Portal Pilot Unit Display



Trelleborg SafePilot - Portal Pilot Unit Display

Integrated Water Level and Bathymetry

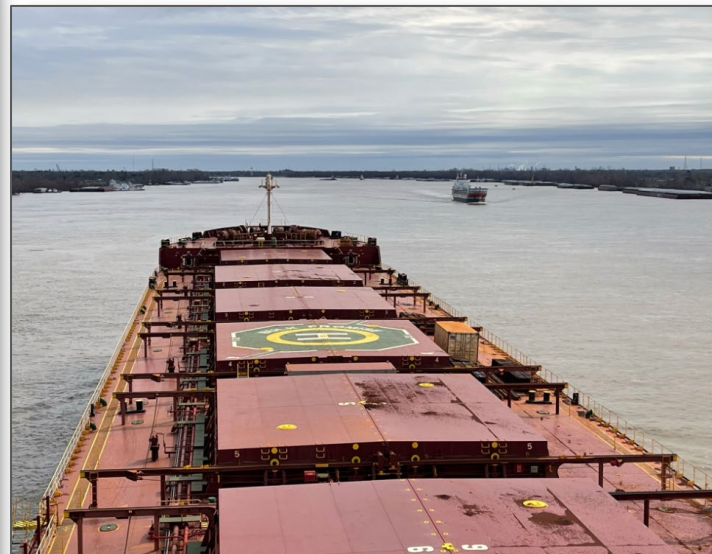
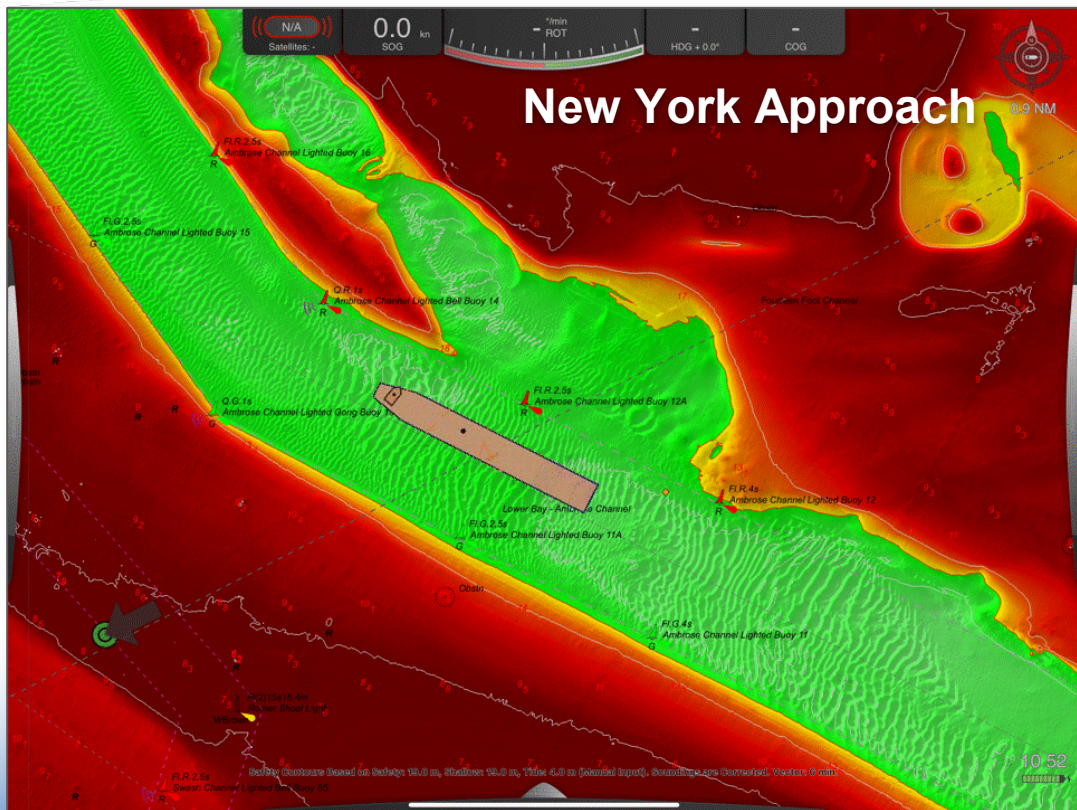


Trelleborg SafePilot - Portal Pilot Unit Display
(Potential Future Capability)

