



United Nations  
Educational, Scientific and  
Cultural Organization

Intergovernmental  
Oceanographic  
Commission

# Briefing on the work of GEBCO



# What is GEBCO?

**GEBCO aims to provide the most authoritative publicly-available bathymetry of the world's oceans.**

It operates under the joint auspices of the International Hydrographic Organization (IHO) and the Intergovernmental Oceanographic Commission (IOC) of UNESCO

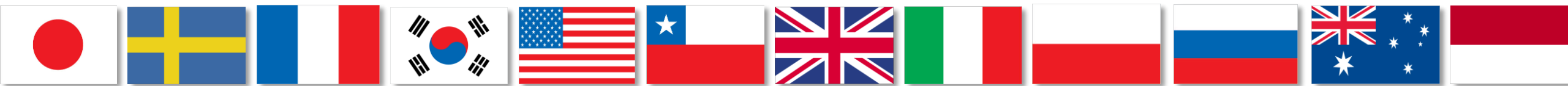




# What is GEBCO?

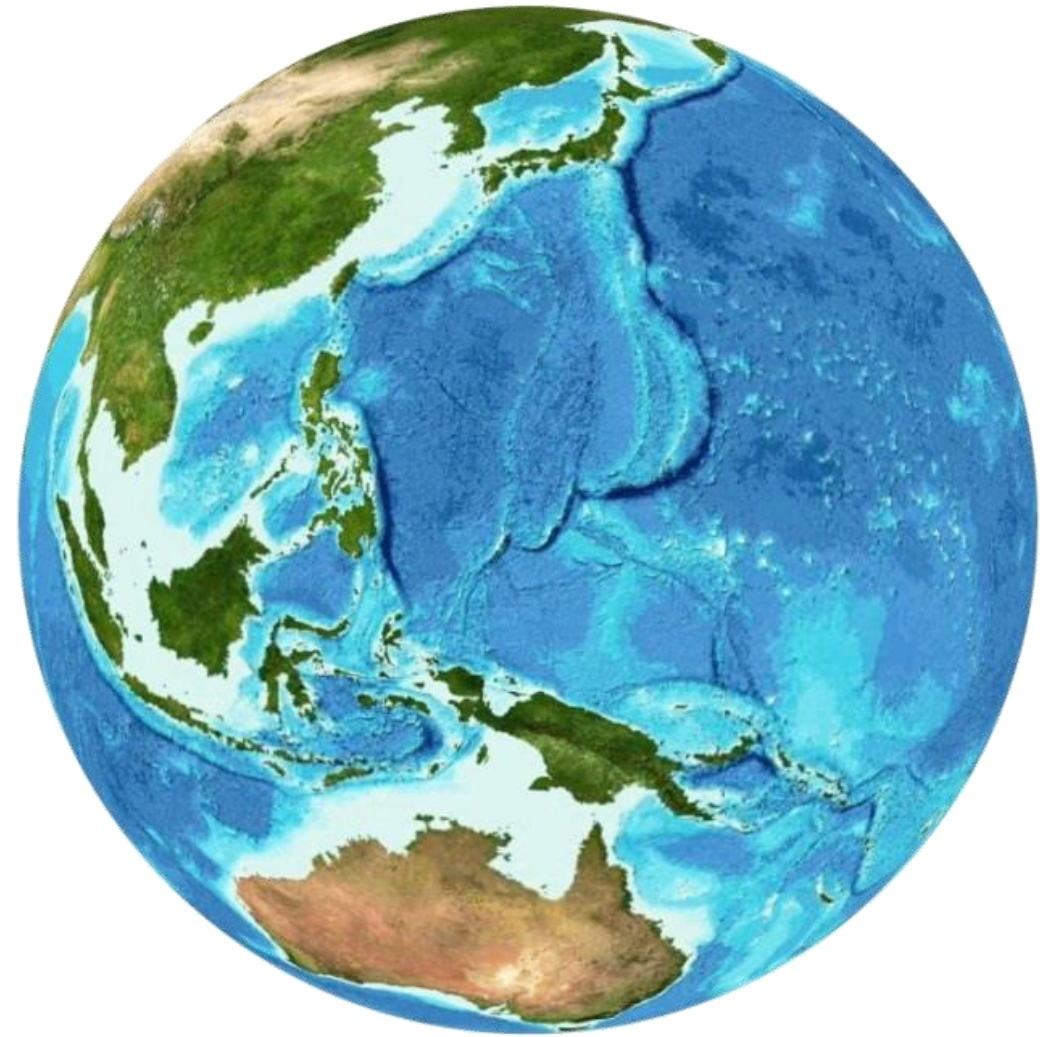
GEBCO's work is directed by a *Guiding Committee* and supported by *sub-committees* and *ad hoc working groups*:

- Technical Sub-Committee for Ocean Mapping (TSCOM)
- Sub-Committee for Undersea Feature Names (SCUFN)
- Sub-Committee for Regional Undersea Mapping (SCRUM)
- Outreach Working group
- IHO-IOC GEBCO Cook Book Working group



