Volume 1, Spring 2021

The Florida Marine Data Hub Newsletter

Welcome to the first volume of The Florida Marine Data Hub newsletter!

What is the Florida Marine Data Hub? Simply put, it is a website that collates information and knowledge about marine data collection, processing, management, and distribution. It is meant to be a one-stop shop for anyone with an interest in marine spatial data. While it focuses on bathymetric and backscatter data, it also includes information about data related to the geology, geomorphology, chemistry, biology, physics, habitats, and uses of our oceans.

The Florida Marine Data Hub is an initiative associated with the establishment and funding, in late 2020, of the West Florida Shelf Standardized Mapping Framework Center of Excellence. The Center of Excellence, hosted in the School of Forest, Fisheries, and Geomatics Sciences at the University of Florida, is led by Vincent Lecours, Erik Kvaleberg, and Joy Hazell. Its goal is to bring the Florida-based community of marine data users and providers together to identify current and future needs for a framework in support of effective and dynamic aggregation of benthic mapping data. Our first objectives as part of this project are to review existing successful frameworks for marine data integration and distribution, and to review current standards, protocols, and guidelines for data collection, integration, and distribution of marine data. We will share our findings on the Florida Marine Data Hub website, which is continually being updated – we welcome contributions! This newsletter will showcase resources and advancements. The newsletter will be produced four times per year and will have recurring sections such as *The Technical Corner*, *Tool of the Trade*, and *Provider Profile*.

You are receiving this newsletter because you have been identified as a member of our community of marine data users and providers. If you wish to subscribe to the newsletter or to be made aware of upcoming workshops associated with this project, please let us know! Enjoy!

INSIDE THIS ISSUE:

Implementation Plan for NOMEC

On January 5, 2021, the federal government released the implementation plan for NOMEC, the *National Strategy for Ocean Mapping, Exploring, and Characterizing the United States Exclusive Economic Zone*.

One of the main items in NOMEC is the establishment of the National Ocean Mapping, Exploration, and Characterization Council to develop and implement multi-disciplinary, collaborative, and coordinated approach to mapping, exploring, and characterizing the US Exclusive Economic Zone (EEZ). This council now oversees the new Interagency Working Group on Ocean Exploration and Characterization (IWG-OEC) and the pre-existing Interagency Working Group on Ocean and Coastal Mapping (IWG-OCM), which aims to "facilitate the coordination of ocean and coastal mapping activities and avoid duplicating mapping activities across the Federal sector as well as with State, industry, academic and non-governmental mapping interests."

The principal goals of NOMEC are to map waters deeper than 40 m within the US EEZ by 2030 and coastal areas by 2040 and to make easy-to-use mapping data available to the public through geographic data portals.

In addition, the NOMEC council will seek stakeholder input to develop standard ocean mapping protocols that harmonize with existing national standards and best practices. Much like the Florida Marine Data Hub, data considered by NOMEC will include bathymetric and backscatter data, seabed and sediment types, sub-bottom geology, and the physical, chemical, and biological characteristics of the seabed and water column.

Overall, the implementation of NOMEC should yield important technological and methodological developments in ocean mapping and will contribute data that are critical to the understanding of the waters within the US EEZ.

What does NOMEC means for Florida?

The implementation of NOMEC and the work of the IWG-OCM will greatly benefit the Florida ocean mapping community. The standard ocean mapping protocol and the inflow of standardized data will provide new research opportunities and better information for the management, conservation, and restoration of Florida's marine biological, geological, cultural, and archeological resources. These efforts can have far-reaching effects for Floridians, for example by contributing to and encouraging a sustainable blue economy.

The 20 government agencies involved in the IWG-OCM

Bureau of Ocean Energy Management (BOEM)
Department of Energy (DOE)
Department of State (DOS)
Environmental Protection Agency (EPA)
Federal Emergency Management Agency (FEMA)
National Aeronautics & Space Administration (NASA)
United States Navy
National Geospatial-Intelligence Agency (NGA)
National Oceanic & Atmospheric Administration (NOAA)
National Park Service (NPS)
Natural Resources Conservation Service (NRCS)
National Science Foundation (NSF)
Office of the Director of National Intelligence (ODNI)
Smithsonian Institution
United States Army Corp of Engineers (USACE)
United States Arctic Research Commission (USARC)
United States Coast Guard (USCG)
United States Forest Service (USFS)
United States Fish & Wildlife Service (USFWS)
United States Geological Survey (USGS)

Implementation Plan for NOMEC

Summary of the five goals and their respective objectives outlined in the NOMEC strategy

1 *Coordinate interagency efforts and resources to map, explore, and characterize the US EEZ*

Objective 1.1 – Establish a National Ocean Mapping, Exploration, and Characterization Council

Objective 1.2 – Develop an implementation plan for the NOMEC strategy COMPLETED

2 *Map the U.S. EEZ*

Objective 2.1 – Establish a standard ocean mapping protocol (SOMP) by June 2022

Objective 2.2 – Coordinate and execute campaigns to map the U.S. EEZ; provide annual updates

