Maritime Collaboration in the 4th Age

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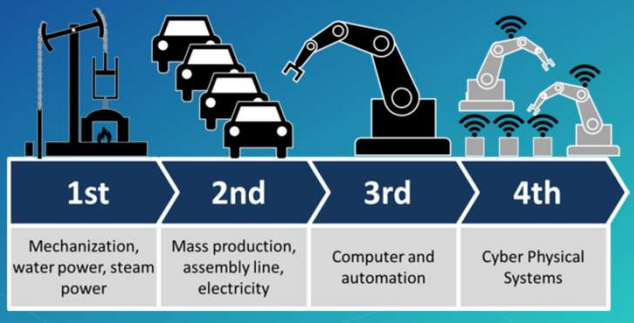
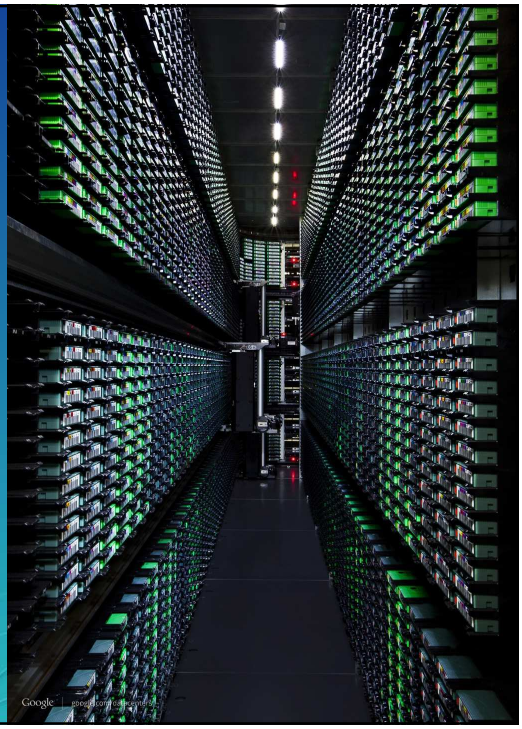
The Fourth Age

- Change is accelerating
  - Faster changes in the next 50 years than in the past few hundred
  - a new "Seaconomics" era
  - GDP and cargo volumes are decoupled
- Change creates new opportunities – new technologies
- A Digital Vision → powered by Data (in time and space)



Key technological factors

- Big Data
  - Volume, Velocity and Variety
- Internet of Things (IoT)
- Artificial Intelligence (AI)



We can see their effects: Autonomous Ships

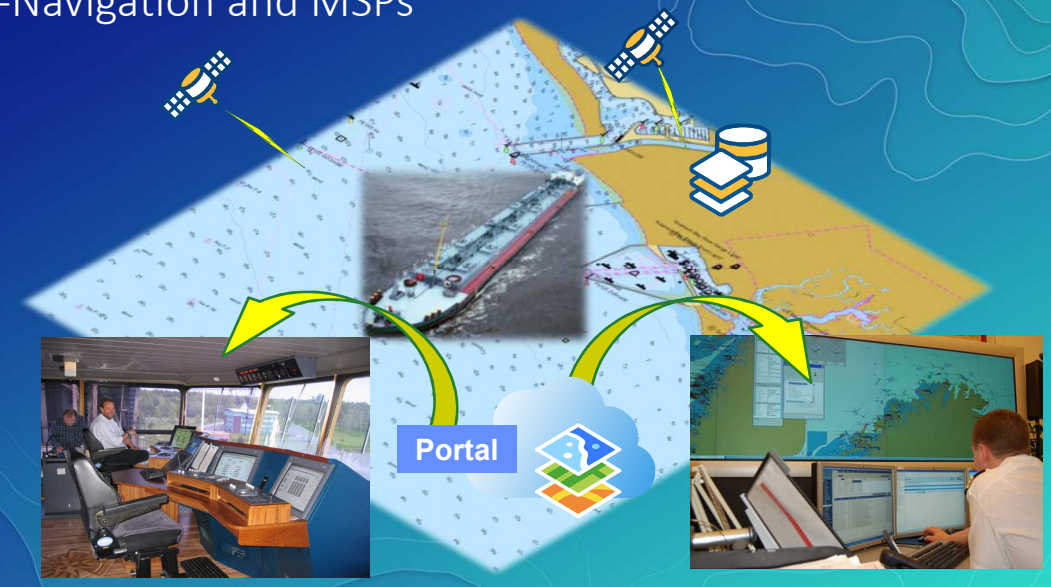
Fast developments around the world

Bigger, more efficient, more complex: new machine readable products

Smart Ports

- Maasvlakte2 terminal in the Port of Rotterdam
- Unmanned electric AGVs
- Remote operated unmanned cranes

E-Navigation and MSPs

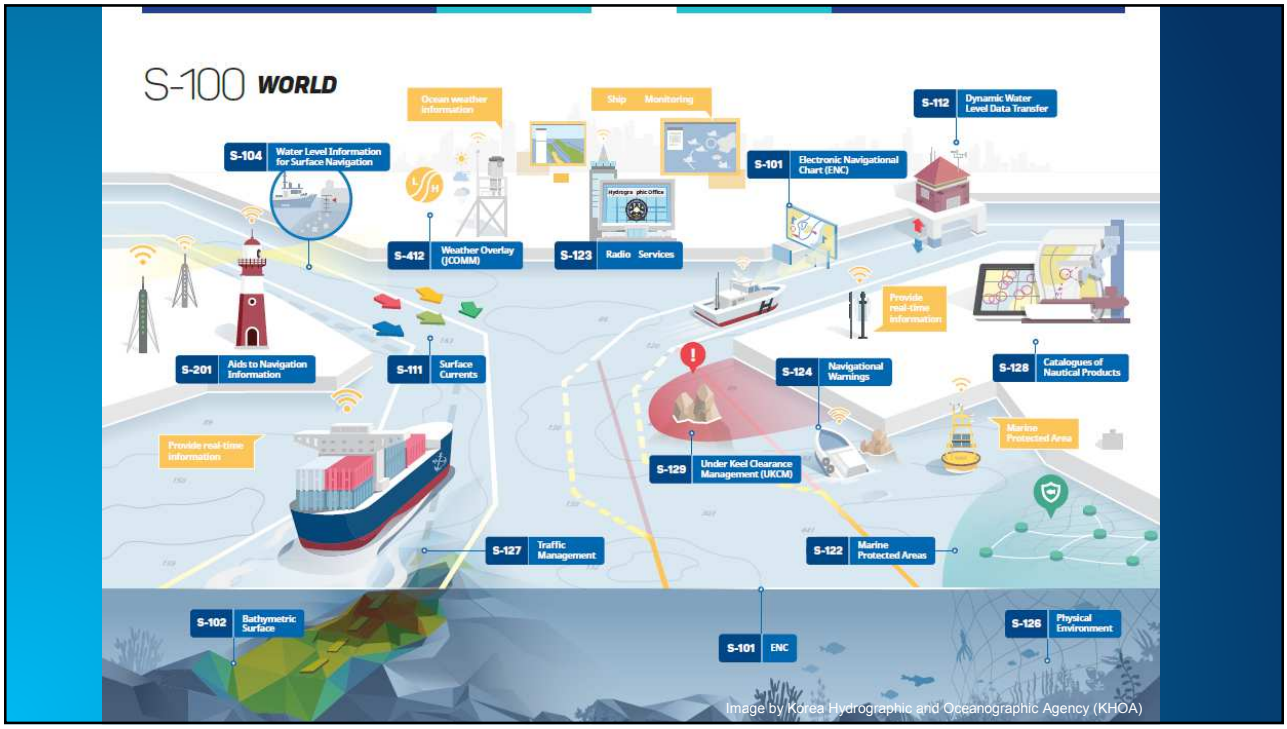


Maritime Services Portfolios

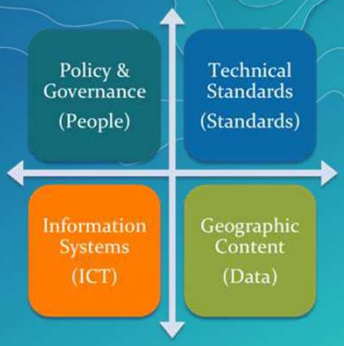
- As part of the improved provision of services to vessels through e-navigation;
- The means of providing electronic information in a harmonized way