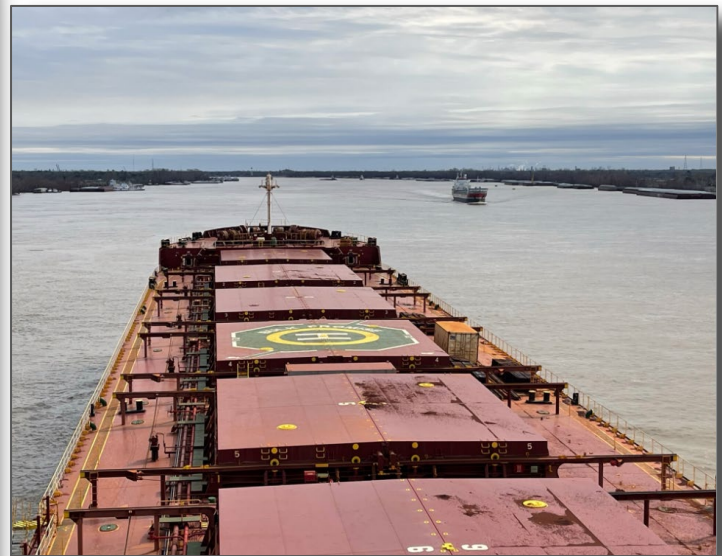


NOAA
Coast Survey

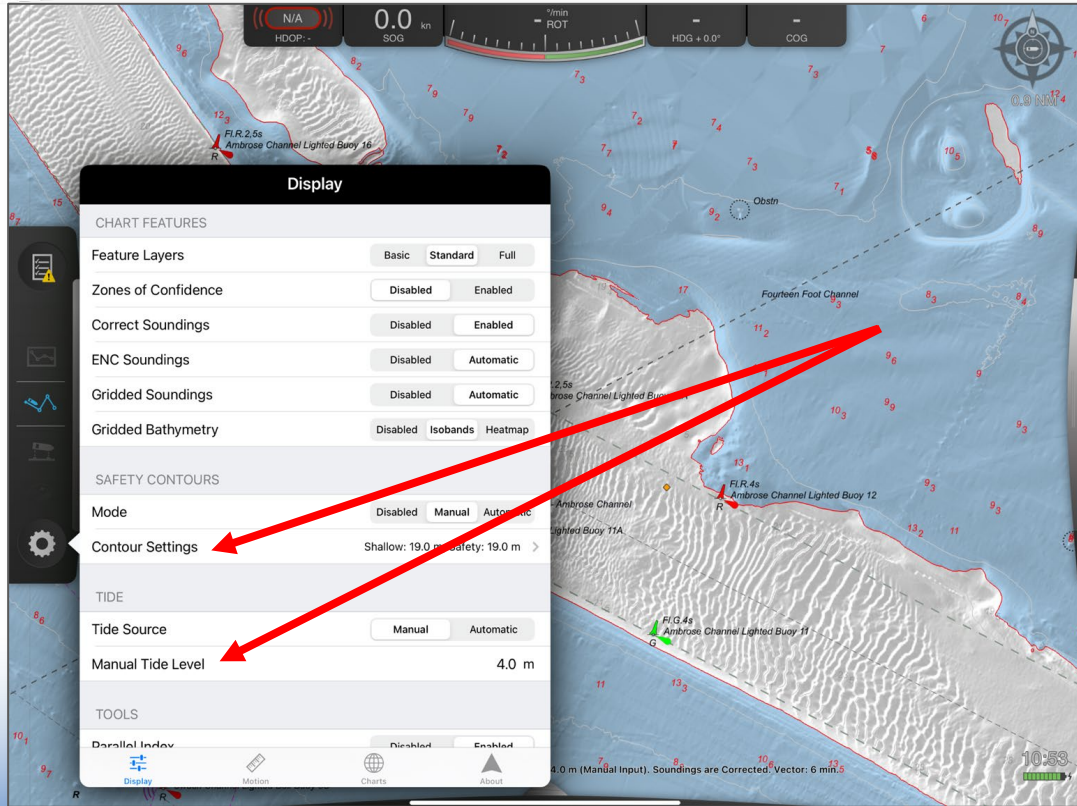
Integrated Water Level and Bathymetry Heatmap



Trelleborg SafePilot - Portal Pilot Unit Display
(Potential Future Capability)



Trelleborg SafePilot - Portal Pilot Unit Display
(Potential Future Capability)

