

**25th Meso-American and Caribbean Sea
Hydrographic Commission (MACHC)
Panama City, Panama
3 December - 6 December 2024**

NATIONAL REPORT FROM UNITED STATES OF AMERICA TO THE MACHC25

Executive summary

The United States appreciates the opportunity to update the Meso-American and Caribbean Sea Hydrographic Commission regarding relevant U.S. hydrographic activities. This document contains select updates since the 2023 U.S. report to the MACHC along with additional relevant information including previously reported updates. Of particular note, in late 2023 the U.S. released the geographic coordinates defining the outer limits of the U.S. continental shelf in areas beyond 200 nautical miles from the coast, including the Alaskan Continental Shelf in the Arctic. Key updates include:

Achievement

- The US public released Satellite Computed Bathymetry Assessment (SCuBA) data for the U.S. seafloor.
- The US has been working with Nations in Capability Building efforts to enhance data collection
 - Satellite Derived Bathymetry
 - New platforms for Data Collections (Furgo)
 - Hosting 3 Hydrographers through the IHO EWH Project
 - IHO Technical Visits
- Geospatial studies:
 - US public released the Dynamic World Coastline – a world-wide coastline collected at 1:50k (50-meter accuracy).
 - A new WMM will be released on December 17, 2024 and along with the regular WMM, NGA and NOAA will release a new product called the WMM High Resolution (WMMHR)

a) HYDROGRAPHIC OFFICE / SERVICE:

- a) This National Report provides specific information pertaining to individual products and services of primary interest to the Meso-American and Caribbean Sea Hydrographic Commission (MACHC) Region. Multiple U.S. government agencies are responsible for the management of Global, U.S. domestic and international hydrographic products, services, and maintenance.

b) Name of the institution:

- i. National Geospatial-Intelligence Agency (NGA)
- ii. National Oceanic and Atmospheric Administration (NOAA)
- iii. United States Navy (USN)
- iv. United States Army Corps of Engineers (USACE)

b) SURVEYS:

a) New technologies and /or equipment

NOAA provides nautical charts and related hydrographic information for the safe and efficient navigation of maritime commerce as well as providing basic data for engineering, scientific, and other commercial and industrial activities within the nation's 3.4 million square nautical mile EEZ ([US EEZ](#)) and along its 95,000 miles of shoreline. To help prioritize out-year hydrographic survey efforts, NOAA uses the Hydrographic Health Model.

The Hydrographic Health Model is a model based on the idea of navigational risk. Navigational risk is the product of the likelihood of an adverse event and the consequence of that event occurring. The model incorporates likelihood parameters such as traffic density, known hazards to navigation, and reported ship groundings to estimate the likelihood of an adverse event. To estimate the consequence of an adverse event, the model incorporates parameters such as proximity to search and rescue stations, proximity to reefs or marine sanctuaries. The model also considers the necessary quality of data to support modern traffic relative to what is currently available, explicitly recognizing that the seafloor changes over time. Seafloor changeability takes into account the frequency of storms, current speed, and accumulation of marine debris, where the quality of data in highly changeable areas decreases faster than the quality of data in less changeable areas. Using historic knowledge of seafloor changeability, the model can also approximate the future quality of survey data and assess how often an area needs resurveying.

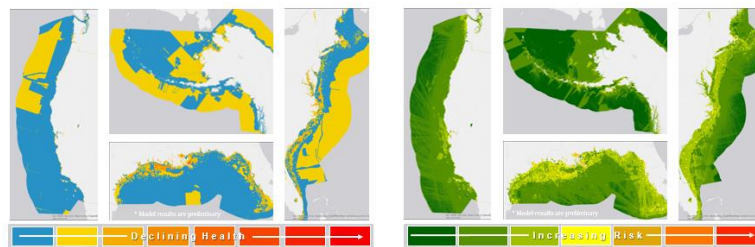
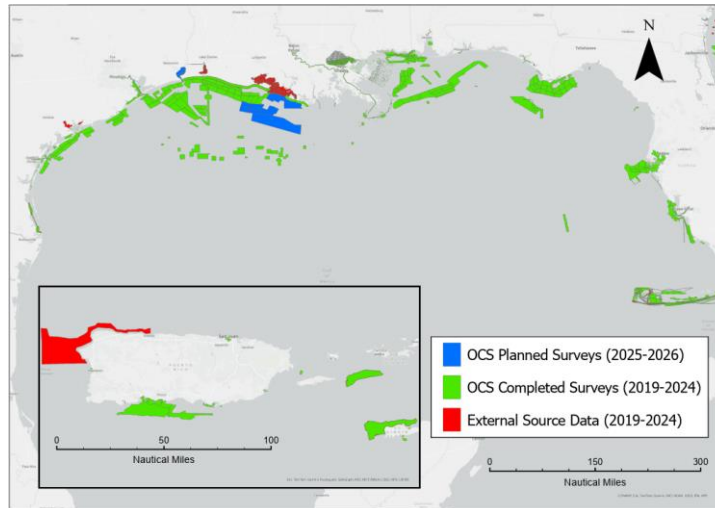