No.	Identified Service	Identified Responsible Service Provider
MSP1	VTS Information Service (IS)	VTS Authority
MSP2	Navigational Assistance Service	National competent VTS Authority/Coastal/Port Authority
MSP3	Traffic Organization Service (TOS)	National competent VTS Authority/Coastal/Port Authority
MSP4	Local Port Service (LPS)	Local Port/Harbor Operator
MSP5	Maritime Safety Information Service (MSI)	National competent authority
MSP6	Pilotage Service	Pilot Authority/Pilot Organization
MSP7	Tugs Service	Tug Authority
MSP8	Vessel Shore Reporting	National competent authority, Shipowner/Operator/Master

No.	Identified Service	Identified Responsible Service Provider
MSP9	Tele-medical Assistance Service (TMAS)	National Health Organization/dedicated Health Org.
MSP10	Maritime Assistance Service (MAS)	Coastal/Port Authority/Organization
MSP11	Nautical Chart Service	National Hydrographic Authority
MSP12	Nautical Publications Service	National Hydrographic Authority
MSP13	Ice Navigation Service	National competent authority
MSP14	Meteorological Information Service	National Meteorological Authority/WMO/Public Institutions
MSP15	Real-time Hydrographic and Environmental Service	National Hydrographic and Meteorological Authorities
MSP16	Search and Rescue	SAR Authorities



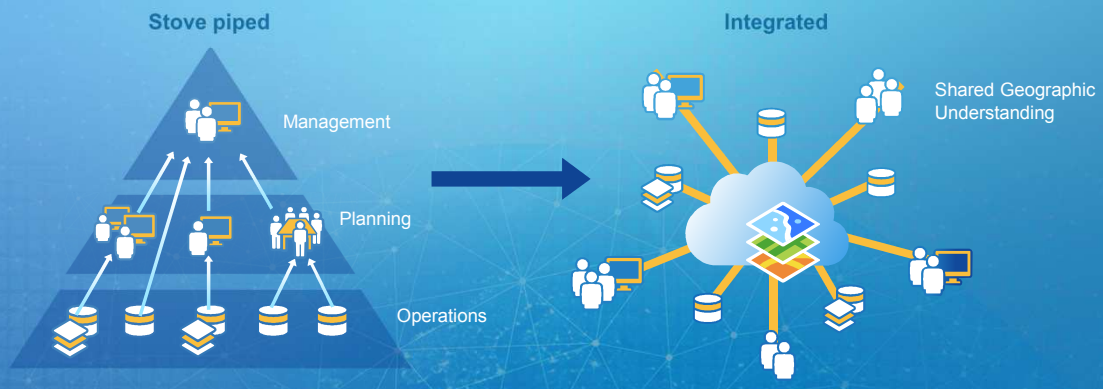
Foundation: Marine Spatial Data Infrastructures (MSDIs)



- SDI is "the relevant base collection of technologies, policies and institutional arrangements that facilitate the availability of and access to spatial data."
- Processes that integrate technologies, policies, standards, organizations and people;
- Structure of working practices and relationships across data producers and users for access, sharing and analyzing geospatial information across government and commerce;
- Hardware, software and system components necessary to support the processes

Enterprise GIS Transforms Organizations

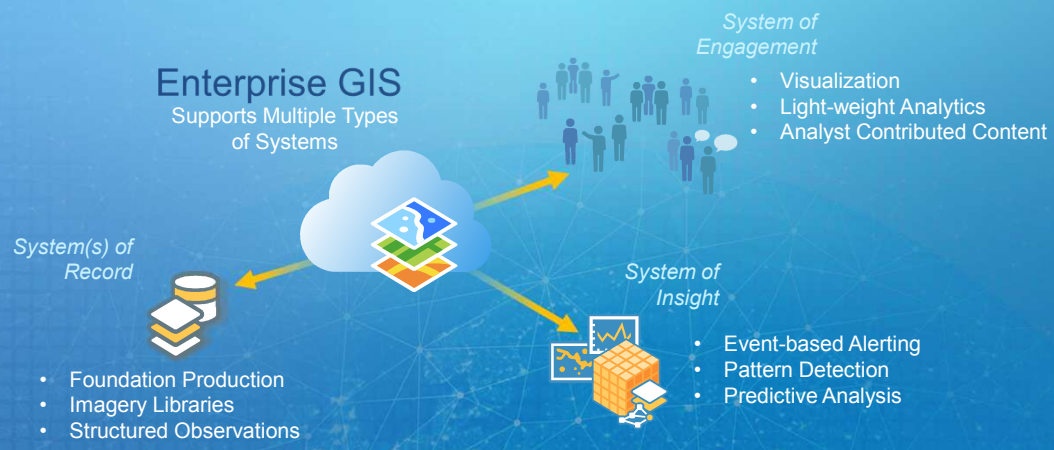
Focusing on end-use, decision support and insights