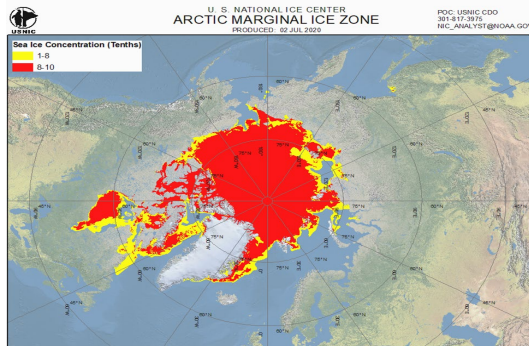


Trelleborg SafePilot - Portal Pilot Unit Display

S - 411

Ice Hazards and Information

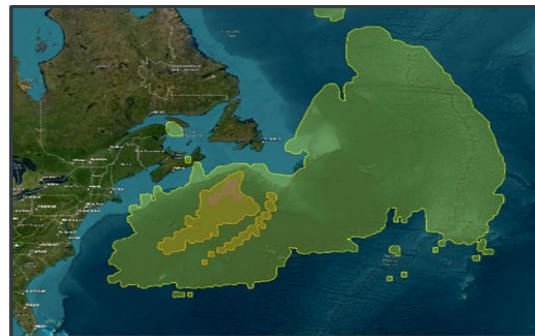
Portrayal Pending



S - 412

Weather and Wave Warnings

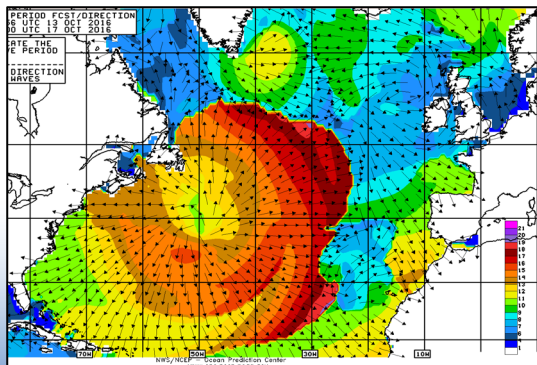
Polygons



S - 413

Weather and Wave Conditions

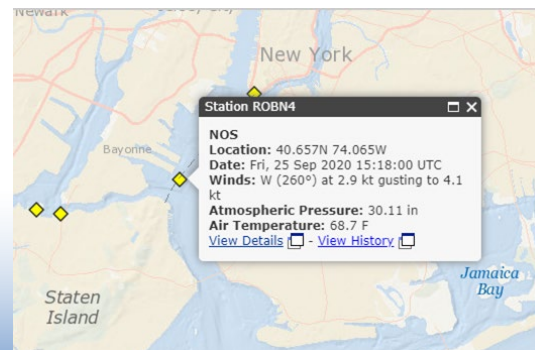
Graphics & Gridded Data



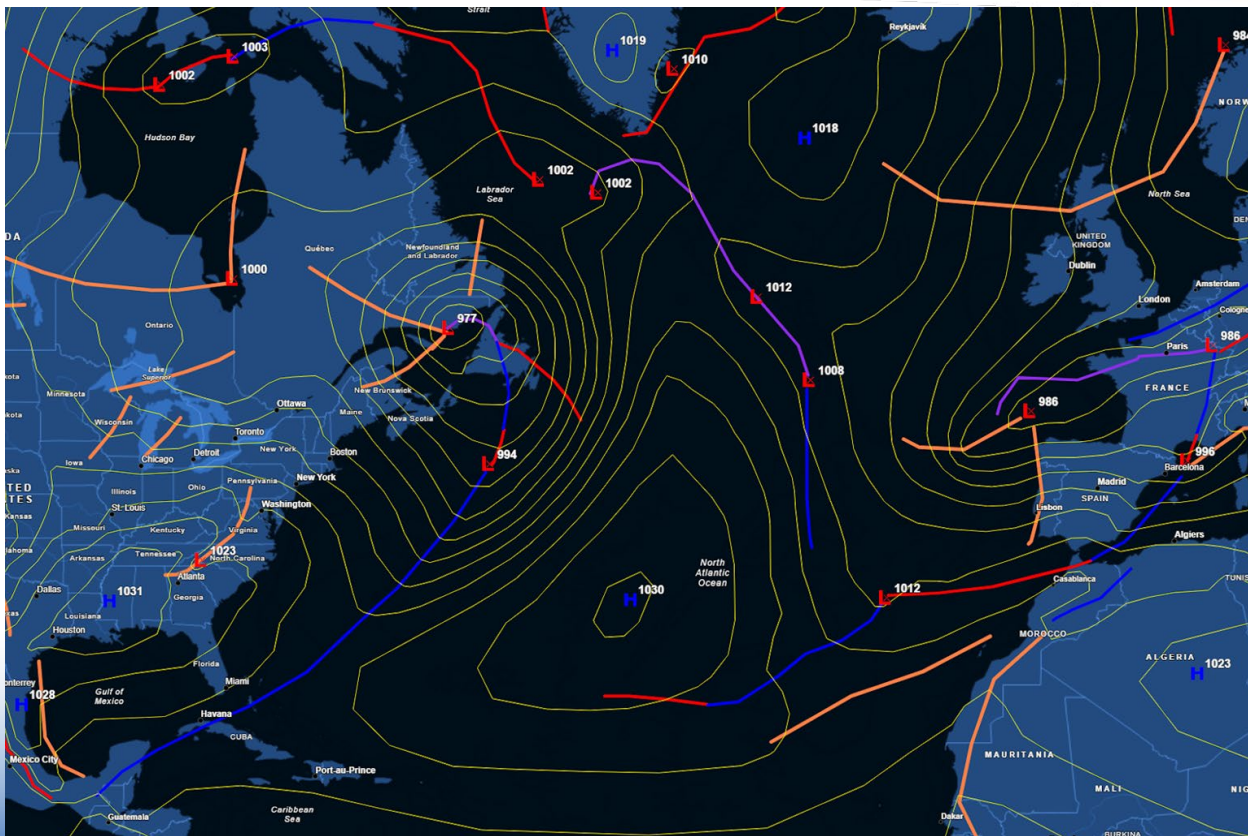
S - 414

Weather and Wave Observations

Point Based Data




Wind and Wave Warning Polygons



Wind Warnings:

Gale Force 

Storm Force 

Hurricane Force 

Wave Warnings:

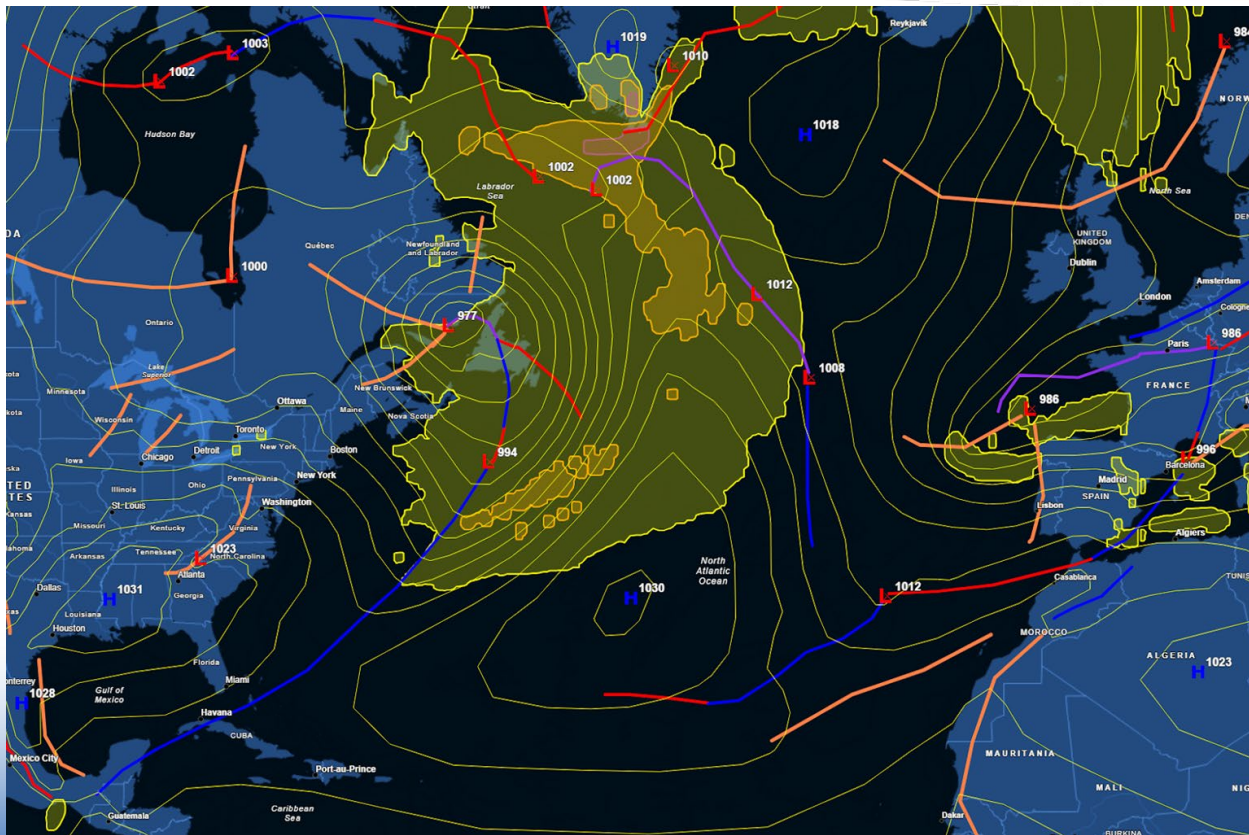
4-6 M 

6-9 M 

9-14 M 

14+ M 


Wind and Wave Warning Polygons



Wind Warnings:

Gale Force 

Storm Force 

Hurricane Force 

Wave Warnings:

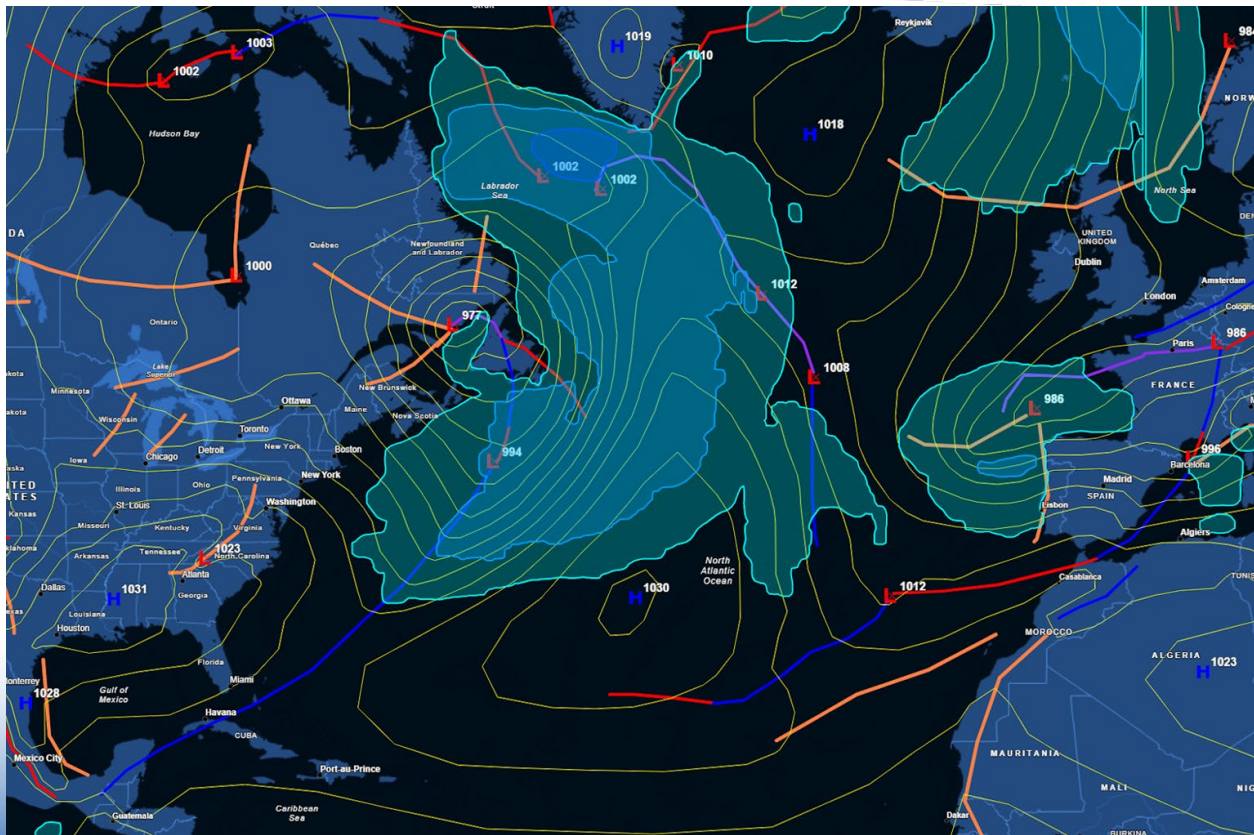
4-6 M 

6-9 M 

9-14 M 

14+ M 


Wind and Wave Warning Polygons



Wind Warnings:

Gale Force 

Storm Force 

Hurricane Force 

Wave Warnings:

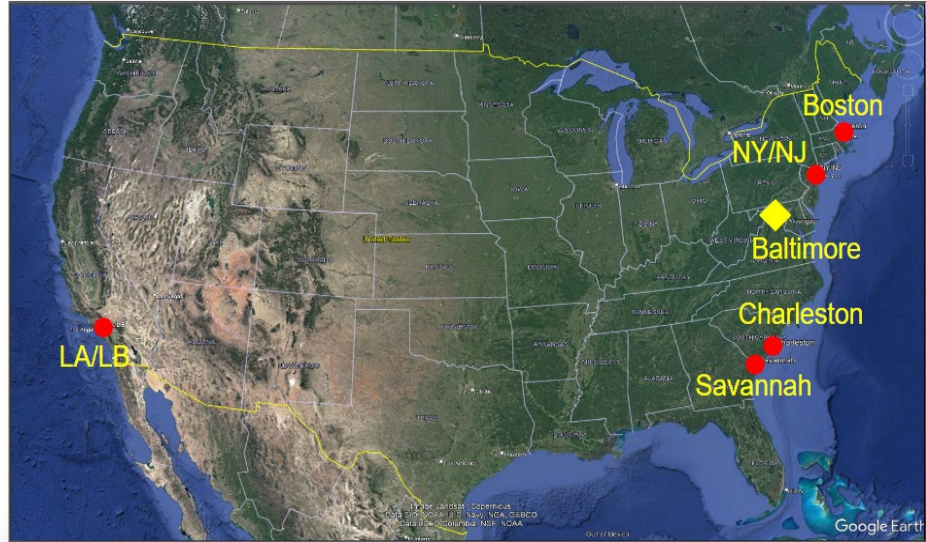
4-6 M 

6-9 M 

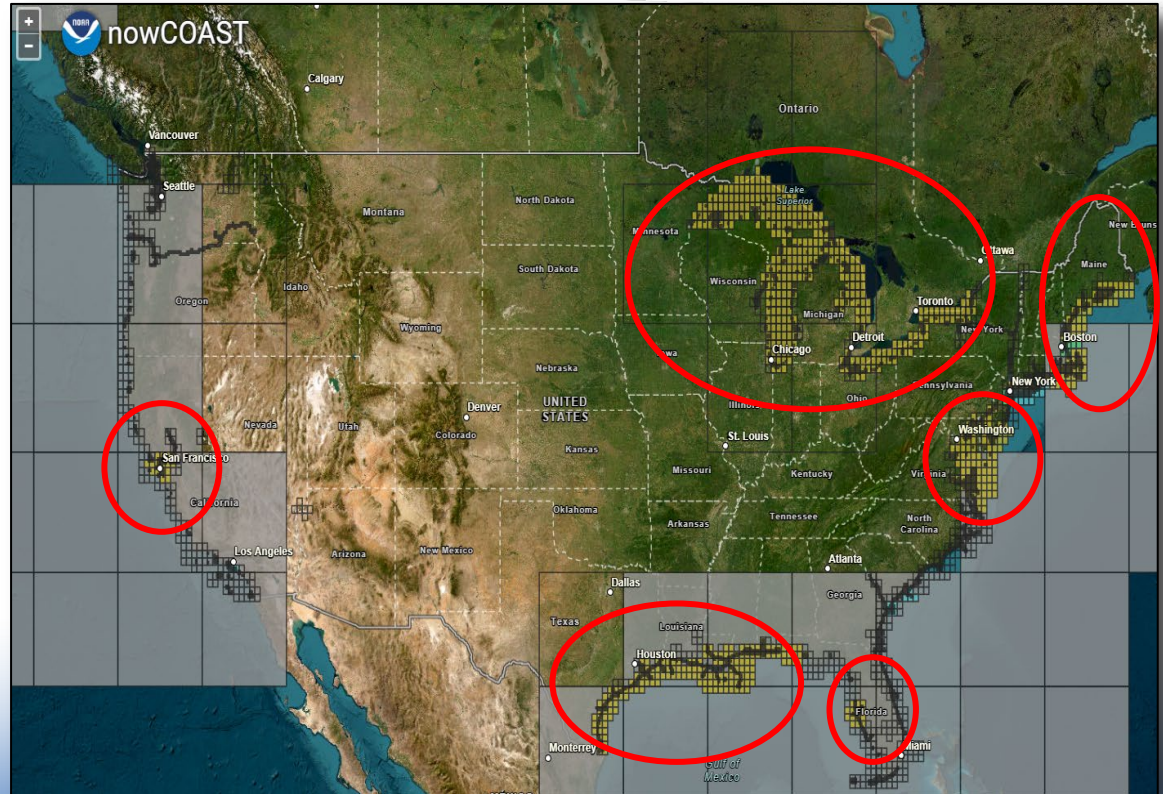
9-14 M 

14+ M 

- S-102 Edition 2.1.0 available in the following locations
 - LA/LB, NY/NJ, Boston, Baltimore, Charleston, Savannah, working on LMR
- Testing Edition 2.2.0 that will work with S-100 metadata upgrade (5.1.0)
- Operation version of S-102 standard released by 12/2024
- S-102 expansion will be put on hold until final standard is established
- Expansion to other locations should start Q2 FY25



- We have test Surface Current Data in locations where we have Operational Forecast Systems
- Data is currently in ver. 1.2.0
- Operational standard ver. 2.0.0 is expected by the end of the 2024

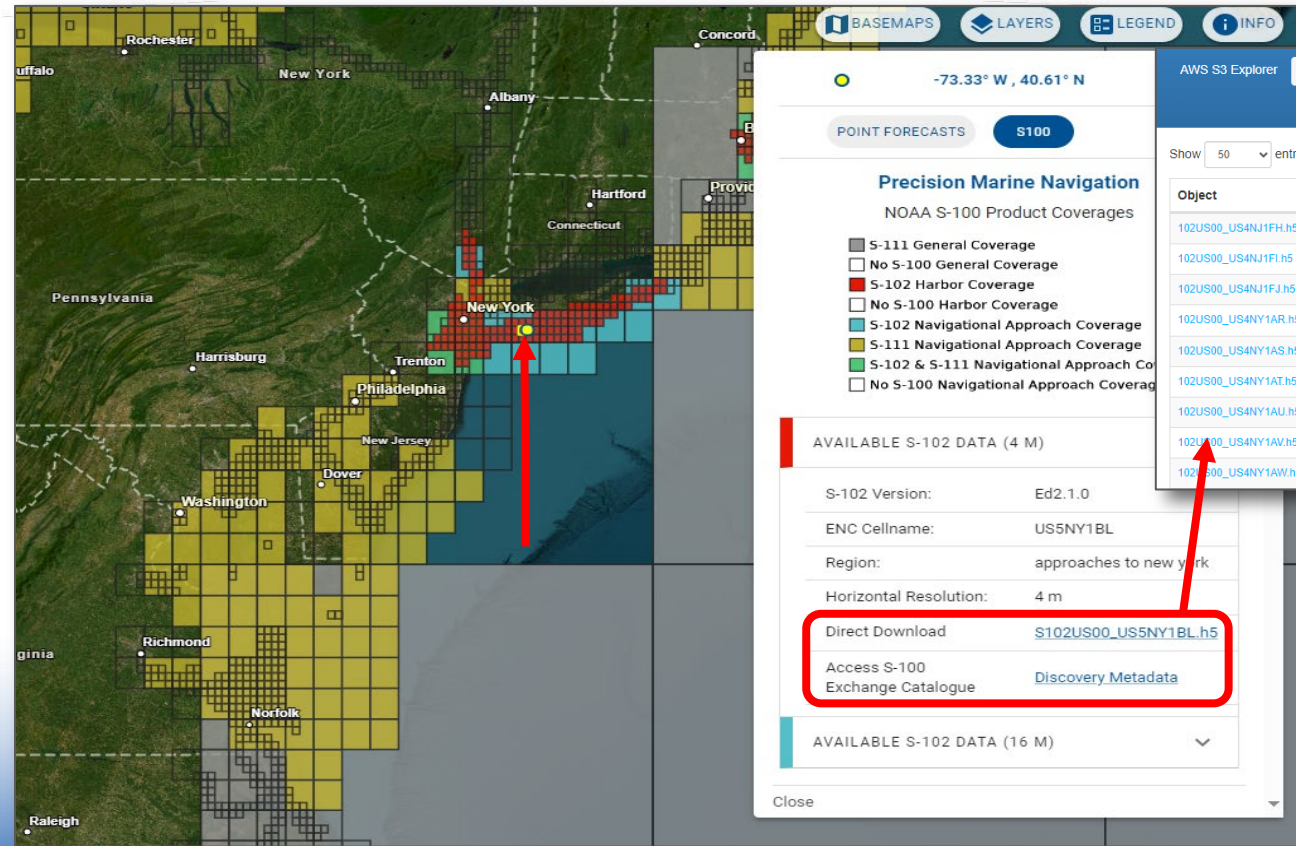




- Developing prototype S-104 water level forecast data using Global STOFs model
- S-104 Operational Standard, ver. 2.0.0 expected by end of 2024
- Test data availability in early/mid 2025

NowCoast S-100 Product Coverage Viewer





POINT FORECASTS **S100**

Precision Marine Navigation

NOAA S-100 Product Coverages

- S-111 General Coverage
- No S-100 General Coverage
- S-102 Harbor Coverage
- No S-100 Harbor Coverage
- S-102 Navigational Approach Coverage
- S-111 Navigational Approach Coverage
- S-102 & S-111 Navigational Approach Coverage
- No S-100 Navigational Approach Coverage