Objective 2.3 – Make mapping data usable and available (deliverables coming in June 2021)

3 *Explore and characterize priority areas of the U.S. EEZ*

Objective 3.1 – Identify strategic ocean exploration and characterization priorities (initial results coming in June 2021)

Objective 3.2 – Establish exploration and characterization standards and protocols by June 2022

Objective 3.3 – Explore and characterize priority areas (ongoing efforts until 2023)

Objective 3.4 – Make exploration and characterization data usable and available (identification of portals due in mid-2021)

4 *Develop and mature new and emerging science and technologies to map, explore, and characterize the U.S. EEZ*

Objective 4.1 – Identify science and technology needs in mapping, exploring, and characterization by June 2021

Objective 4.2 – Support development, testing, deployment, and use of new technologies

Objective 4.3 – Support partnerships on ocean methodologies, technology, and applications

5 *Build public and private partnerships to map, explore, and characterize the U.S. EEZ*

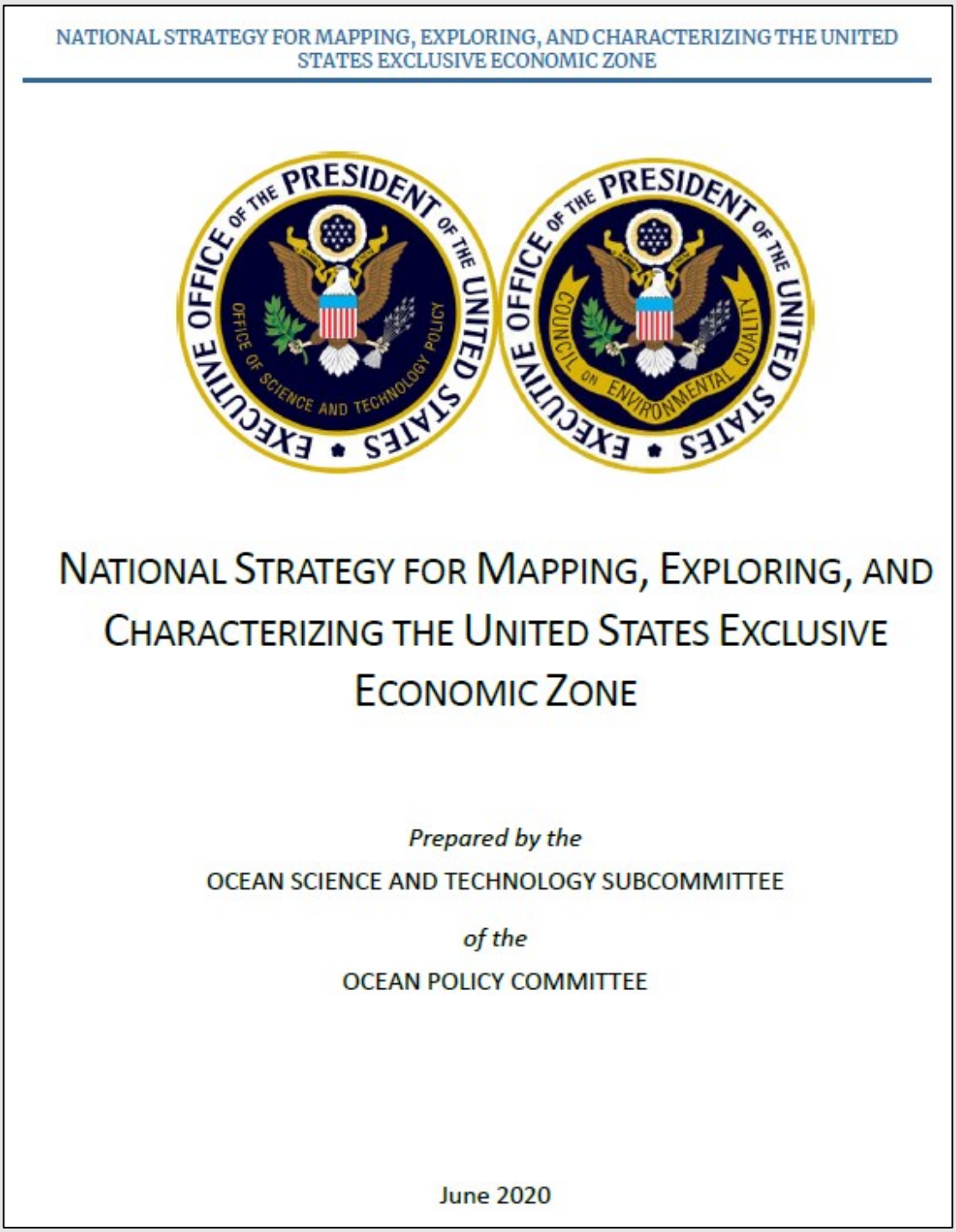
Objective 5.1 – Maximize opportunities for non-federal participation

Objective 5.2 – Foster cross-sector engagement

Objective 5.3 – Inspire and involve the public

Implementation Plan for NOMEC

The NOMEC Implementation Plan can be downloaded from the image below:



To learn more about the IWG-OCM:
[Interagency Working Group on Ocean & Coastal Mapping]

The Nippon Foundation-GEBCO Seabed 2030 Project

Launched during the United Nations Ocean Conference in 2017, the Nippon Foundation-GEBCO Seabed 2030 Project keeps attracting attention.