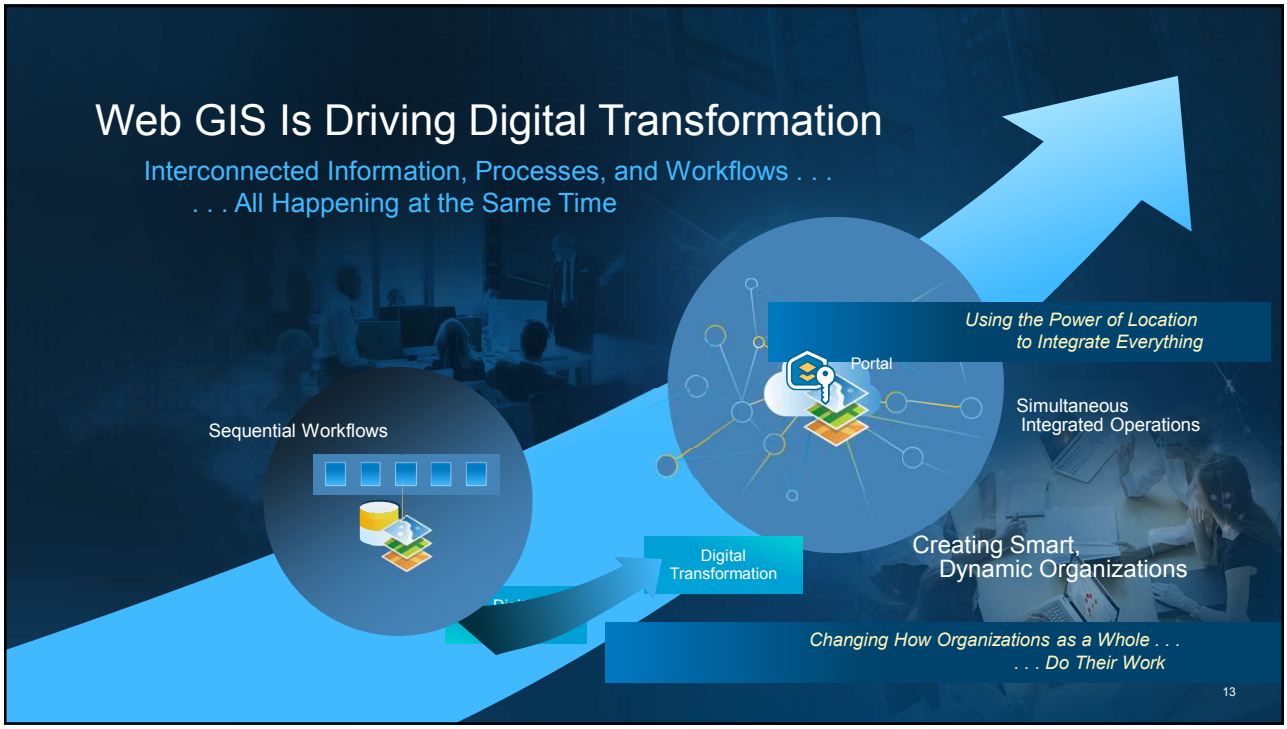


Opening Access and Engaging Everyone

An Enterprise GIS empowers a Maritime Community

Connecting People, Processes and Data




Web GIS Is Driving Digital Transformation
Interconnected Information, Processes, and Workflows . . .
. . . All Happening at the Same Time
Using the Power of Location
to Integrate Everything
Portal
Simultaneous
Integrated Operations
Sequential Workflows
Digital
Transformation
Creating Smart,
Dynamic Organizations
Changing How Organizations as a Whole . . .
. . . Do Their Work
13


What's Next? Massive Transformation . . .
Interconnected Information, Processes, and Workflows . . .
. . . All Happening at the Same Time
Creating Smart,
Dynamic Organizations
Using the Power of Location to Integrate Everything

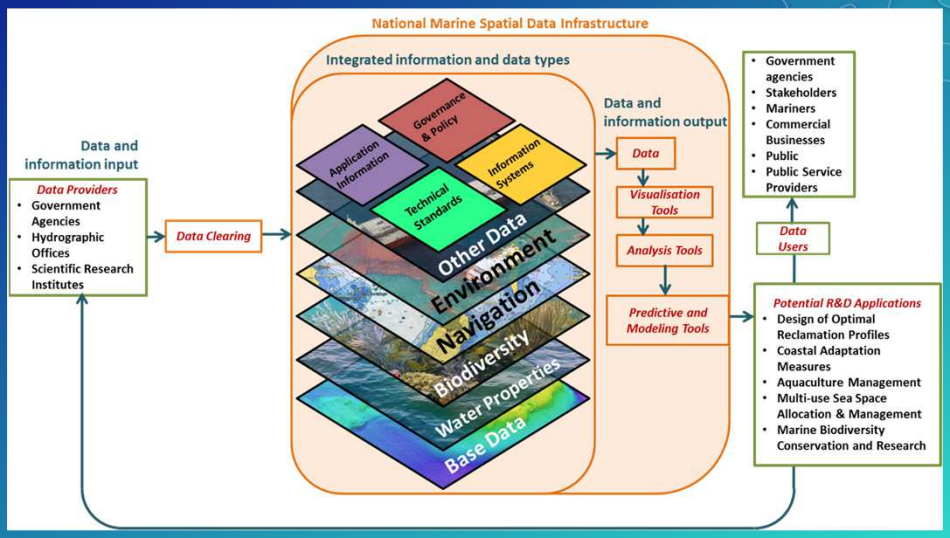
How Do We Take the Next Step?

Embrace Digital Transformation . . .

. . . and Leverage The Science of Where

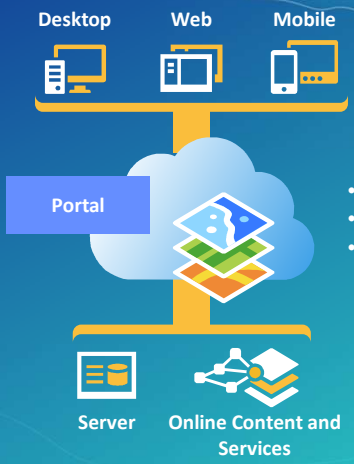
Foundation: Marine Spatial Data Infrastructures (MSDIs)

NMSDI Conceptual Model



A Platform for supporting the Maritime Community

ArcGIS at the foundation of MSDI

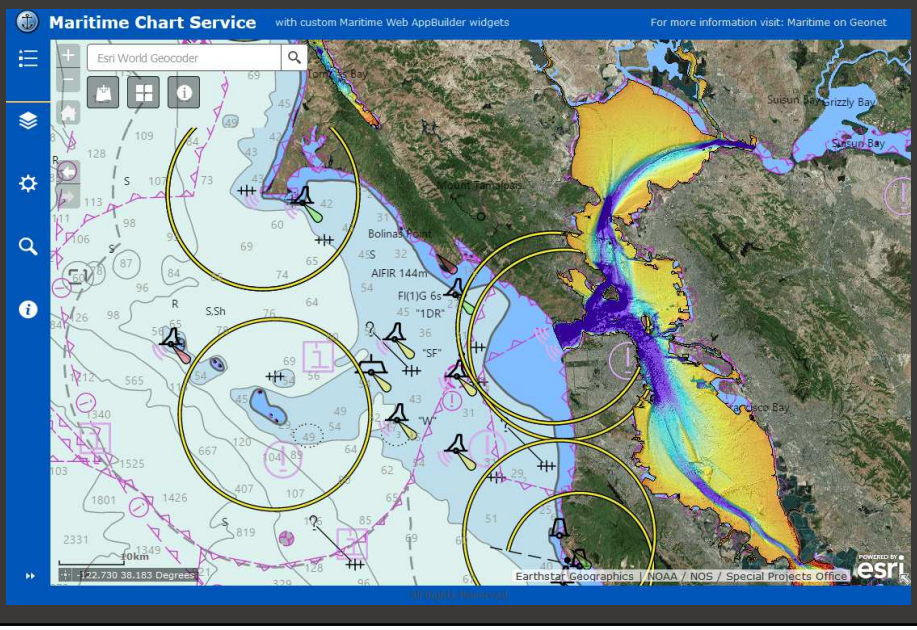


- System of Records
- System of Engagement
- System of Insights

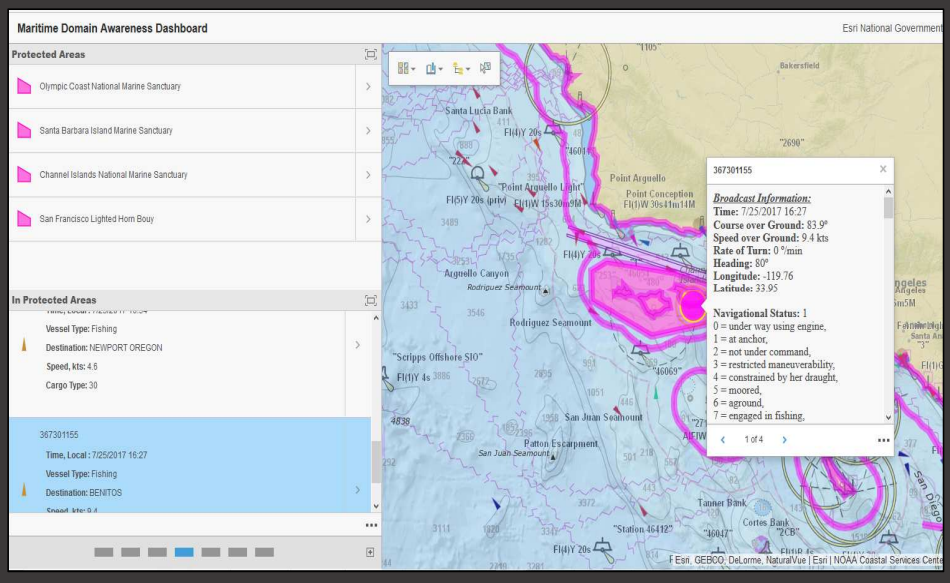
Services
- Historical
- Now cast
- Forecast