AVAILABLE S-102 DATA (4 M)

S-102 Version: Ed2.1.0
 ENC Cellname: US5NY1BL
 Region: approaches to new york
 Horizontal Resolution: 4 m

Direct Download [S102US00_US5NY1BL.h5](#)

Access S-100 Exchange Catalogue [Discovery Metadata](#)

AVAILABLE S-102 DATA (16 M)

Close

AWS S3 Explorer

noaa-s102-pds / ed2.1.0 / national_bathymetric_source / approaches_to_new_york / dcf2 / tiles

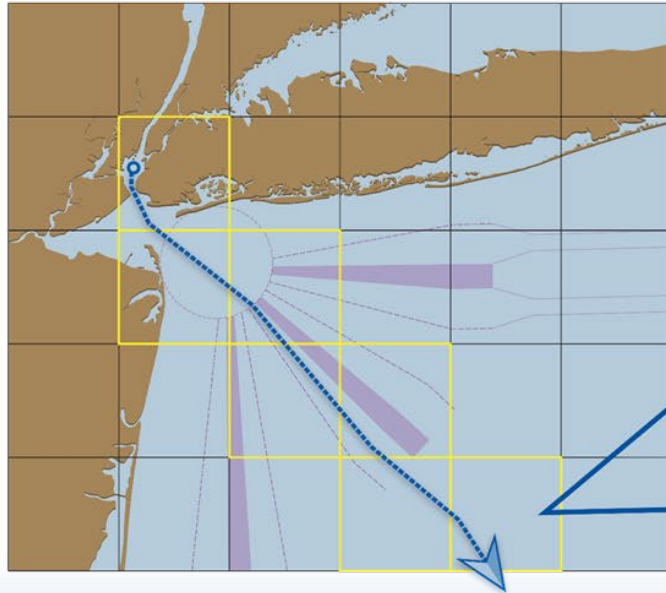
Hide folders? Folder Bucket 89

Show 50 entries Search:

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102US00_US4NJ1FI.h5	a month ago	2023-12-06 13:16:06	10 MB
102US00_US4NJ1FJ.h5	a month ago	2023-12-06 13:16:08	11 MB
102US00_US4NY1AR.h5	a month ago	2023-12-06 13:15:32	3 MB
102US00_US4NY1AS.h5	a month ago	2023-12-06 13:15:16	5 MB
102US00_US4NY1AT.h5	a month ago	2023-12-06 13:16:21	7 MB
102US00_US4NY1AU.h5	a month ago	2023-12-06 13:16:39	9 MB
102US00_US4NY1AV.h5	a month ago	2023-12-06 13:16:17	11 MB
102US00_US4NY1AW.h5	a month ago	2023-12-06 13:16:02	11 MB