Figure 1 Hydrographic Health and Risk Conceptualization

A statutory mandate authorizes NOAA to provide nautical charts and related hydrographic information for the safe and efficient navigation of maritime commerce as well as providing basic data for engineering, scientific, and other commercial and industrial activities within the nation's 3.4 million square nautical mile EEZ.



Planned surveys will be a combination of either 200 percent side scan sonar/object detection multibeam coverage in regions of critical under keel clearance, or 100 percent side scan sonar/complete coverage multibeam surveys where there is a relaxed requirement for feature detection. Alternatively, data may be acquired at a relaxed requirement to maximize coverage in deeper waters. These plans do not reflect emerging storm response work.

b) Surveys outside U.S. Waters

- i. The U.S. Navy conducts hydrographic surveys outside the United States in international waters and in territorial waters of partner nations, through diplomatic channels and international agreements. These survey operations enhance maritime commerce and security and support relationship and capacity building initiatives. No cooperative hydrographic surveys have been conducted in the region since MACHC-20.
- ii. Through a contract partnership with Furgo, an Airborne Survey was completed of a port in Dominican Republic in February 2024. FUGRO conducted hydrographic survey IVO Manzanillo Port with their RAMMS LIDAR system. This survey produced hydrographic data to improve nautical chart products in the area as well as demonstrating the capabilities of the current generation of the RAMMS system. RAMMS is a commercialized product based off of US Navy funded development of the PILS push-broom LIDAR system, and its unique design allows it to be flown on a variety of crewed and uncrewed platforms.
- iii. NASA utilizes ICESat-2 bathymetry to support a wide range of coastal and marine science needs, from coral reef monitoring to studies of nearshore processes. With these new bathymetric capabilities, NASA is currently funding the development a new Level-3a data product focused on along-track bathymetry extraction with the designation ATL24. This product is projected to launch summer of 2024.
Source: <https://agupubs.onlinelibrary.wiley.com/doi/full/10.1029/2023EA003270>

c) New ships / Data collections Methodologies

- i. National Oceanic and Atmospheric Administration
NOAA survey platforms include six 28-foot survey boats, a research


vessel, a LIDAR-capable aircraft, and private contractors and the following ships: [NOAA Ship Fairweather](#), [NOAA Ship Rainier](#), [NOAA Ship Thomas Jefferson](#), and [NOAA Ship Ferdinand R. Hassler](#).

Additional information on NOAA's hydrographic vessels can be found online at: <https://nauticalcharts.noaa.gov/about/survey-vessels.html>.

- ii. U.S. Navy
The Naval Oceanographic Office (NAVOCEANO), a subordinate command of COMNAVMETOPCOM, currently employs six Pathfinder Class 100-meter multi-purpose survey ships to conduct oceanographic, bathymetric, and hydrographic surveys in deep-ocean and coastal waters. Each ship carries two 10-meter hydrographic survey launches (HSLs).
- iii. NAVOCEANO also maintains Airborne LIDAR Hydrography (ALH) capability with the Optech, Inc., "Coastal Zone Mapping and Imaging" LIDAR (CZMIL) system. A Basler BT-67, a refurbished DC-3, serves as the airborne system that carries the CZMIL system. NAVOCEANO's subordinate command Fleet Survey Team (FST), employs rapidly deployable survey assets equipped with four portable multi-beam kits to support boat of opportunity (BOO) surveys; six Unmanned Surface Vessels (USV), including four Teledyne Z-Boat 180, and two Marine Robotics Sea Otters equipped with multi-beam sonar; two Iver3 580 Unmanned Underwater Vehicles equipped with Bathymetric Interferometric Side Scan Sonar; and four rapid littoral survey vehicles (RLSVs) (personal watercraft fitted with a single beam echo sound side-scan scan sonar). FST survey assets are highly portable and can be commercially shipped or hand-carried by our survey team as checked baggage on commercial airlines. FST also maintains a stand-by "Fly-Away Team" consisting of four personnel and survey gear to outfit boats of opportunity. This capability enhances standard Navy survey requirements and provides the capacity to maintain navigable approach corridors in support of humanitarian aid and disaster relief.
- iv. NGA has partnered with multiple contract data collection vendors to acquire survey information around the MACHC region
 - Airborne Lidar (Furgo)
 - Accoustic
 - CSB (need the link for this here)