The Nippon Foundation-GEBCO Seabed 2030 Project has the ambitious aim of mapping the global ocean floor by 2030. This will be achieved by working with data providers to release bathymetric data holdings, integrating pre-existing data into a single grid, and encouraging data collection in areas where gaps exist. The initiative is supported by many international organizations and partner companies. For example, the Seabed 2030 Project recently announced new collaborations with the Scripps Institution of Oceanography and with the Global Multi-Resolution Topography (GMRT) Synthesis Project operated at Columbia University's Lamont-Doherty Earth Observatory (LDEO).

Work is delegated to four regional centers, each with a designated geographic focus area. The Alfred Wegener Institute (Germany) hosts the Southern Ocean regional center, the New Zealand National Institute of Water & Atmospheric Research hosts the center for the South and West Pacific Ocean, the LDEO hosts the regional center for the Atlantic and Indian Oceans, and Stockholm University (Sweden) and the University of New Hampshire share the responsibility for the Arctic and North Pacific Oceans regional center. A fifth center, hosted at the British Oceanographic Data Center, received input data from the four regional centers and maintains the global seamless grid.

The ultimate goal of this effort is to transfer the final grid to the International Hydrographic Organization Data Center for Digital Bathymetry, hosted by NOAA's National Centers for Environmental Information (NCEI), to ensure its sustainability and availability to everyone. As of 2020, an estimated 19% of the world's seafloor has been mapped. Current mapping progress can be viewed using BathyGlobe.

An interesting by-product of the Seabed 2030 Project has been the increase in visibility of ocean mapping to the public eye. In addition, the discussion surrounding the project is increasing the interest in technology development, such as the unsupervised and rapid collection of high-resolution data. The Shell Ocean Discovery XPRIZE is an example of how growing awareness about the importance of seafloor mapping increased opportunities for development and discoveries. The GEBCO-Nippon Foundation team that participated in this competition was awarded the final grand prize by developing the SEA-KIT autonomous surface vehicle for seafloor data collection, processing, and visualization.

Leaders of seafloor mapping efforts in Florida are encouraged to share their data with the Atlantic and Indian Oceans Regional Center and to NOAA NCEI, thus contributing to an important and exciting global effort to map the world's oceans by 2030.

For more information:

https://seabed2030.org/ https://www.gebco.net/ https://www.nippon-foundation.or.jp/en

Jakobsson *et al.* (2017) The Nippon Foundation – GEBCO – Seabed 2030: Roadmap for Future Ocean Floor Mapping.

Mayer *et al.* (2018) Seabed 2030: The Quest to See the World's Oceans Completely Mapped by 2030. *Geosciences*, 8, 63.

Wölfl *et al.* (2019) Seafloor Mapping – The Challenge of a Truly Global Ocean Bathymetry. *Frontiers in Marine Science*, 6, 283.

Seabed 2030 Launch IHO Intro to Seabed 2030 Seabed 2030: Cowdsourcing Data for a Blue Economy

Standards, Norms, and Conventions

When looking into "best practices", it can be difficult to find a consensus, particularly when the terminology can be so variable. Here we discuss some of this terminology.

Terminology is often field-specific, which makes it difficult to find a clear definition of terms in a multidisciplinary field like ocean mapping. In cartography, for example, a framework is defined as a set of rules and procedures set by an individual or an organization; some frameworks are widely adopted, others are not or are restricted to the organization that established them – *e.g.*, the cartographic projection, language, and font used for a specific set of map can be decided based on a given framework. In contrast, cartographic conventions are unstated rules and assumptions that are almost universally applied; conventions are developed over time and sometimes adopted by international organizations. One of the best examples of cartographic convention is that on most maps water is shown as blue, not orange.

In hydrography, we typically hear the term standards. According to the International Organization for Standardization (ISO), the definition of standards is a lengthy process that can take many years because a standard cannot become one until a consensus is reached within the community of interest. The ISO has established a suite of standards for geographic information, the 19100 series, which includes standards on metadata (ISO 19115) and standards on data quality (ISO 19157). Many of these standards have been endorsed by the Federal Geographic Data Committee and are used by federal and state agencies. With a focus on safety of navigation, the International Hydrographic Organization (IHO) established the S-44 IHO Standards for Hydrographic Surveys, whose sixth version was released in late 2020 to adapt to new seafloor mapping technologies. NOAA's National Ocean Service (NOS) developed a separate set of standards, although partly based on S-44, to be used for surveys undertaken or sponsored by NOAA: the NOS Hydrographic Surveys Specifications and Deliverables, often used in parallel with their Field Procedures Manual that was last updated in February 2021. Finally, the U.S. Corps of Engineers, which focuses on more coastal work, has their own requirements for hydrographic surveying and mapping digital products.