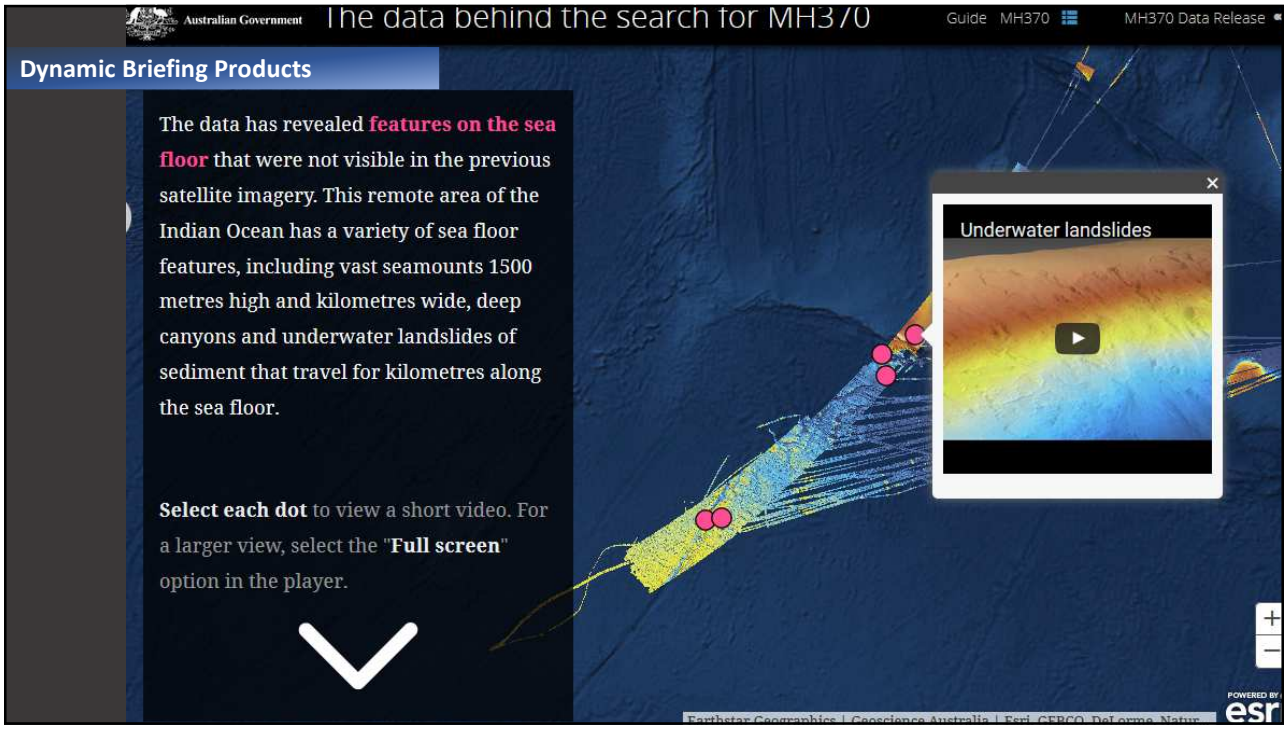
At all levels of the organization

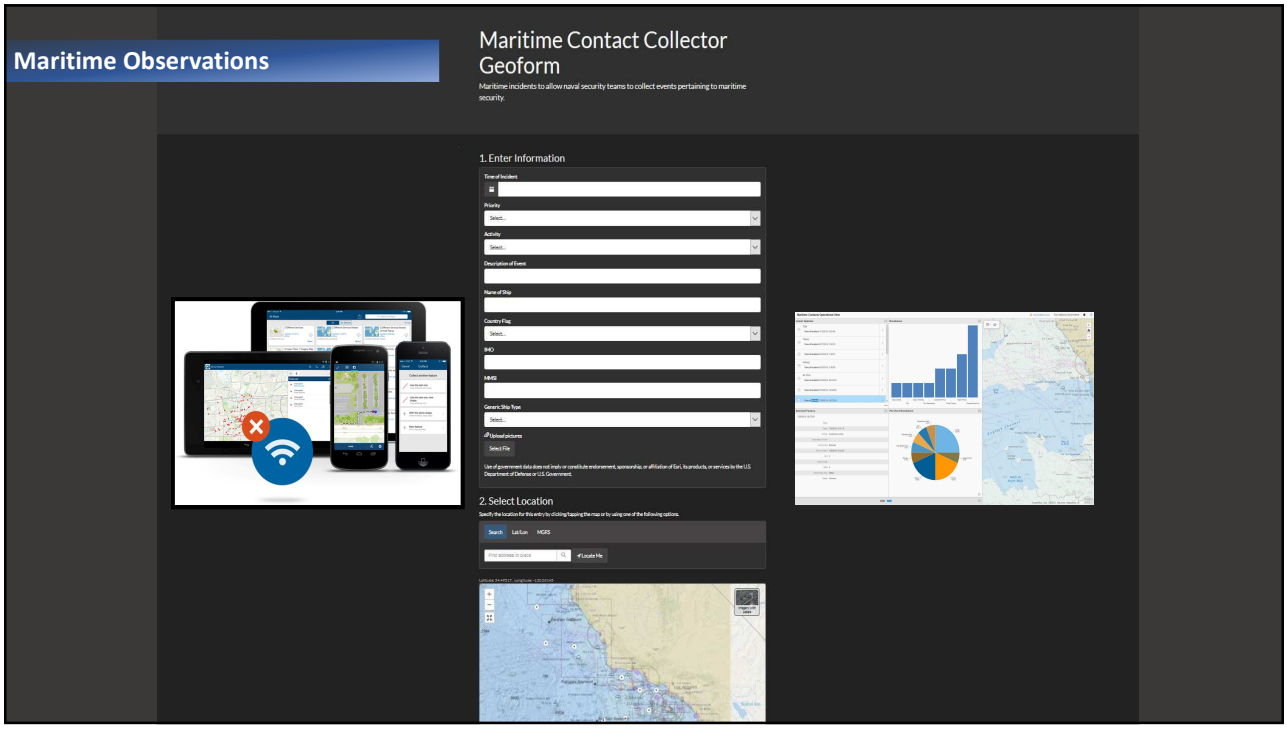
ENC Viewer



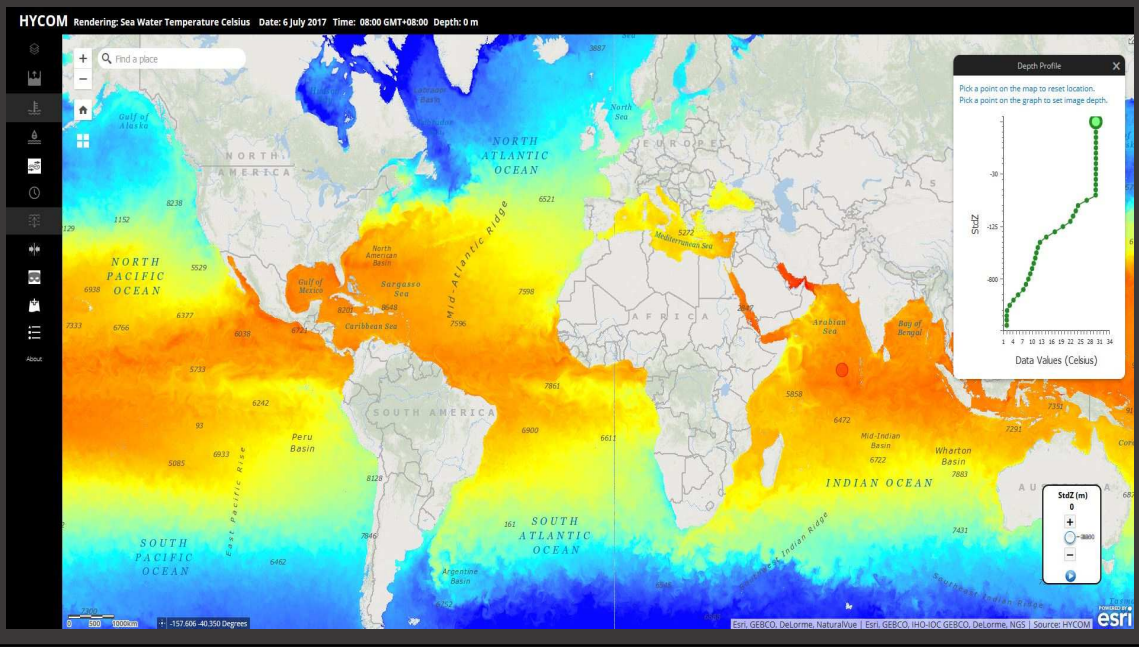
Real-time Situational Awareness



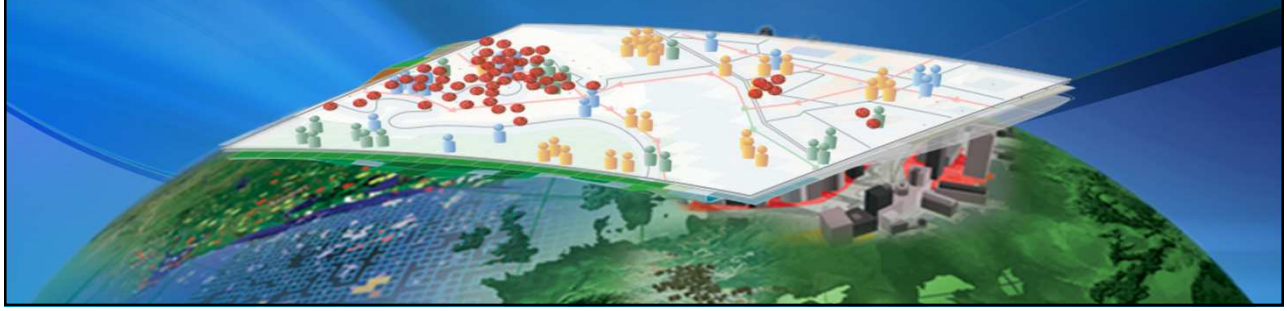

Australian Government
The data behind the search for MH370
Guide
MH370
MH370 Data Release
Dynamic Briefing Products
The data has revealed features on the sea floor that were not visible in the previous satellite imagery. This remote area of the Indian Ocean has a variety of sea floor features, including vast seamounts 1500 metres high and kilometres wide, deep canyons and underwater landslides of sediment that travel for kilometres along the sea floor.