Coordination is done when operating in waters outside of the US national boundaries.

- d) Crowdsourced and satellite-derived bathymetry - national policy:
 - i. The U.S. allows the collection of CSB within all national waters and continues to support the IHO Crowdsourced Bathymetry Initiative. Continued IT infrastructure improvements in 2023 will enhance the ability to manage Crowdsourced Bathymetry receipt, filtering and provisioning.
- e) Challenges and achievements

- i. The U.S. engages with multiple commercial and industry partners to collect hydrographic data globally using IHO S-44 standards. These commercial datasets are considered equivalent to data collected by national assets.
 - ii. To expand awareness of industry and academic capabilities, the U.S. has established a Geospatial Innovation Center where U.S. government agencies can engage with industry partners and review innovative technology, methodology, and capabilities for potential use. On 8 January 2024, the U.S. launched a 1-million-U.S.-dollar Grand Challenge to forecast industrial fishing. This challenge includes the detection of illicit activity to support the enforcement and prevention of illegal, unreported, and unregulated (IUU) fishing activity. For more information, visit: [https://info.nga.mil/news/NGA_NSIN_host_\\$1M_challenge_for_forecasting_IUU_fishing.html](https://info.nga.mil/news/NGA_NSIN_host_$1M_challenge_for_forecasting_IUU_fishing.html)
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- iii. The U.S. Navy deactivated its Fleet Survey Team in 2023. Navy maintains a limited capacity to conduct shallow water, littoral hydrographic survey via personnel and equipment from the Naval Oceanographic Office and Naval Oceanography Mine Warfare Center

c) NEW CHARTS & UPDATES:

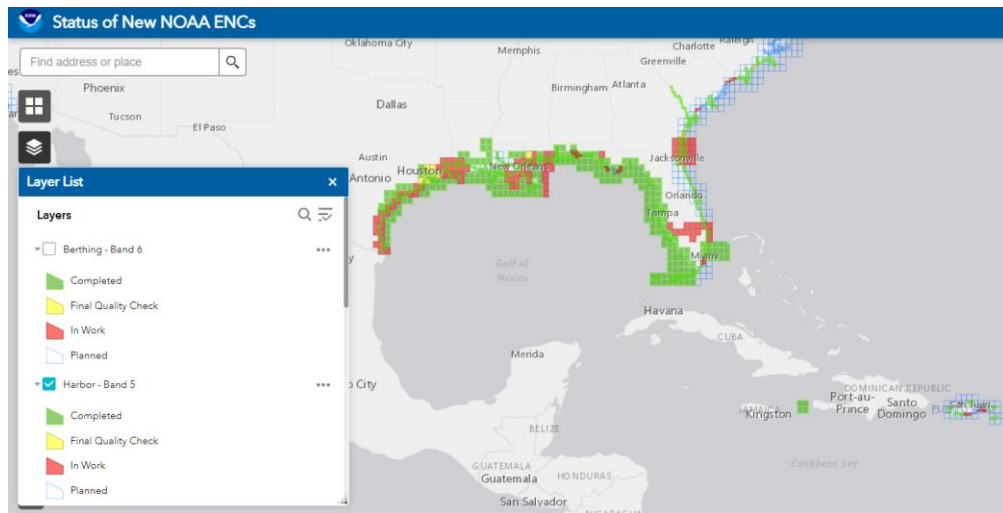
a) Charting Plan

- i. In August 2023, NOAA released a new [Nautical Charting Plan](#). The focus of this plan is the continued transition away from the production of paper nautical charts and continuously improving the production of NOAA electronic navigational charts (NOAA ENC®). Part of the plan involves “re-scheming” the current suite of ENCs—based on the original paper chart extents—to a gridded format with standardized sizes and scales. The new layout will include 7,200 ENCs with new charts often providing larger-scale and more detailed coverage.
- ii. NGA is “re-scheming” the current suite of PCA ENC – based on the original paper chart extents – to a gridded format using NGA’s global grid.

