Crowd-Sourced Bathymetry

Fugro Supports Global Seabed Mapping, Ocean Science Initiatives

By David Millar • Dr. Kelley Brumley
This past May, nearly 250 thought leaders, champions and key stakeholders from the international ocean community gathered in Copenhagen, Denmark, to participate in the First Global Planning Meeting of the United Nations Decade of Ocean Science for Sustainable Development. The Decade kicks off in 2021, and the aim is to “support efforts to reverse the cycle of decline in ocean health and gather ocean stakeholders worldwide behind a common framework that will ensure ocean science can fully support countries in creating improved conditions for sustainable development of the Ocean.”

Attendees in the three-day event were diverse in culture and background. They included representatives from ocean science and technology; ocean policy and sustainable development; business and industry; non-governmental organizations and civil society; as well as donors and foundations. With a shared belief that sci-
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It’s an ambitious project that will require cross-sector collaboration worldwide. The hope is that existing high-resolution bathymetric data, which have been collected and archived by industry as well as academia, will be donated to the project. The unsurveyed portion of the seafloor will be mapped in part by utilizing crowdsourced bathymetric data.

The International Hydrographic Office defines crowdsourced bathymetry as: “the collection of depth measurements from vessels, using standard navigation instruments, while engaged in routine maritime operations.” Every vessel with a sonar could potentially contribute data to help reach the goal of mapping the entire seafloor by the year 2030.

In addition to working with clients to investigate potential data-sharing opportunities, Fugro has initiated its own large-scale crowd-sourced bathymetry campaign.

Seabed 2030

Seabed 2030 is a collaborative project between The Nippon Foundation and the General Bathymetric Chart of the Oceans (GEBCO) to inspire the complete mapping of the world’s ocean by 2030 and to compile all bathymetric data into the freely available GEBCO Ocean Map. A wholly mapped ocean will inform global policy, improve sustainable use and advance scientific research.

Currently, less than 15 percent of the world’s oceans are mapped to modern survey standards. Knowing the depth and shape of the seafloor is fundamental to applications such as safe navigation, disaster management, weather prediction, habitat studies and resource development, among many others.

With 85 percent of the ocean left unmapped, a significant gap remains in our understanding of the ocean and its processes, forcing decisions to be made based on assumptions rather than science. The results can prove significant. The United Nations First Global Integrated Marine Assessment reports that much of the ocean is seriously degraded, and stressors are projected to increase as the human population continues to grow.

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Fugro’s Contribution

Fugro’s crowd-sourced bathymetry solution provides highly automated collection of high-resolution multibeam echosounder data during vessel transits. The program began in 2016 from one vessel in the Americas region, with a goal of developing the systems and processes needed to support remote command and control of data acquisition, as well as remote data upload and transfer. Once workflows were established, the program was expanded to other survey vessels.

A key component of Fugro’s process is its Office Assisted Remote Services (OARS), a proprietary technology that enables safe and efficient data acquisition without the need for dedicated survey staff on board the survey vessel. OARS is supported by three command centers strategically located around the globe, operating 24/7, 365 days a year. The technology makes it possible for valuable data to be collected from transiting vessels with minimal effect on Fugro’s standard operating procedures.

Over the past two years, Fugro has grown its crowd-sourced bathymetry program to include seven multibeam-equipped vessels, contributing approximately 500,000 sq. km of high-resolution bathymetry to Seabed 2030. The company ultimately plans to expand its in-transit collection capability across its entire global survey fleet for even greater impact to the project.

Additional Benefits, Opportunities

While the impetus for Fugro’s Seabed 2030 contributions was to help build a publicly available global database, the work has also benefited regionally focused programs. One such project is the Atlantic Ocean Research Alliance (AORA). AORA was formed under the 2013 Galway Statement on Atlantic Ocean Cooperation between the European Union, the United States of America and Canada. With a goal of improving knowledge about the Atlantic Ocean to support a prosperous and sustainable blue economy, AORA has identified seabed mapping as a priority area of collaboration. Over the past two-and-a-half years, Fugro’s bathymetric data contributions to Seabed 2030 in this region have totaled approximately 278,000 sq. km. These data, which were provided to AORA’s Atlantic Seabed Mapping International Working Group, cover an area about the size of Iceland.

In many cases, the multibeam data contributed by Fugro has included backscatter and water column data along with the bathymetry. Modern multibeam sensors can acquire all three data types simultaneously. Together, they provide significant information for characterizing the seafloor and water column, all of which is of great interest to key priority areas of the UN’s Decadal ocean goals and to ocean science in general.

Crowd-sourced bathymetry does not always involve multibeam sonars and multibeam data, however. Single-beam sonars have tremendous utility and potential when the power of the crowd is employed. One can easily imagine what is possible when depth measurements are acquired from cruise ships, commercial shipping vessels, fishing vessels and private yachts as they are engaged in their routine maritime operations.

The crowd-sourced approach can also be applied to the collection and contribution of other ocean observation data. Examples include temperature, salinity, currents, and marine mammal and bird observations, to name a few. In the United States, for example, NOAA has implemented a Voluntary Observing Ship (VOS) program for contributing weather information at the volunteer’s location. If this program were expanded and/or adapted to include other oceanographic data, crowd-sourced ocean observation could flourish. Similar procedures
currently utilized by Fugro to remotely command and control multibeam systems could also be used to help coordinate a global effort of seafloor mapping and ocean observations.

Get Involved

Understanding our oceans is essential to predictions that will help guide our adaptation to inevitable change. Cooperation and collaboration is key, with success dependent upon participation from stakeholders, defined as international organizations, universities, nongovernmental organizations, maritime industries, youth organizations and citizens. These stakeholders can work together to either consolidate existing data, share data that are currently not in the public domain, help map areas where no data exist, or just help get the message out that these data are needed.

The Decade of Ocean Science will rely on an inclusive and participatory stakeholder process to facilitate global communication and shared learning across the stakeholder communities. Gatherings of members from all sectors will be held in 2019 and 2020 to identify priority areas for the Decade, and to define the ocean science needed to achieve sustainable development goals. This series of meetings will also include an official Stakeholder Forum that will continue to collect relevant inputs into the design of the Decade.

It is necessary that local and regional desired outcomes are clearly defined, so that the formulation of scientific products can help guide sustainable-use polices. Incorporating and leveraging existing international programs such as AORA and Seabed 2030 allows for a “bottom-up” collaborative approach to this work.

Over the next year, there will be opportunities for all stakeholders to share, learn and collaborate as an implementation plan for the Decade is developed. Collectively, the community can help ensure that every bit of data collected and every ocean observation shared adds to the greater good. Only by working together will we realize the end-goal of exploring the ocean, sustainably utilizing its bounty and protecting its health for a safe and livable world.

David Millar is Fugro’s government accounts director for the Americas region, based in the Washington, D.C. area. He is a member of the GEBCO Guiding Committee and on the Seabed 2030 Establishment Team. Millar has 30 years of ocean mapping, marine geophysical and hydrographic survey experience and has been with Fugro since 2003.

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