Select each dot to view a short video. For a larger view, select the "Full screen" option in the player.
Underwater landslides
POWERED BY esri


Maritime Observations
Maritime Contact Collector Geoform
Maritime incidents to allow naval security teams to collect events pertaining to maritime security.
1. Enter Information
2. Select Location

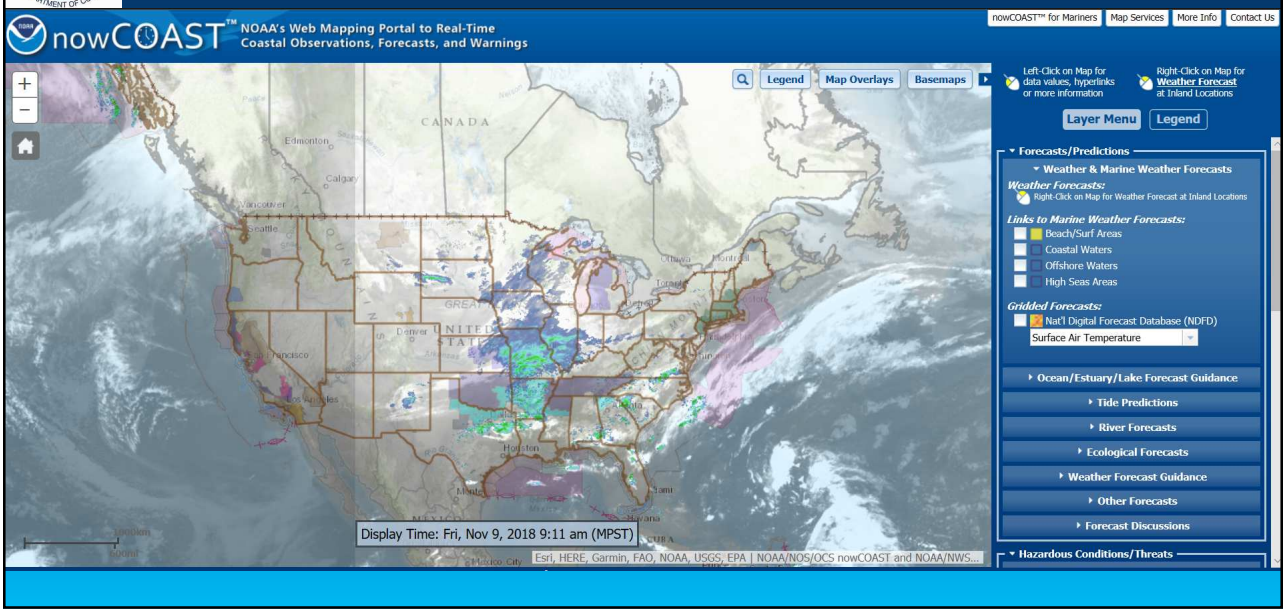
Oceanographic Data Analysis



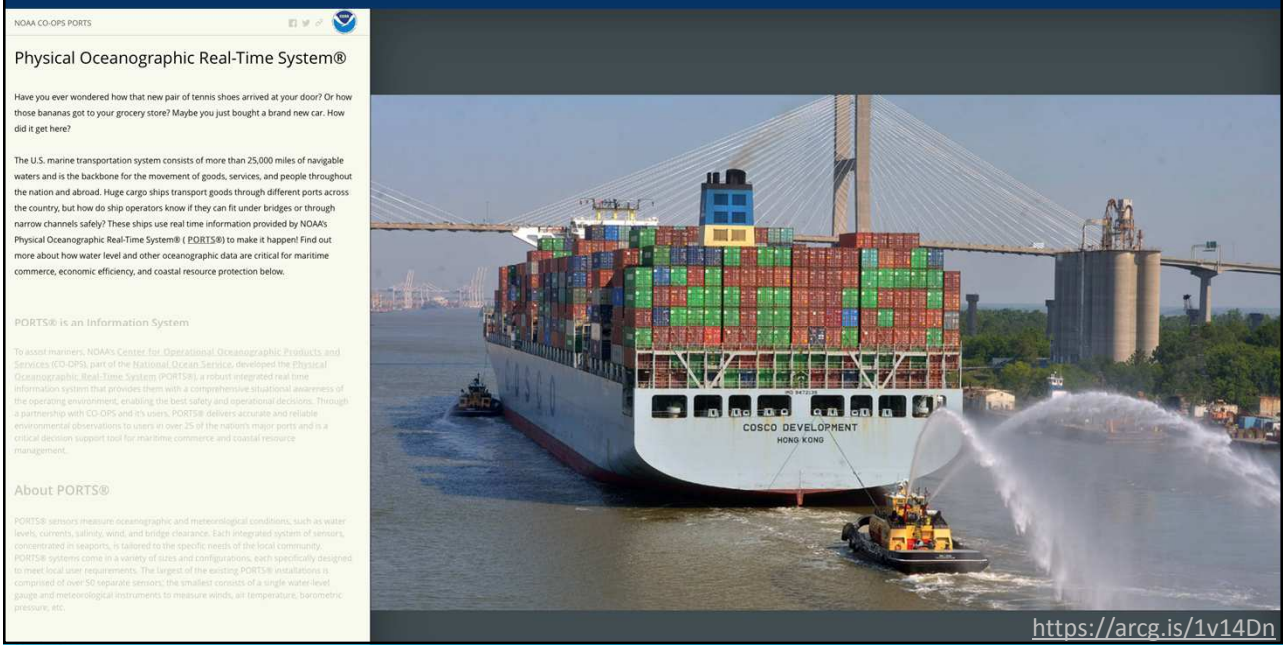
MSDI in Action



NOAA nowCOAST



NOAA PORTS: Physical Oceanographic Real-Time System



NOAA PORTS: Physical Oceanographic Real-Time System

Physical Oceanographic Real-Time System (PORTS®)