# GEBCO Products

- Global gridded bathymetric data
  - GEBCO 2014: 30 arc-second grid
  - GEBCO 2019: 15 arc-second grid
- Gazetteer of Undersea Feature Names
- Digital Atlas
- Grid viewing software
- Printable maps
- Web Map Service (WMS)
- IHO-IOC GEBCO Cook Book





# Capacity-building Initiative: Postgraduate Certificate in Ocean Bathymetry



*Funded by:*

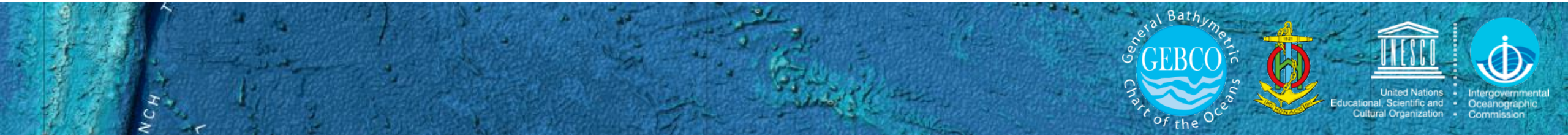
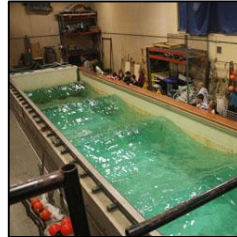
The Nippon Foundation of Japan

*Taught at:*

The Center for Coastal and Ocean Mapping / Joint Hydrographic Center;  
University of New Hampshire, USA