Given that marine data are so diverse and have many different uses, it is challenging to compile a single set of standards or protocols. Instead, users must seek the standards and best practices that best match their requirements in terms of data quality, spatial, thematic, and temporal scales, instrumentation used, and needs. In short, users must either collect data that will be fit-for-use or evaluate whether existing data are fit-for-use for their particular purpose. It is the responsibility of the data collection team to provide the appropriate metadata that will allow the user to make this evaluation. Find more about standards on the Hub!

For more information:

https://www.oceanbestpractices.org/

Tanhua *et al.* (2019) Ocean FAIR Data Services. *Frontiers in Marine Science*, 6, 440.

Pearman *et al.* (2019) Evolving and Sustaining Ocean Best Practices and Standards for the Next Decade. *Frontiers in Marine Science*, 6, 277.

Buck *et al.* (2019) Ocean Data Product Integration through Innovation – The Next Level of Data Interoperability. *Frontiers in Marine Science*, 6, 32.

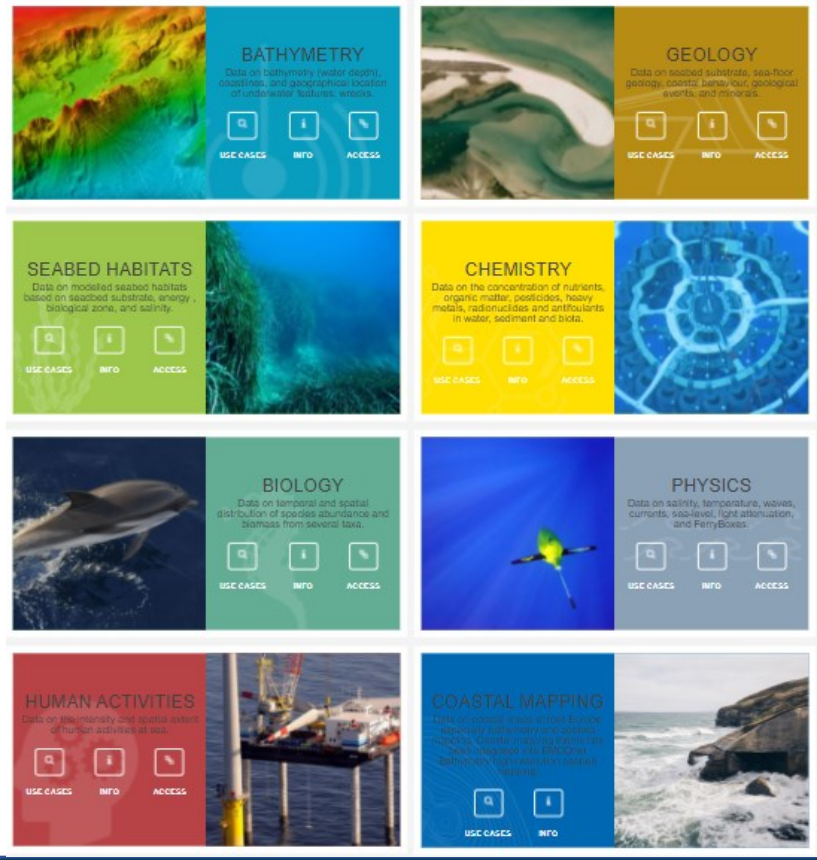
The EMODnet Framework

EMODnet, the *European Marine Observation and Data Network*, is a suite of geoportals that ingests, standardizes, organizes, and freely distributes marine data, data products, and metadata.

Established in 2006 by the European Commission, EMODnet is a collaborative initiative between more than 160 maritime agencies and organizations in Europe. The program was initiated to facilitate the coordination of marine data gathering and observations in Europe, and to make the resulting data, information, and products freely available to end users.

For example, EMODnet just released a shoreline-migration map, available from their Geology portal (see below). This map, made from field measurements and aerial photography, allows users to investigate large-scale coastal behavior and identify areas of rapid change. EMODnet also produces a map of the week every week to showcase their data and products!

EMODnet maintains a series of data portals accessed through specific map viewers that enables the exploration of available data organized in eight themes.



Interestingly, EMODnet established "Checkpoints", which are regional projects designed to assess the performance and shortcomings of EMODnet-provided data. Checkpoints, which are characterized by a given geographic area (*e.g.*, Arctic, Atlantic, Baltic Sea, Black Sea, Mediterranean Sea, North Sea), establish challenges meant to test data against real user needs. For example, challenges can address questions related to climate, energy production, marine protected areas, oil leaks and spills, fishery management and impacts, eutrophication and river inputs, alien species, and others. Challenges are used as a monitoring system to ensure that EMODnet as a whole remains relevant and up-to-date. Reports from each checkpoint can be found on its respective webpage, available here.