All Charting rescheming will be done in coordination with the MIIC

b) ENC coverage, gaps and overlaps

- i. The U.S. has no known significant gaps or overlaps. However, as gridded ENC schemes are implemented by both NOAA and NGA, additional work with ENC coverage may be needed.
- ii. As of October 2024, NOAA has produced 3,969 gridded ENCs based on the gridded chart scheme described within the Nautical Charting Plan, including 1,040 in the MACHC region. The estimated ENC gridding completion date is February 2026.



- iii. NGA's U1 ENC portfolio will be completed on 1 November. We anticipate publishing around 3,400 U1 ENC for defense purposes. NGA will regrid 200 ENC's in our PCA's falling within MACHC areas in US FY25 to ensure they align with our global gridding scheme.
 - i. All regarding scheme and releasability will be done in coordination with the PCA Nation and the MIIC.

c) ENC distribution method

- i. U.S. S-57 ENC produced in domestic waters and over Prime Charting Authority (PCA) waters are available either directly from the NOAA website, or via the RENC system and additional value-added distributors.
 - i. NOAA website at: <https://nauticalcharts.noaa.gov/>
 - ii. NOAA's Interactive Catalog at: <https://www.charts.noaa.gov/InteractiveCatalog/nrnc.shtml>
 - iii. International Center for ENC's Distributors at: <http://www.ic-enc.org/Distribution.html>.
 - iv. PRIMAR Distributors at: <https://www.primar.org/home>

d) Raster Navigational Charts (RNCs)

- i. By January 2025, NOAA will end production and maintenance of NOAA traditional paper charts and RNC products. Six months before a chart is canceled, NOAA updates the chart with a note in the lower left corner stating the chart's status as a "last edition" and the date on which it will be canceled. NOAA also updates its Lists of Latest Chart Editions to indicate that the last edition of the chart has been published. When the chart is canceled, the chart number will be moved from its position in the list of active charts to a cumulative list of canceled charts at the bottom of the page. The List of Latest Chart Editions can be found at: <https://nauticalcharts.noaa.gov/charts/list-of-latest-editions.html>. Other products and services based on the paper chart that will be or have been canceled by January 2025 include: 1) Full-size nautical chart PDF images, 2) BookletCharts™, 3) RNC Tile Service, 4) Seamless Raster Navigational Chart Services, and 5) RNC Viewer.
- ii. NOAA is continuing its development and improving the NOAA Custom Chart, a webbased application that will enable users to download and print raster chart files created from the most up-to-date ENC data. In July, NOAA released Version 3.0 of the tool that now works with the new NOAA Navigation Update Application to

determine the number and type of changes that have been made to ENC data since a chart was exported, allows users to control the placement and number of compass roses shown on a chart and continued improvement to use more traditional paper chart symbology. The NOAA Custom Chart is available at <https://devgis.charttools.noaa.gov/pod/>

- iii. With the continued transition to electronic navigation, NGA is shifting paper chart production activities to a smaller suit, created via the Certified Printed Electronic Navigational Charts (CPENC) process. This process efficiently converts ENC data directly to a paper chart, including a graphical update service.

e) Other charts

- i. The U.S. produces many Digital Nautical Charts (DNCs) in MACHC waters. The DNC produced by NGA, are unclassified limited distribution vector datasets containing maritime significant features essential for safe marine navigation. NGA will cease production of DNC in March 2026 and maintain S-57 ENC as we move into the S-100 transition.
- ii. Certified Printed Electronic Navigational Charts (CPENCs) are automatically rendered and printed versions of NGA's ENCs that are certified safe for maritime navigation where U.S. hardcopy requirements still exist. CPENCs are maintained via a new corrections process utilizing ENC change detection results, which symbolically highlight and communicate critical changes on an updated, digital "CORRECTED" version. This new corrections process saves a substantial amount of internal resources compared to the traditional textual Notice to Mariners process.