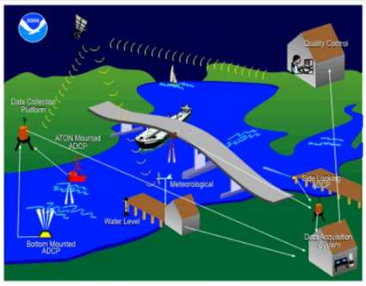
The United States maritime transportation system consists of over 25,000 miles of waterways, ports, and other navigable waters. It is the backbone for moving goods, services, and people throughout the U.S. and abroad. More than 95% of all U.S. trade involves some form of maritime transport, and ships move $1.4 trillion worth of products in and out of U.S. ports every year. Ship operators across the globe rely on accurate information about ocean conditions, including water levels, currents, and winds, so they can plan efficient shipping routes, maximize cargo onboard, and safely navigate narrow shipping lanes.

PORTS® is an integrated system of sensors concentrated in seaports that provide commercial vessel operators with accurate and reliable real-time information about environmental conditions. PORTS® measures and disseminates observations, predictions and nowcast/forecasts for water levels, currents, bridge air gap, salinity and meteorological parameters (e.g., winds, waves, atmospheric pressure, visibility, air and water temperatures).

This data improves navigation safety by reducing groundings and collisions by up to 60% for commercial and recreational vessels and preventing oil spills. It can also increase shipping efficiency by reducing transit delays and allowing mariners to optimize their cargo load. Mariners need these data, tools, and services to make critical navigation decisions, especially as significantly larger vessels transit through U.S. ports because of the Panama Canal expansion.

PORTS®: Select a PORT

MyPORTS - An application designed to let you customize your own PORTS® page (select what data you want to see from any PORTS®).

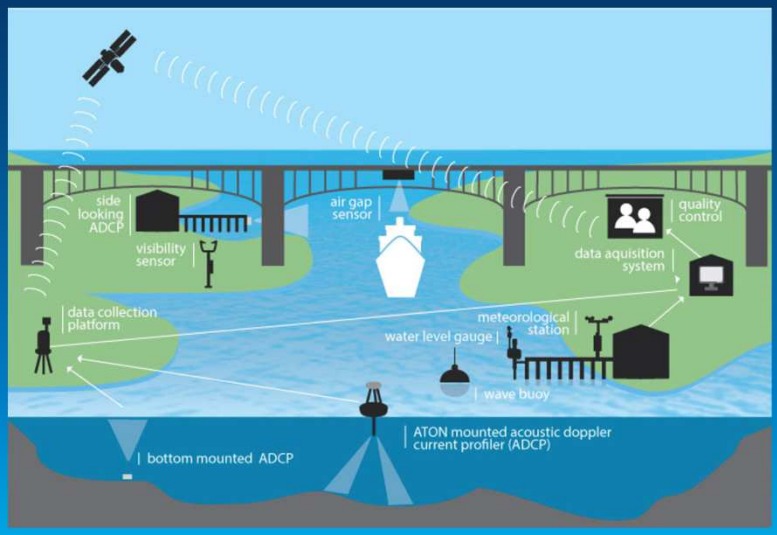


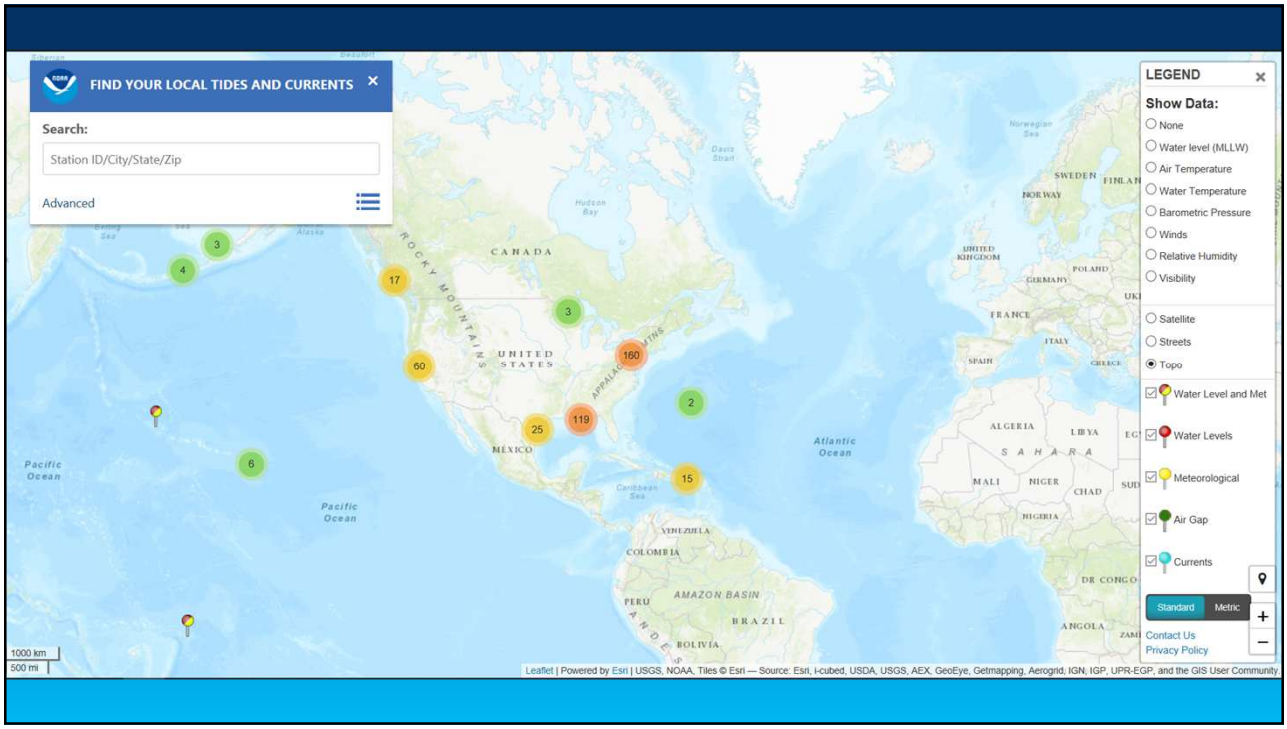
An example of the sensors that make up the Physical Oceanographic Real-Time System (PORTS®).