S-100 and the Power of Discovery Metadata

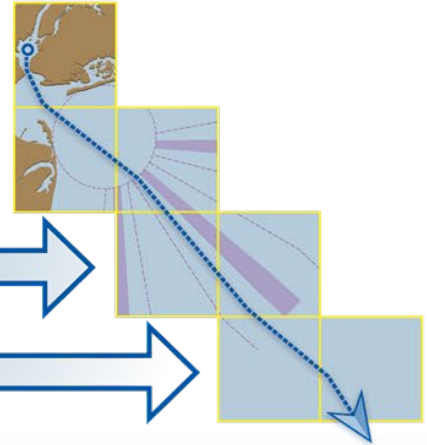


DISCOVERY METADATA

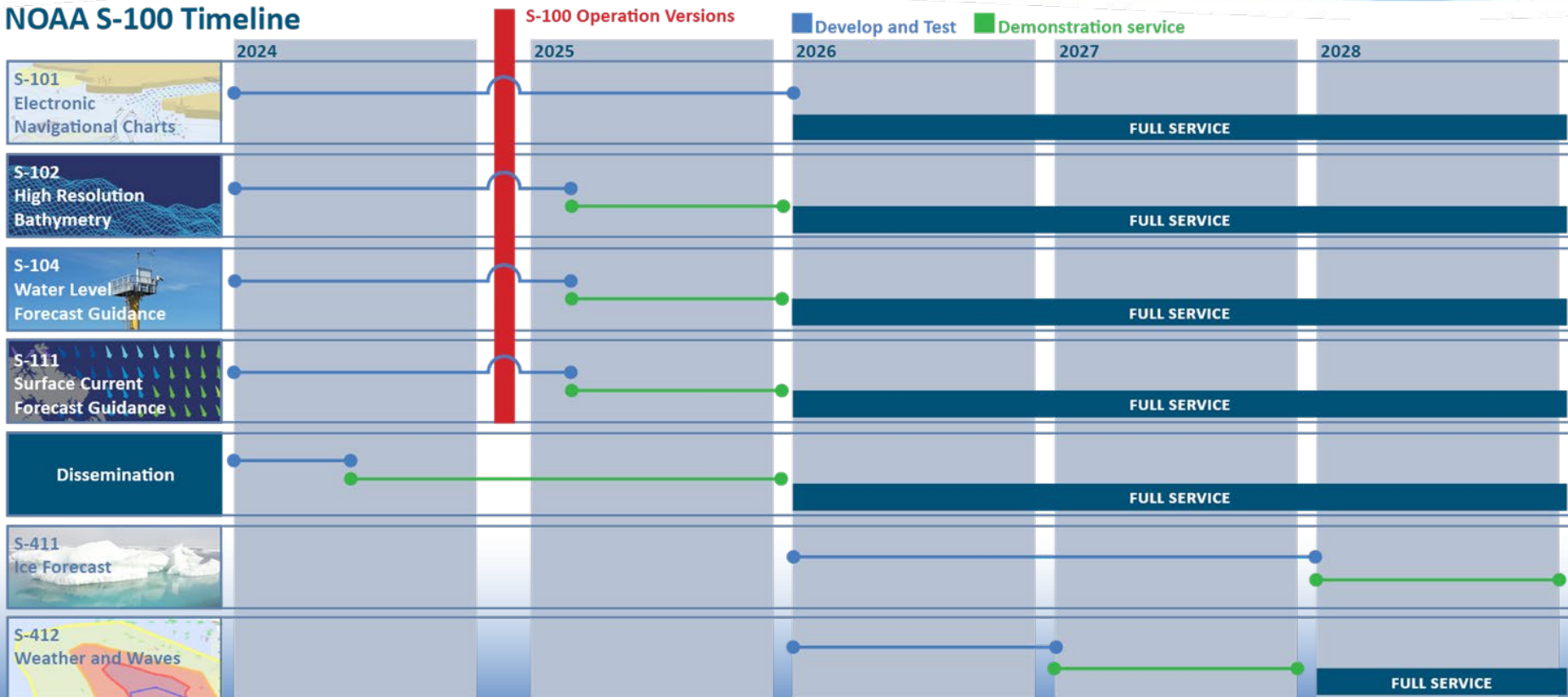
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NOAA OPERATIONAL OCEANOGRAPHIC FORECAST SYSTEMS. THE INFORMATION HAS BEEN
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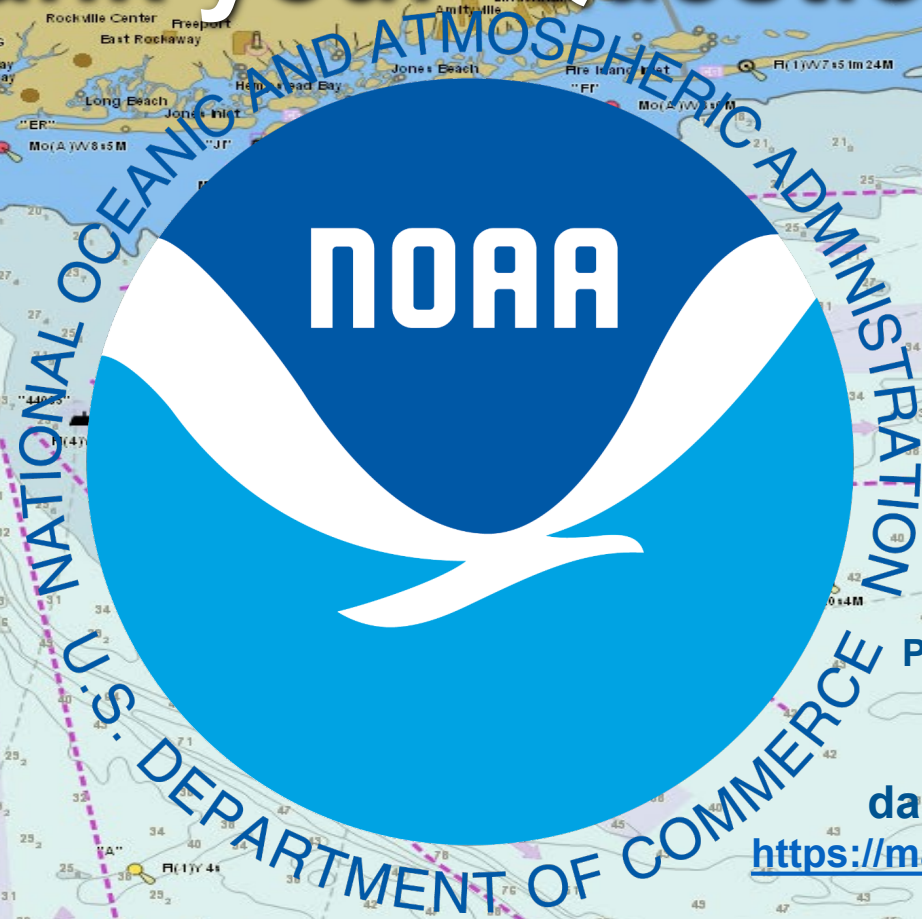
NOAA S-100 Timeline



- In 2022, the International Maritime Organization (IMO), amended its Electronic Chart Display and Information System (ECDIS) standard to leverage S-100 based ENC's beginning in 2026.
- S-100 ECDIS will be voluntary starting **1 January 2026**
- From **1 January 2029** new systems must comply with the new IMO Resolution on ECDIS Performance Standards (MSC.530(106))
- New ECDIS aim to be “dual fuel” capable – able to display both S-57 and S-101 for a smooth transition period.



Thank you! Questions?

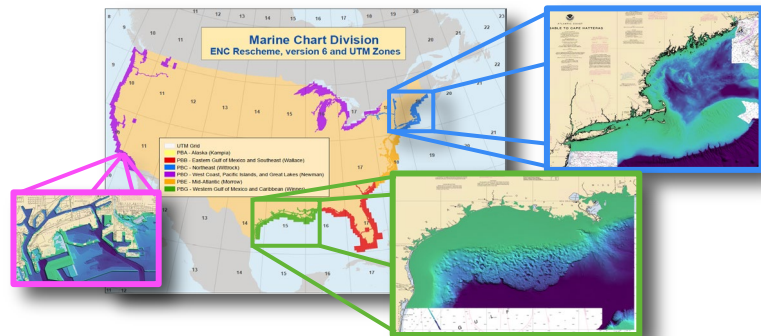
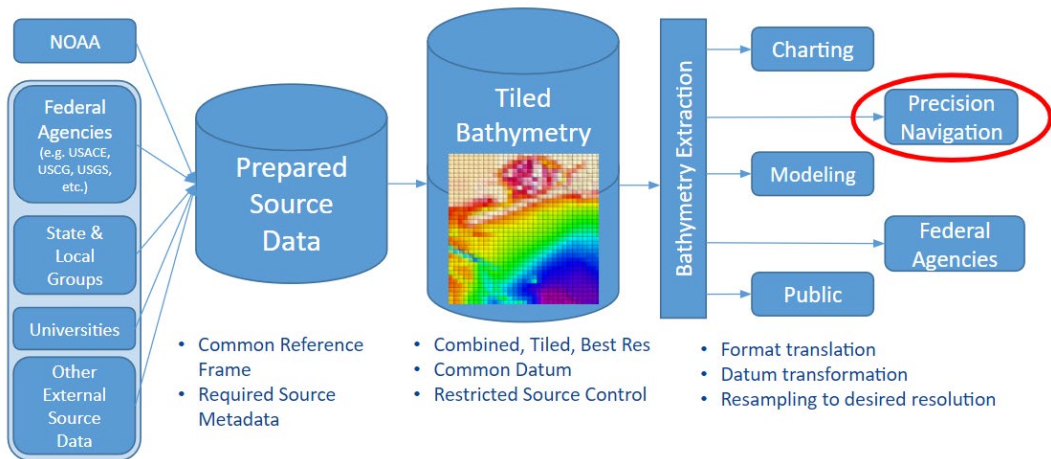