d) PUBLICATIONS:

a) Updated publications

- i. The US has updated the Maritime Safety Information (MSI) interface to reorganize the information and improve the efficiency of the user. The information found on the MSI website includes Notice to Mariners, Publications, Navigational Warnings, Piracy, Drill Rigs, the Product Catalog, and several miscellaneous products and calculators. Users can also submit questions or subscribe to update services for some of following products as well. The interface can be found at: <https://msi.nga.mil/>
- ii. US Sailing Directions consist of useful information important to navigators of coastal waters. Digital updates can be downloaded from NGA at: <https://msi.nga.mil/>

- iii. World Port Index (WPI) – Pub 150 contains the location and physical characteristics as well as the facilities and services offered by major ports and terminals worldwide. The WPI is also available via the IHO Online catalogues and can be used as an API for other web services. Digital updates are available to the public and posted at the NGA Maritime Safety website, at: <https://msi.nga.mil/Publications/WPI>.



- iv. The NGA List of Lights and their digital updates are available to the public and

posted at the NGA Maritime Safety website, at:
<https://msi.nga.mil/Publications/NGALOL>

- v. The NGA Radio Aids and Fog Signals (Pub 117) and their digital updates are available to the public and posted on the NGA Maritime Safety website at:
<https://msi.nga.mil/Publications/RNA>.

b) Means of delivery, e.g. paper, digital

- i. All of the publications are available digitally in PDF format from the NGA website at: <https://msi.nga.mil/Publications>.
- ii. Users can enroll in a Publication Updates Subscription Service to receive e-mail notifications of nautical publication updates and new editions.
- iii. NGA publications can be ordered from commercial vendors found on the NGA website at: <https://msi.nga.mil/Products>.

e) **MARITIME SAFETY INFORMATION (MSI)**

a) Existing infrastructure for MSI dissemination

- i. Maritime Safety Information (MSI) is navigational and meteorological warnings, meteorological forecasts and other urgent safety-related messages broadcast to ships. NGA is the NAVAREA IV and XII Coordinator and promulgates warnings via Inmarsat's SafetyNET II service and Iridium's Safetycast service.

b) Notice to Mariners

- i. The U.S. Notice to Mariners, provides timely information for the correction of all U.S. Government navigation charts from a wide variety of sources, both foreign and domestic. Information published in Notice to Mariners provides for the correction of unclassified nautical charts.

The U.S. Coast Guard issues Local Notices to Mariners for NOAA charts, while NGA issues Notices to Mariners for the worldwide suite of NGA paper charts. Local Notice to Mariners are updated weekly and available for download in several formats. For future chart cancellations, Local Notice to Mariners will announce "no new editions" and the cancellation date. It will subsequently announce the cancellation six months later.

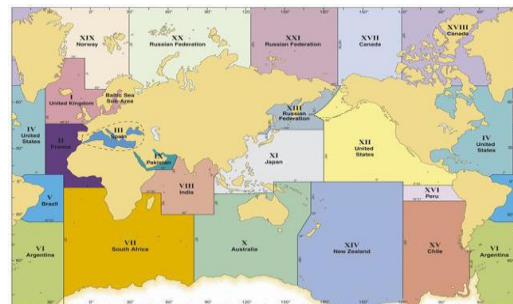
Mariners can download applicable Notices from the web at:

<https://www.navcen.uscg.gov/?pageName=lnmMain>

The U.S. Notice to Mariners are posted at the NGA Maritime Safety website at <https://msi.nga.mil/NTM>.

c) Navigation Warnings

- i. The NAVAREA coordinator is the authority charged with coordinating, collating, and issuing navigational warnings for a designated NAVAREA within the IMO/IHO World-Wide Navigational Warning Service (WWNWS). MACHC Waters primarily lie within NAVAREA IV/XII (USA



(NGA) is the NAVAREA IV/XII Coordinator) and NAVAREA V (Brazil is the NAVAREA V Coordinator).

f) C-55

The US updates its C-55 entry periodically. C-55 can be found at: December 2023 IHO U.S. C-55. <https://iho.int/uploads/user/pubs/cb/c-55/c55.pdf> The U.S. entry to C-55 (pages 489-512) covers INT regions A, B, K, L and N.