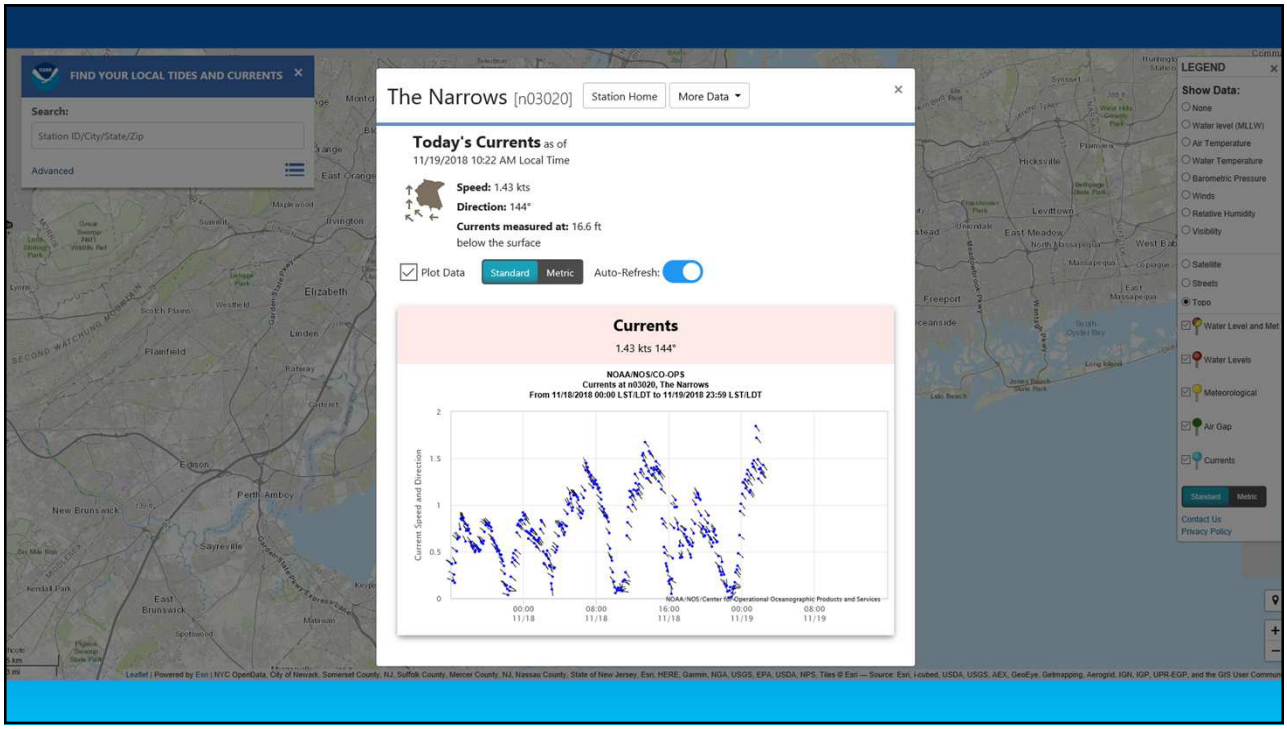
Tides & Water Levels | Harmful Algal Bloom Forecasts | PORTS® | Sea Level Info | Contact Us

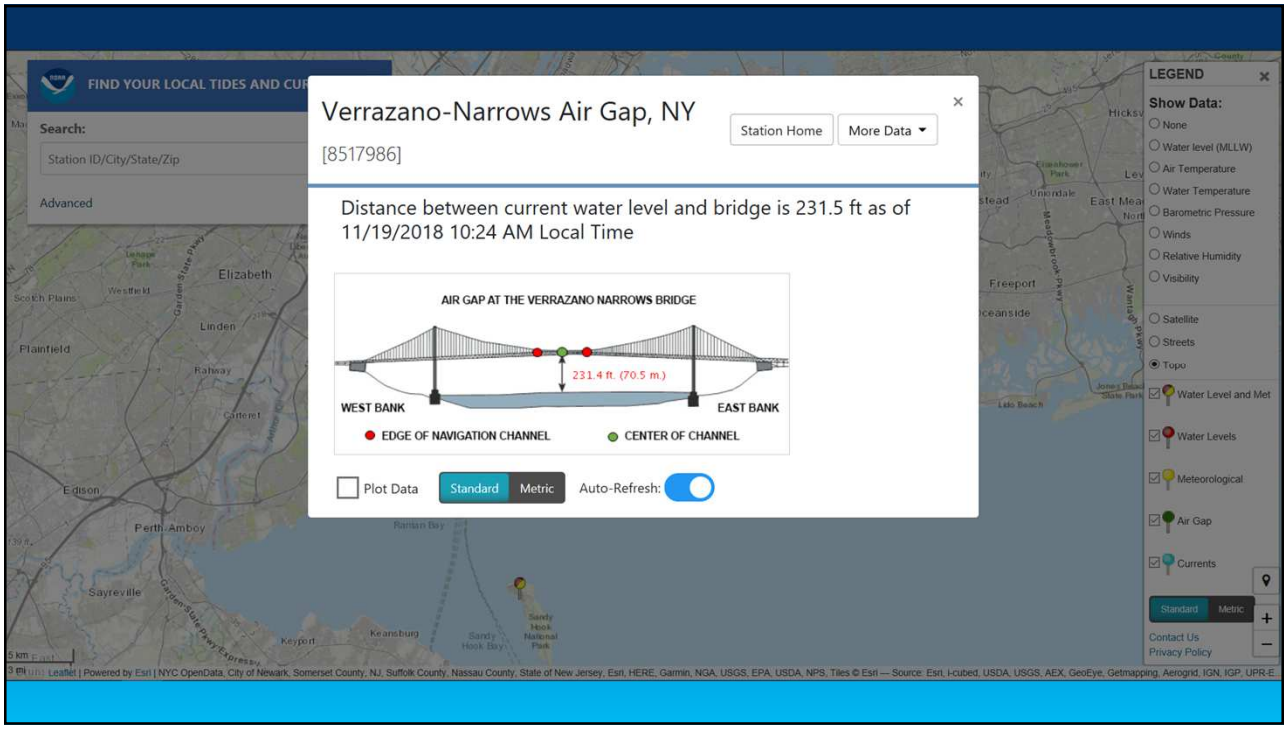
Coastal & Great Lakes Conditions Forecast | Meteorological & Other Oceanographic Data | Currents | News | Web Services

NOAA CO-OPS PORTS




FIND YOUR LOCAL TIDES AND CURRENTS
Search:
Station ID/City/State/Zip
Advanced
LEGEND
Show Data:
None
Water level (MLLW)
Air Temperature
Water Temperature
Barometric Pressure
Winds
Relative Humidity
Visibility
Satellite
Streets
Topo
Water Level and Met
Water Levels
Meteorological
Air Gap
Currents
Standard
Metric
Contact Us
Privacy Policy
CANADA
UNITED STATES
MÉXICO
Pacific Ocean
Atlantic Ocean
Leaflet | Powered by Esri | USGS, NOAA, Tiles © Esri — Source: Esri, i-cubed, USDA, USGS, AEX, GeoEye, Getmapping, Aerogrid, IGN, IGP, UPR-EGP, and the GIS User Community


FIND YOUR LOCAL TIDES AND CURRENTS
The Narrows [n03020]
Station Home
More Data
Today's Currents as of
11/19/2018 10:22 AM Local Time
Speed: 1.43 kts
Direction: 144°
Currents measured at: 16.6 ft
below the surface
Plot Data
Standard
Metric
Auto-Refresh:
Currents
1.43 kts 144°
NOAA/NOS/CO-OPS
Currents at n03020, The Narrows
From 11/18/2018 00:00 LST/LDT to 11/19/2018 23:59 LST/LDT
Current Speed and Direction
LEGEND
Show Data:

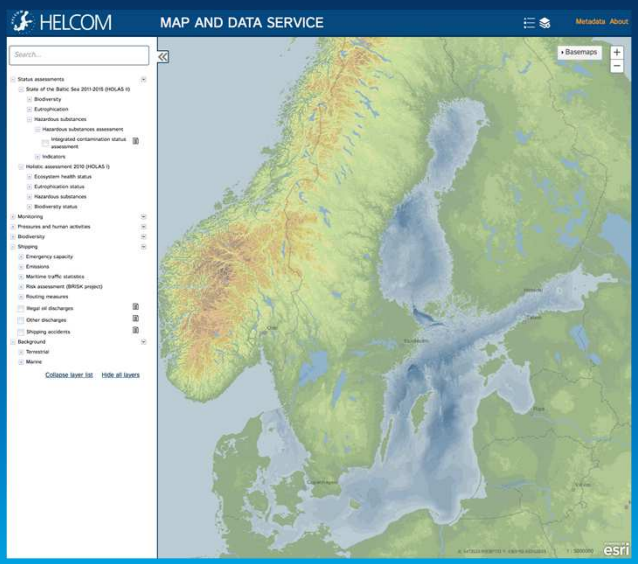

FIND YOUR LOCAL TIDES AND CU
Search:
Station ID/City/State/Zip
Advanced
Verrazano-Narrows Air Gap, NY
[8517986]
Station Home
More Data
Distance between current water level and bridge is 231.5 ft as of 11/19/2018 10:24 AM Local Time
AIR GAP AT THE VERRAZANO NARROWS BRIDGE
231.4 ft. (70.5 m.)
WEST BANK
EAST BANK
EDGE OF NAVIGATION CHANNEL
CENTER OF CHANNEL
Plot Data
Standard
Metric
Auto-Refresh:
LEGEND
Show Data:
None
Water level (MLLW)
Air Temperature
Water Temperature
Barometric Pressure
Winds
Relative Humidity
Visibility
Satellite
Streets
Topo
Water Level and Met
Water Levels
Meteorological
Air Gap
Currents
Contact Us
Privacy Policy
Elizabeth
Linden
Plainfield
Edison
Perth Amboy
Sayreville
Keansburg
Keyport
Freeport
East Meadow
Hicksville
Lido Beach

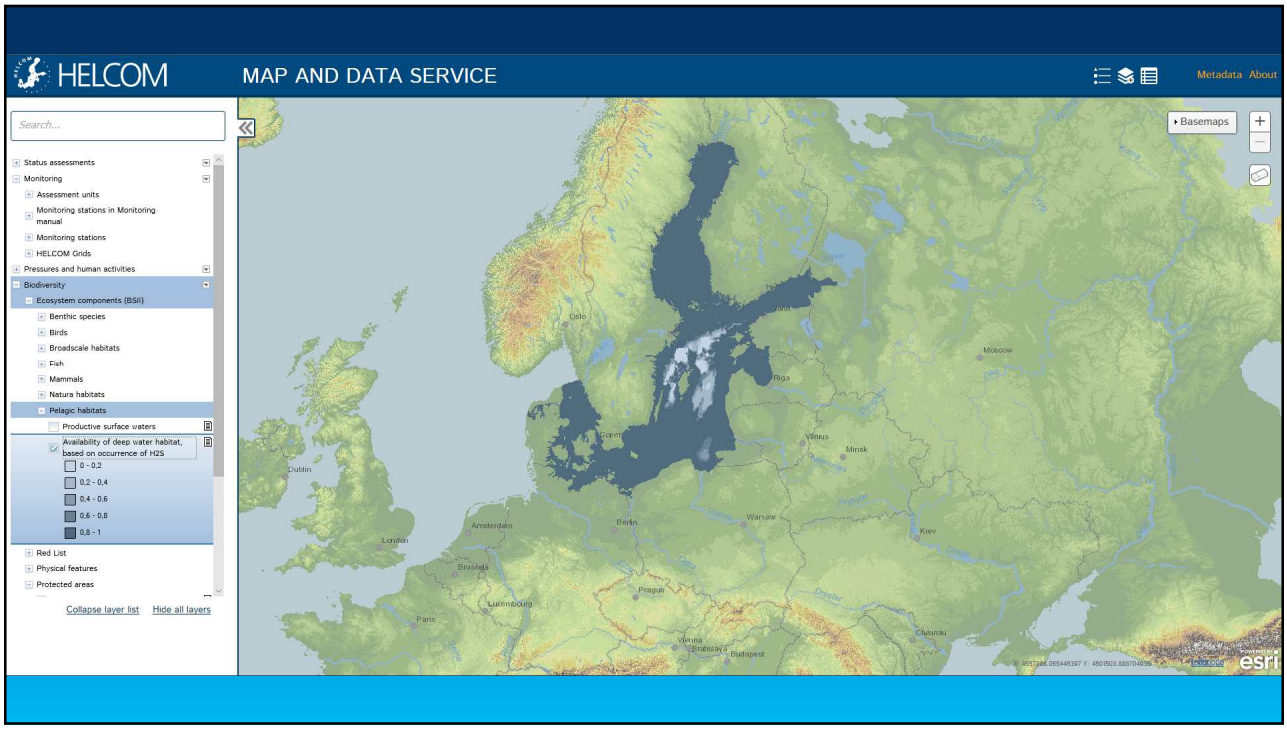

NOAA

HELCOM Map and Data Services

Baltic Marine Environment Protection Commission – Helsinki Commission

- Governing body of the Helsinki Convention
- Denmark, Estonia, The EU, Finland, Germany, Latvia, Lithuania, Poland, Russia and Sweden;
- Established four decades ago;
- The 1992 Helsinki Convention entered into force on January 17, 2000;
- Eight main groups: Gear, Maritime, Pressure, Response, State & Conservation, Fish, Agri, Maritime Spatial Planning;
- Its vision for the future is a healthy Baltic Sea environment with diverse biological components functioning in balance, resulting in a good ecological status and supporting a wide range of sustainable economic and social activities.

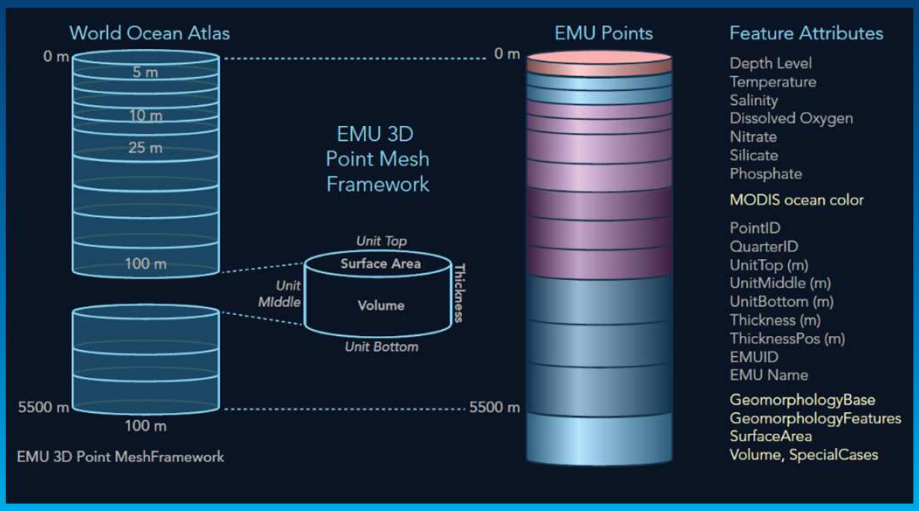




Ecological Marine Units (EMUs)

EMU 3D Point Mesh Framework

- 52,000,000 points
- ¼ degree by ¼ degree in the horizontal
- Variable z depth (z thickness ranges from 5 m to 5,500 m)
- Data values represent the average of five "prominent decadal means"
- No temporal component related to seasonality
- The point mesh lives in ArcGIS Pro



A Platform for supporting the Maritime Community

MSDI in action, take a look!

- NOAA PORTS Storymap https://arcg.is/1v14Dn
- Ecological Marine Units Project https://arcg.is/00WTXn
- Living Atlas of the World by Esri www.esri.com/livingatlas
- Atlas of Ocean Wealth OECS http://maps.oceanwealth.org


esri
THE
SCIENCE
OF
WHERE