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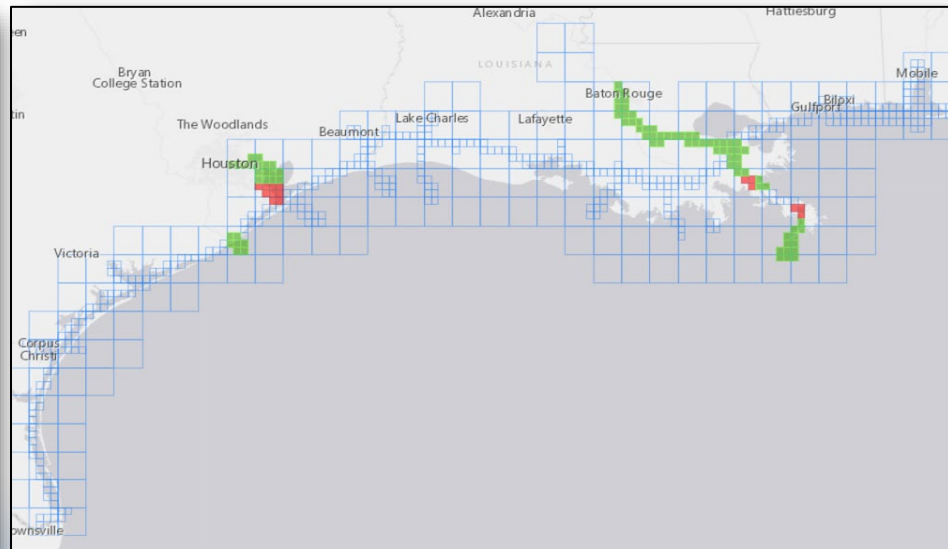
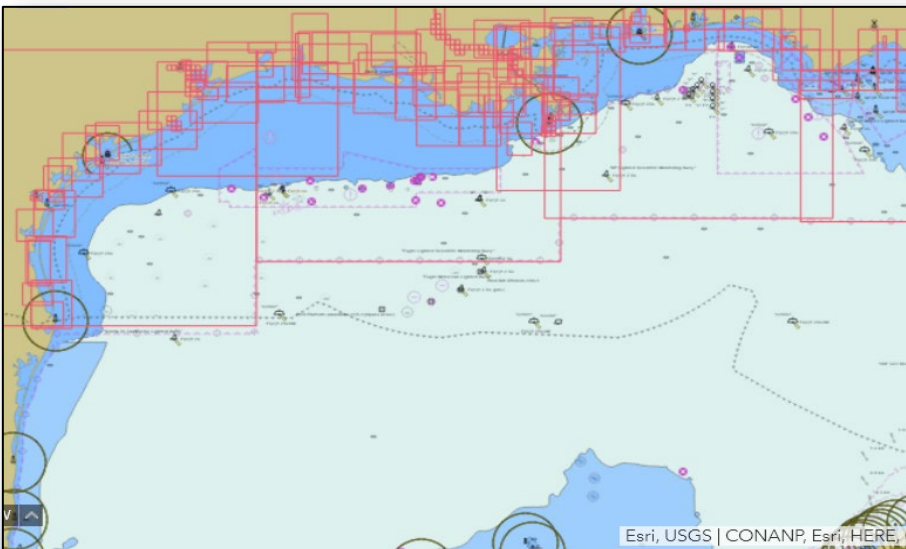


National Bathymetric Source (NBS)





ENC Regridding



Ending Paper Nautical Chart Production

- NOAA's traditional paper chart production line is being shut down, enabling the redirection of resources to improve NOAA's premier nautical navigation product, the electronic navigational chart (NOAA ENC®).
- This ongoing five-year process to end traditional paper nautical chart production was announced in November 2019.
- The expected cancellation date of these products and services is January 2025.



NOAA Custom Chart Tool

NOAA Custom Chart (NCC) is a web app that enables users to create their own customized nautical charts directly from the latest official NOAA electronic navigational chart (NOAA ENC®) data.

NCC outputs geospatially referenced Portable Document Format (PDF) files using the paper size, scale, and location selected by the user. Depths can be displayed in meters, feet, or fathoms and there are a few other display options, such as changing the depth at which a shallow water blue tint is applied and the depiction of a "safety contour" based on a vessel's draft.

The screenshot displays the NOAA Custom Chart Tool interface. At the top left, the logo for the Office of Coast Survey, National Oceanic and Atmospheric Administration, U.S. Department of Commerce is visible. A search bar with the text "Find address or place" is located at the top center. The main area is a detailed nautical chart of the Gulf of Mexico, showing depth contours, soundings, and various navigational markers. The chart is overlaid with a grid and includes a scale bar at the bottom left. The text "Gulf of Mexico" is prominently displayed across the center of the chart. At the bottom right, the text "NOAA Custom Chart Version 1.2 Choose your own chart scale and location" is visible. The bottom of the interface features a navigation menu with links for Home, Legend, Contact Us, Privacy Policy, Disclaimer, Information Quality, Freedom of Information Act, USA.gov, Ready.gov, EEO, and Take our Survey. The website is owned by the Office of Coast Survey.

NOAA Custom Chart Tool

Chart Catalog Viewer

Catalog changes will be lost if you close the application before clicking "Save Chart Catalog".

Open Existing Chart Catalog

Create New Catalog

Save Chart Catalog

Charts in Active Chart Catalog (none)

Search Search by Date, Title, Scale or Page Size..

	Actions	Date	Title	Scale	Page Size	Orientation	Coordinates	Depth Units
<input type="checkbox"/>	<input type="button" value="Delete"/>	1/17/2023	York River Entrance	20000	ANSI D	Landscape	37.231°N -76.430°W	Feet
<input type="checkbox"/>	<input type="button" value="Delete"/>	1/17/2023	Elizabeth River	20000	ANSI D	Landscape	36.857°N -76.326°W	Feet
<input type="checkbox"/>	<input type="button" value="Delete"/>	1/17/2023	Hampton Roads	40000	ANSI E	Landscape	36.977°N -76.087°W	Feet

0 of 3 Selected

Select All

Clear Selection

Export Functions

Chart Catalog

Open Chart Catalog Viewer

Active Catalog (none)

Chart Queue

Hampton Roads

Elizabeth River

York River Entrance

Export Selected Charts

Delete Selected Charts