g) CAPACITY BUILDING

a) Offer of and/or demand for Capacity Building

- i. The United States is an active participant in the IHO Capacity Building Sub-Committee (CBSC).
- ii. US conducted on behalf of the IHO a Technical Visit to Costa Rica. During the visit the TV team met with many different stakeholders and discussed the need for an NHC, and a formal agreement with their recognized PCA.

b) Training offered

- i. Category-A Competence Training for Hydrography
Training opportunities are available at various institutions in the United States. Two Category A certified hydrographic programs are available through:
 - The University of Southern Mississippi (USM)
 - The University of New Hampshire (UNH)
- ii. Category-B Competence Training for Nautical Cartography
 - NGA conducts annual training with an IBSC recognized S-8 Cat B course.
 - NOAA program for S-8 Cat B is on a temporary hold.
- iii. Category-B Competence Training for Hydrography
U.S. Navy offers an IBSC recognized Cat B International Hydrographic Management and Engineering Program (IHMEP), commencing annually in February. This training is available to both uniformed and civilian government personnel. U.S. Navy's Category A and B programs and mobile training all qualify for Security Cooperation assistance.
- iv. Maritime Safety Information (MSI) Training – The US supports the IHO MSI training course and provides support to nations through on site and remote guidance. NGA is currently finalizing a virtual MSI training course which will be available to the IHO and our international partners in the months to come.
- v. Other training partnerships
 - In 2020, the University of South Florida (USF) College of Marine Science entered into a five-year cooperative agreement with NOAA's Office of Coast Survey to launch the Center for Ocean Mapping and Innovative Technologies (COMIT) with the aim to develop new technologies and approaches to ocean and coastal zone mapping in line with NOAA's commitment to building resilient coastal ecosystems, communities, and economies. COMIT will build on USF's expertise in ocean engineering, habitat and bathymetric mapping, modeling of coastal storm events, coastal geodesy, sea level rise, and safe navigation in ports such as Tampa Bay.
 - In 2023, NOAA and the University of New Hampshire (UNH) expanded a 24-year ocean and Great Lakes mapping partnership through the creation of a new Center of Excellence for Operational Ocean and Great Lakes Mapping. The center will focus on: delivering practical hydrographic training and fostering workforce development for ocean mapping operations, providing technical expertise and systems support for NOAA's mapping operations on an increasingly diverse set of platforms, including new ships and uncrewed

survey vessels, and partnering with academia and industry to transition ocean mapping research to operations.

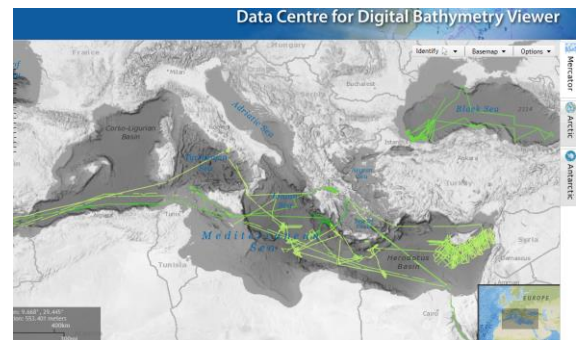
h) OCEANOGRAPHIC ACTIVITIES

a) GEBCO & Seabed 2030

- i. The U.S. is a strong supporter of the IHO/IOC GEBCO and the Seabed 2030 project. Using a shared resource approach, the U.S. provides technology and software in support of the IHO Data Centre for Digital Bathymetry (DCDB) and the GEBCO Gazetteer. These activities work to support the GEBCO and has great potential to create partnerships and cooperation between interested parties, significantly improving our understanding of the sea floor and empower sustainable ocean management.

b) Crowdsourced Bathymetry Activities

- i. The U.S. provides support for the IHO-initiated project to develop a global database for crowdsourced bathymetry hosted by IHO DCDB. The IHO DCDB, co-located with NOAA's National Centers for Environmental Information (NCEI), is building the infrastructure necessary to provide archiving, discovery, display and retrieval of global crowdsourced bathymetry data from mariners around the world. The online database can be found at: https://www.ncei.noaa.gov/maps/iho_dcdb/



i) SPATIAL DATA INFRASTRUCTURES

a) Status of MSDI

- a. The United States actively supports MSDI within the country, as well as regionally, and internationally. The MSDI capability is important for supporting non-traditional users of hydrographic data to allow them to complete their environmental research, port development, disaster support projects, etc. The U.S. MSDI efforts help build a larger community of users for this marine data than the traditionally intended hydrographers and cartographers making Safety of Navigation products and data.