EMODnet also has an effective Data Ingestion portal to assemble and harmonize marine data, products, and metadata. A plethora of information relevant to our efforts as part of the Florida Marine Data Hub are also offered, such as guidelines on marine data management. In sum, EDMOnet models a gold standard for marine data hubs and frameworks, and we are certainly looking up to it!

EMODnet Open Conference and Jamboree 2021

EDMODnet is organizing a conference. Held from June 14th to 16th, it will be open to everyone and is free to attend! It will be a hybrid conference with in-person attendance in Oostende, Belgium, and virtual attendance online. Presentations and discussions will address topics relevant to both European and global partners and users, including open marine data and information in the digital era and ocean observation and data collection.

Click here to see the schedule and register!

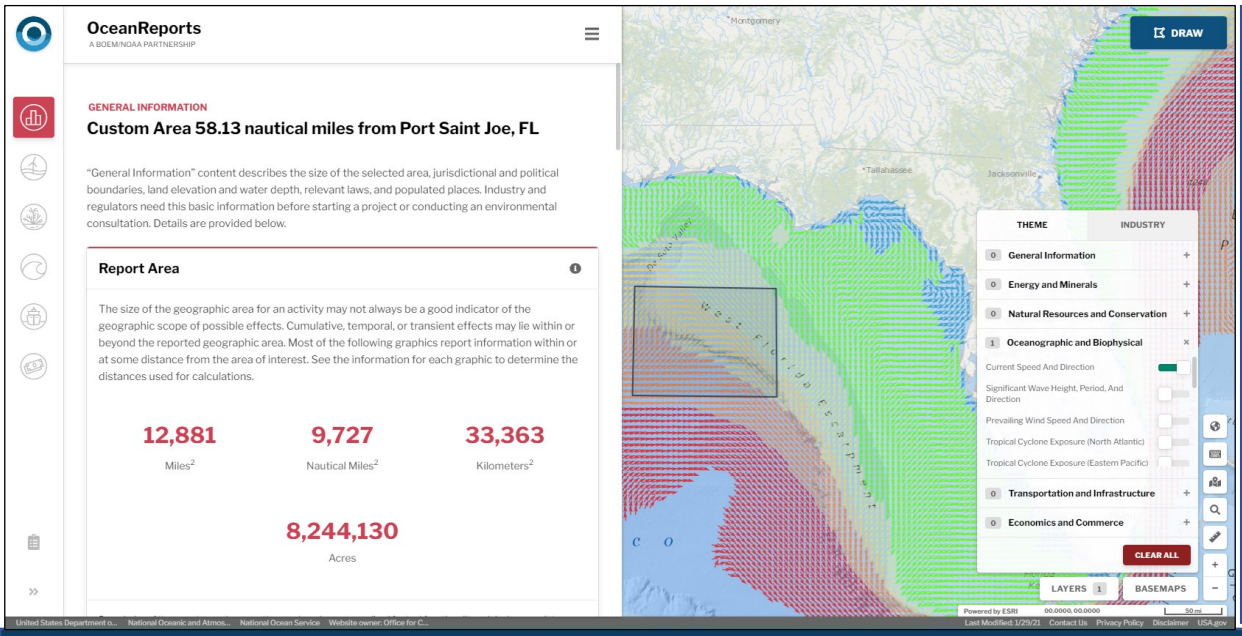
OceanReports

NOAA's Office for Coastal Management and National Centers for Coastal Ocean Science, in collaboration with the Bureau of Ocean Energy Management, developed *OceanReports*, a tool providing on-the-fly maps, graphics, and information based on the analysis of over a hundred ocean datasets.

OceanReports is a web-based tool used to generate comprehensive reports from user-delineated areas of the ocean within the U.S. Exclusive Economic Zone. A component of MarineCadastre.gov, the OceanReports tool launches from a web browser. Once launched, users can select and visualize a number of base maps linked to different themes and industries. For example, offshore wind energy leases, salinity, critical habitats, and ocean disposal sites can all be displayed at the same time on the map. Users can also measure distance directly from the map.

Users can draw – or provide the coordinates for – a polygon representing their area of interest. As soon as the area is completely drawn, a report showing general information about the area – including its size, depth, nearby populated places, and jurisdictions – is quickly generated. Using a menu on the left of the screen, the user can then explore additional topics related to their area, grouped into "Energy and Minerals", "Natural Resources and Conservation", "Oceanographic and Biophysical", "Transportation and Infrastructure", and "Economics and Commerce". OceanReports temporarily saves the generated reports, allowing the user to return to a previously defined area of interest. All reports can also be saved as a PDF file. The tool also offers 126 pre-generated "Quick Reports" of special interest areas and other areas organized by state. Finally, OceanReports provides metadata about the information available within the tool and offers the option to download the data from its original source.