The U.S. supports implementation of the UN Statement of Shared Guiding Principles for Geospatial Information Management. Access to data and services, usable to the public, can help fuel entrepreneurship, innovation, and scientific discovery—all of which improve lives and contribute significantly to job creation—is the foundation of the [U.S. Open Data Policy](#). The open data policy has led to public availability of most hydrographic data, products, and services produced by U.S. Hydrographic Offices for data downloads at no cost.

b) Involvement in regional or global MSDI efforts

- i. The U.S. holds active roles in supporting the work of several international MSDI-focused working groups:
 - IHO MSDIWG
 - United Nations Committee of Experts on Global Geospatial Information Management (UN-GGIM) Working Group on Marine Geospatial Information (WG-MGI)

- Open Geospatial Consortium (OGC) Marine Domain Working Group (Marine DWG)
 - Regional MSDI working groups where applicable, including the MACHC MSDIWG
- ii. In 2022-2023, NGA sponsored Phase 3 of the ongoing Open Geospatial Consortium (OGC) Federated Marine SDI-Pilot (FMSDI-Pilot) which was an overarching, sea-based health and safety scenario incorporating the land/sea interface in the Arctic that demonstrated the technology and data used with OGC, IHO, and other community standards in response to a grounding event and the evacuation of a cruise ship or research vessel in the Arctic. The OGC Engineering Report summarizes the outcomes of this phase and is available at the link below. This pilot directly responds to the [OGC-IHO MSDI Concept Development Study](#).
Source: <https://www.ogc.org/initiatives/fmsdi3/>

c) MSDI national portal

- i. The Federal Geospatial Data Committee (FGDC) is an organized structure of federal geospatial professionals that provide executive, managerial, and advisory direction and oversight for geospatial decisions and initiatives across the United States federal government. FGDC works collaboratively with federal, state, and local governments, non-Federal collaborates, communities, constituents, and professional bodies providing the enabling foundation of standards, data catalogs, partnerships, and tools that make up the National SDI (NSDI). For more information visit: <https://www.fgdc.gov/>

Related to MSDI is the U.S., “MarineCadastr.gov.” This is an integrated marine information system that provides data, tools, and technical support for ocean planning. The team for MarineCadastr.gov continually works “to increase access to data through data and map services. The services are designed to deliver data without replication and directly from the 21 sources.” MarineCadastr.gov supports complementary efforts: Digital Coast, Data.gov, and Geoplatform.gov (a FGDC initiative). For more information see: <https://marinecadastre.gov/>

d) Other initiatives

- i. NGA’s EarthDEM Portal
The National Geospatial-Intelligence Agency (NGA) and the National Science Foundation (NSF) partnered with the University of Minnesota and other members of the academic research community, private sector, and international partners to create this first-ever publicly available, high-resolution, satellite-based elevation data map. The 3-D digital elevation models, are the product of the DEM project, which was created after a January 2015 executive order calling for enhanced coordination of national efforts in the Arctic. EarthDEM covers land surface between 60 degrees N and 60 degrees South excluding Alaska, Greenland, and the Kamchatka Peninsula. U.S. agencies agreed to extend the DEM and its continued public access through 2032. Available on NGA’s GEOINT Services portal: Digital Elevation Data, Reference Graphics, Vector/Thematic Maps and their Service Endpoints, and Nautical Charts and Sailing Directions

j) INNOVATION

a) Use of new technologies

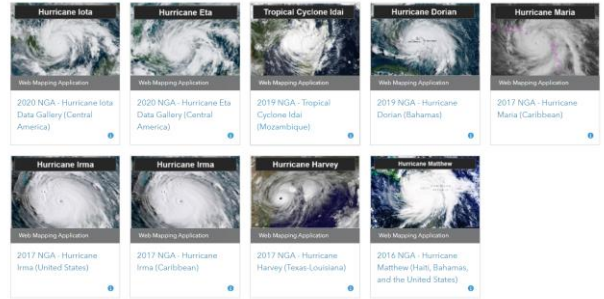
- i. NGA DNC to ENC Production Transition –NGA has fully transition from producing the DNC product as the primary digital navigation product to ENC (S-57). This will bring NGA into line with the international community and allow for easier sharing of

digital data with other hydrographic offices and provide a common operating picture when working together with other foreign partners.