In the example below, the base map displays ocean current speed and direction. A report was generated from a rectangle drawn over the West Florida Escarpment, close to the boundary between the West Florida Shelf and the deeper Gulf of Mexico. The report shows that the area is located about 58 miles from Port Saint Joe, FL, and covers more than 12,800 square miles.



For more information:

OceanReports tool bring ocean data to your fingertips

OceanReports: Ocean neighborhood analyses

MarineCadastre.org

OceanReports (from DigitalCoast)

OceanReports

The United States Interagency Elevation Inventory

The U.S. Interagency Elevation Inventory is a national service listing all available high-resolution topographic, bathymetric and topo-bathymetric datasets.

The second version of the U.S. Interagency Elevation Inventory was released earlier this year, and now allows users to find datasets by (1) inputting specific coordinates, (2) drawing a point, line, or polygon on a map viewer, and (3) by searching specific metadata terms. The search results can then be filtered and sorted based on elements such as data type, collection year, quality level, data access, and record owner.

The inventory does not host the datasets but identifies where to find them. When possible, *i.e.*, if the data are openly accessible, direct links to datasets are provided. However, the inventory also allows users to search for datasets that are not necessarily open access. In such cases, the search results include contact information to connect with the data owners.

Several governmental organizations have partnered to create and maintain the listing service, including the National Oceanic and Atmospheric Administration (NOAA), the Federal Emergency Management Agency (FEMA), the U.S. Geological Survey (USGS), the National Park Service, the U.S. Army Corps of Engineers (USACE), the U.S. Forest Service, and the U.S. Department of Agriculture (USDA). The datasets, which were collected over the last 25 years, are updated semiannually and include metadata such as vertical accuracy and point spacing.

A useful companion to the U.S. Interagency Elevation Inventory is the U.S. Mapping Coordination webGIS, a "collaboration site for mapping data acquisition" that includes not only existing data, but also a variety of mapping priorities and planned and ongoing mapping projects. Supported by SeaSketch, the data used in this tool are provided by the Integrated Working Group on Ocean and Coastal Mapping (see the article on NOMEC, p. 2) and the U.S. Geological Survey 3D Elevation Program.

For more information:

Frequently Asked Questions on the U.S. Interagency Elevation Inventory

USGS video tutorial (Version 1 of the Inventory)

Digital Coast GeoZone blog posts related to elevation

Blog post about Version 2 of the U.S. Interagency Elevation Inventory

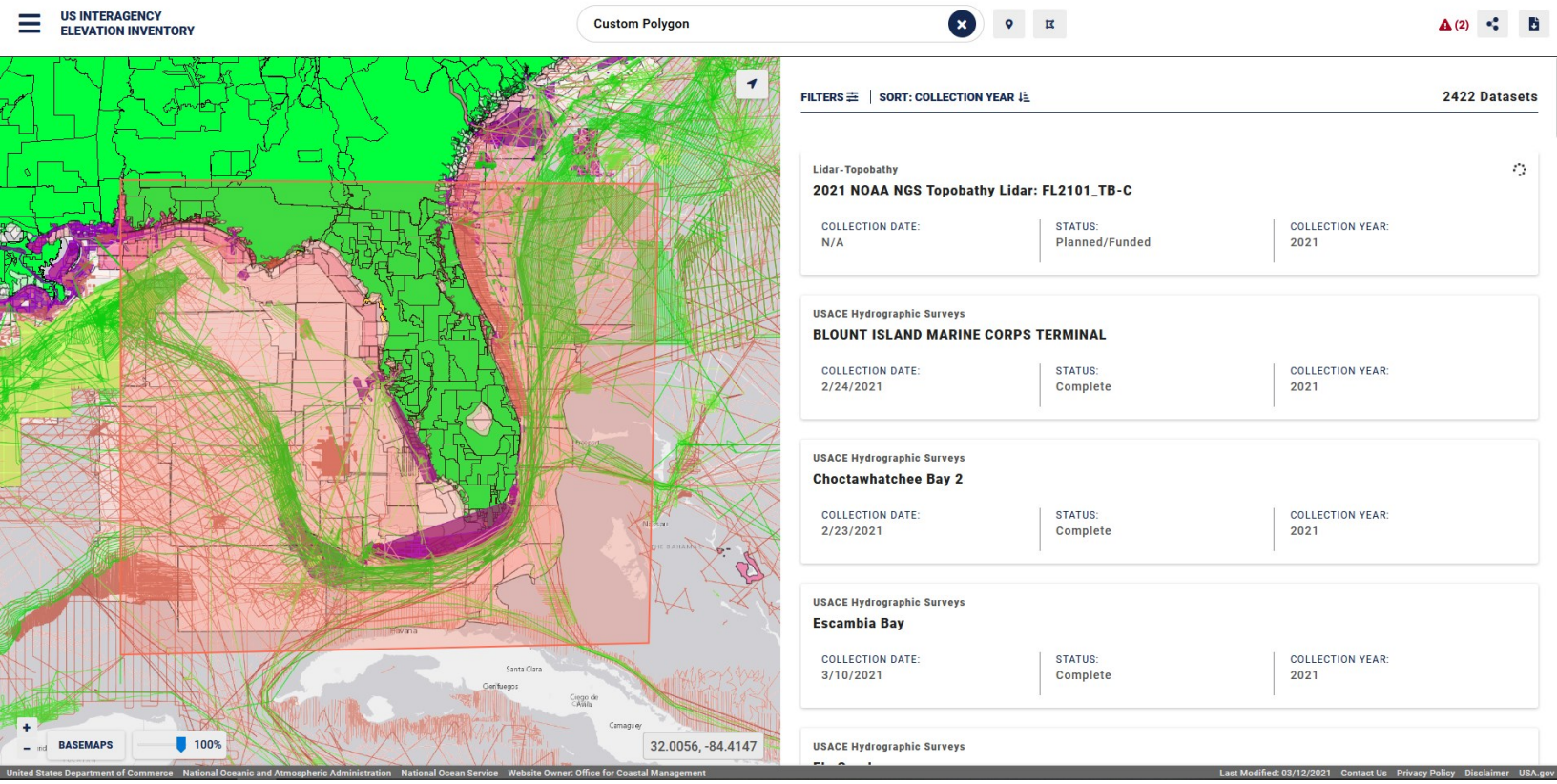
Downloads and resources related to the U.S. Interagency Elevation Inventory

The U.S. Interagency Elevation Inventory through OpenTopography

U.S. Interagency Elevation Inventory through DigitalCoast

U.S. Interagency Elevation Inventory (Home)

The United States Interagency Elevation Inventory



In the example above, a search polygon drawn around Florida returned more than 2,400 datasets, including:

- topographic lidar (terrestrial elevation data)
- topobathymetric lidar (seamless elevation and bathymetric data across the land/sea boundary)
- bathymetric lidar (shallow-water depths)
- NOAA hydrographic surveys (*e.g.*, nautical charts, port and harbor management data)
- multibeam echosounder surveys (high-resolution water depth and backscatter data)
- trackline surveys (water depths measured by transiting ships)
- USACE hydrographic surveys (*e.g.*, from coastal engineering projects)
- synthetic aperture radar (terrestrial digital elevation models)
- data from other surveys (*e.g.*, from academic or private survey efforts).

Miscellaneous News from the Field

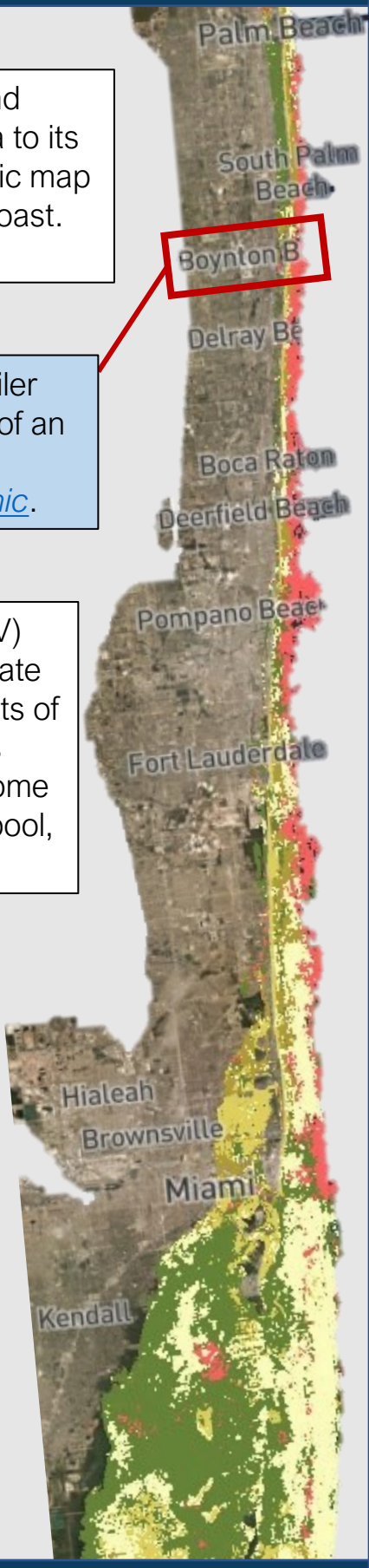
The Allen Coral Atlas, which provides satellite-derived benthic and geomorphic maps, recently added over 30,000 km^2 of coral reef area to its database. The image shown on the right is a screen grab of the benthic map produced by the Allen Coral Atlas' team for Florida's southeastern coast. Take a peek at the rest of the state *here*.

A study of coastal currents using an Acoustic Doppler Current Profiler (ADCP) in the Boynton Beach Inlet contributed to the understanding of an unusual "urban" habitat for manta rays in South Florida. More details *here*; the story was also featured in *National Geographic*.