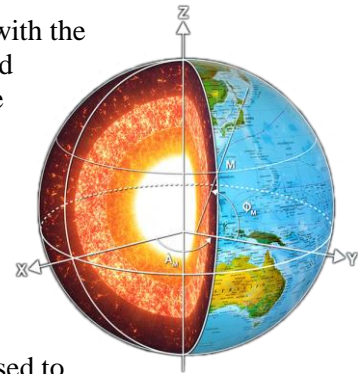
k) OTHER ACTIVITIES

- a) Preparation for responses to disasters
 - i. NGA Humanitarian Support Portal - NGA maintains a Humanitarian Assistance Disaster Response (HADR) website to support Hurricanes and various disasters around the World. It contains maps and documents to support the first responders in their relief efforts. It can be found at:

<https://nga.maps.arcgis.com/home/index.html>



- b) Magnetic and gravity surveys
 - i. The U.S. is working on outyear plans to continue support for the World Magnetic Model and WGS84 reference frame maintenance
 - ii. A new WMM will be released on December 17, 2024 and along with the regular WMM, NGA and NOAA will release a new product called the WMM High Resolution (WMMHR). The WMMHR has more coefficients and more digits in each coefficient resulting in a more accurate picture of the magnetic field. NGA highly recommends that you use the WMMHR instead of the WMM in all of your systems when the model is released later this year, however, the WMMHR may not simply plug and play into your systems because of the additional digits and information.

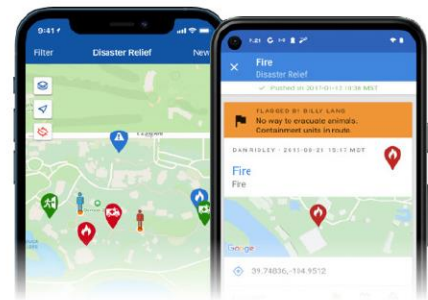


NOAA has put together a test version of WMMHR that can be used to see how your systems will react to the new format. The WMMHR (2020 test version) can be accessed at

<https://www.ngdc.noaa.gov/geomag/data/WMM/WMMHR/> . If you have any questions or comments regarding the WMMHR model.

- c) Dynamic World Coastline
 - i. NGA has authorized the public release of the Dynamic World Coastline (DWC), a global vector dataset collected at 1:50,000 or larger with 50m or better (CE90) horizontal accuracy. The coastline was compiled at the debris or wet/dry interface from high resolution satellite imagery. NGA is actively working on where to host the data for public consumption.

- ii. Mobile Awareness GEOINT Environment (MAGE)
 - i. MAGE is a situational awareness and mobile data collection platform customizable to support teams with a variety of different missions and use cases. While operating in a low bandwidth or disconnected environment, team members can continue to collect data offline which MAGE automatically shares with the

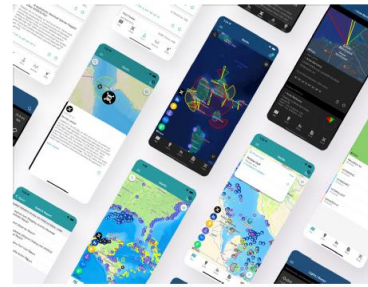


MAGE iOS and Android displaying observations on the map and showing the details.

team when a data connection is available.

d) Marlin – One-stop-shop for Maritime Safety Information in your hands

- i. Marlin brings NGA’s Maritime Safety Information datasets to devices in an offline-capable mobile application. Download the latest maritime safety reports and reference information before setting sail, then search and view the information on an interactive map, even without cell service.



Marlin provides many unique and interactive visualizations of Maritime Safety Information displayed on iOS and Android mobile devices

1) **CONCLUSIONS**

- a) The U.S. is committed to support the global hydrographic community.

Annex A

Input to the IHO Publication P-5 (*Yearbook*)

The United States updates Publication P-5 on an as needed basis and is not regionally specific.

Annex B

Input to the IHO Publication C-55 (*Status of Hydrographic Surveying and Charting Worldwide*)

The United States updates Publication C-55 on an as needed basis for all regions

Annex C

National MSI Self-Assessment

The United States updates National MSI Self-Assessments on an as needed basis, and are not regionally specific