SeaRobotics recently acquired the autonomous surface vessel (ASV) R/V Albatross from the Seafloor Mapping Lab (SFML) of California State University Monterey Bay. For many years, the ASV supported the efforts of the California Seafloor Mapping Program. When SFML stopped its activities, SeaRobotics, which initially built the ASV, brought it back home to Stuart, Florida. SeaRobotics will integrate the ASV into their rental pool, available to Florida's ocean mapping community.

The University of South Florida and NOAA recently launched the Center for Ocean Mapping and Innovative Technologies (COMIT). The arrival of COMIT is promising for Florida's ocean mapping community. More on COMIT here. Twitter: @ComitUsf

The Florida Coastal Mapping Program (FCMaP) steering committee submitted a statement of interest to NOAA's Notice of Matching Fund Opportunity for Hydrographic Surveys and Request for Partnership Proposals.
In doing so, FCMaP hopes to encourage different agencies to advocate for the critical need to map Florida's coastal waters. Visit FCMaP's website for more info (and note their new logo)!



The Florida Marine Data Hub Newsletter

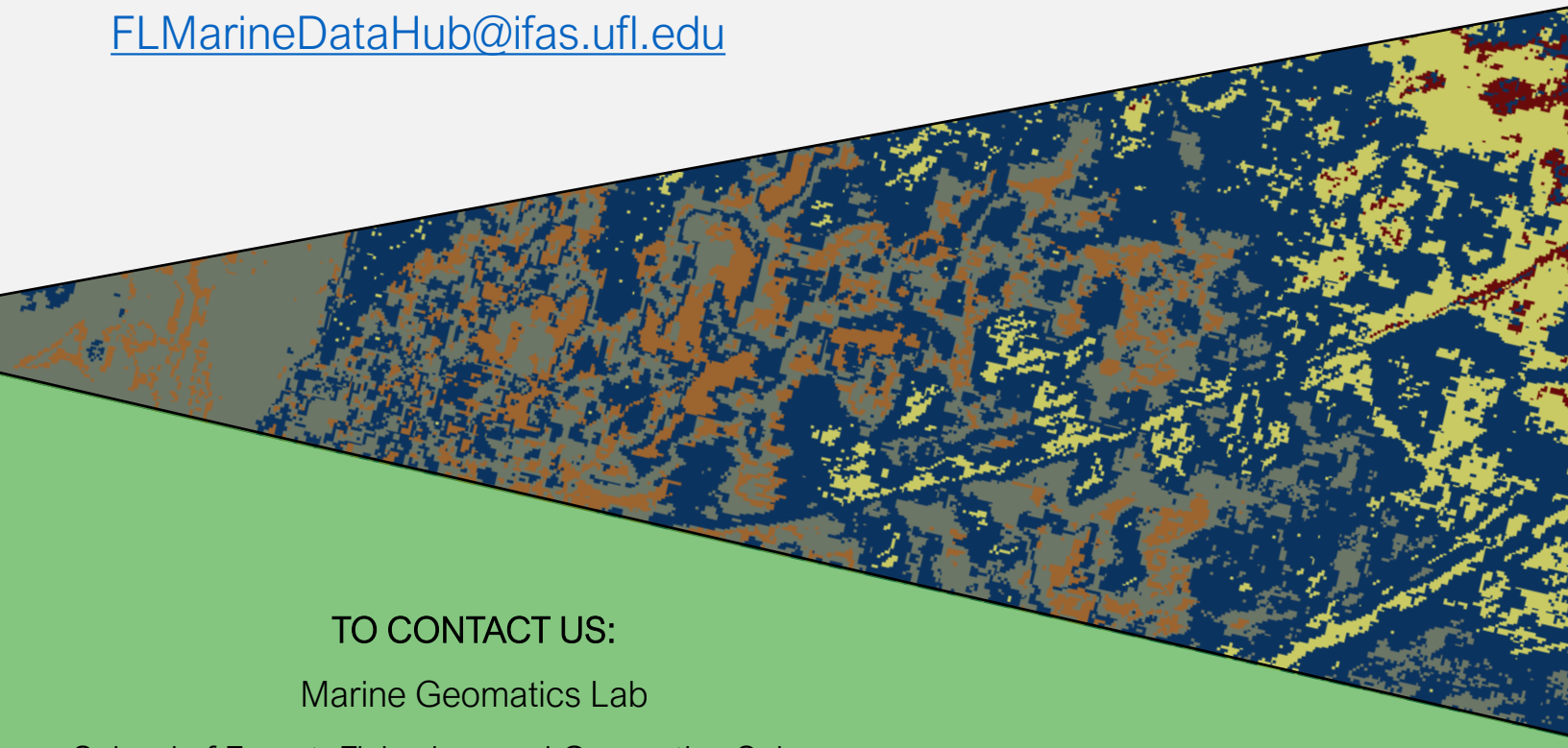
Want to contribute content to this newsletter or to the website?

Interested in sharing a story or dataset?

Have questions or feedback?

Get in touch!

FLMarineDataHub@ifas.ufl.edu



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