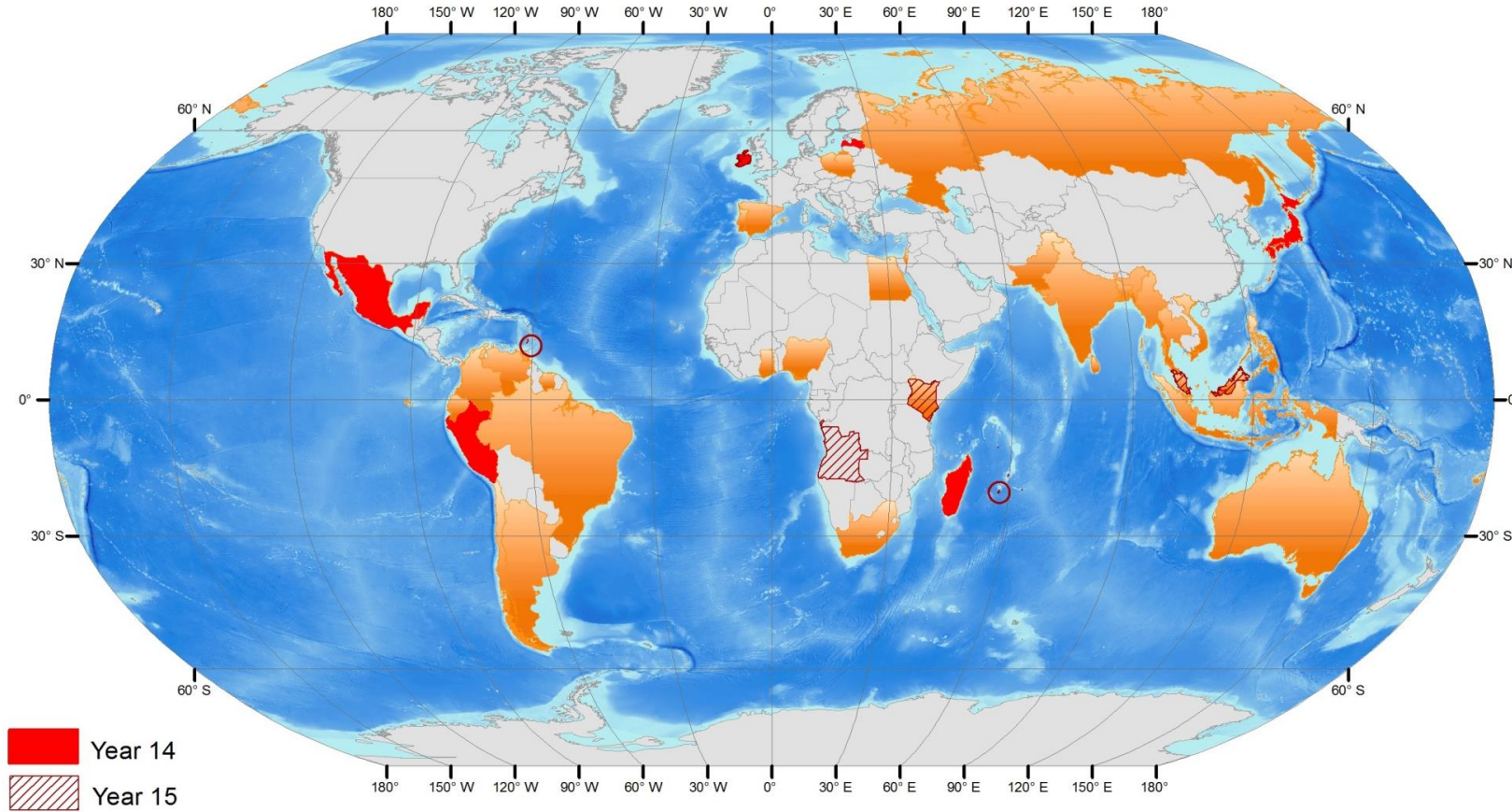


*Training a new generation of scientists and hydrographers in ocean bathymetry*





# Capacity-building Initiative: Nippon Foundation / GEBCO Alumni



**90 Scholars from 40 coastal states over last 15 years!**

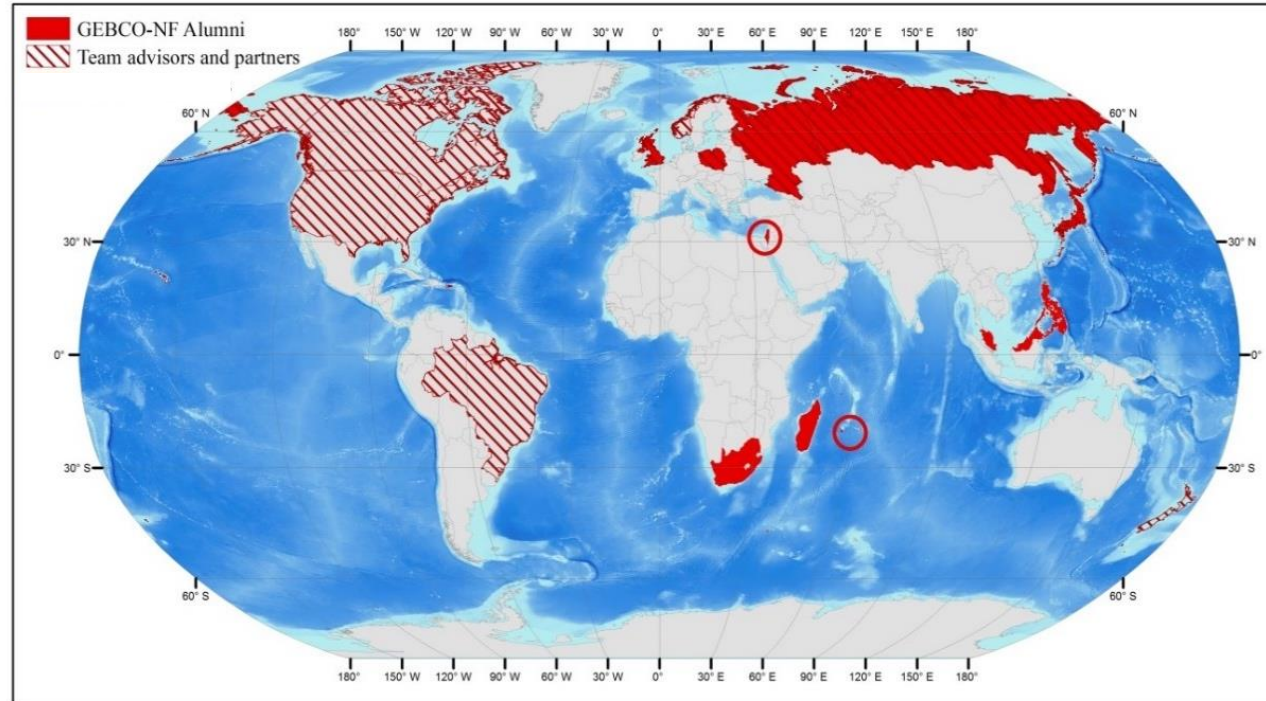


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# GEBCO-NF Alumni Team







# The Nippon Foundation-GEBCO Seabed 2030 Project

**Vicki Ferrini, PhD**

Head, Seabed 2030 Regional Data Center for the Atlantic and Indian Oceans

Lamont-Doherty Earth Observatory of Columbia University

[atlantic-Indian@seabed2030.org](mailto:atlantic-Indian@seabed2030.org)





A collaborative project between The Nippon Foundation and 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.



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-The **Nippon Foundation** is a private Japanese-based, non-profit grant-making organization with a mission based around philanthropic activities to pursue global maritime development and assistance for humanitarian work.

-The **General Bathymetric Chart of the Oceans (GEBCO)** organization operates under the joint auspices of the International Hydrographic Organization (IHO) and the Intergovernmental Oceanographic Commission (IOC) of UNESCO





Empower the world to *make policy decisions, use the ocean sustainably*, and *undertake scientific research* that is informed by a detailed understanding of the global ocean floor.

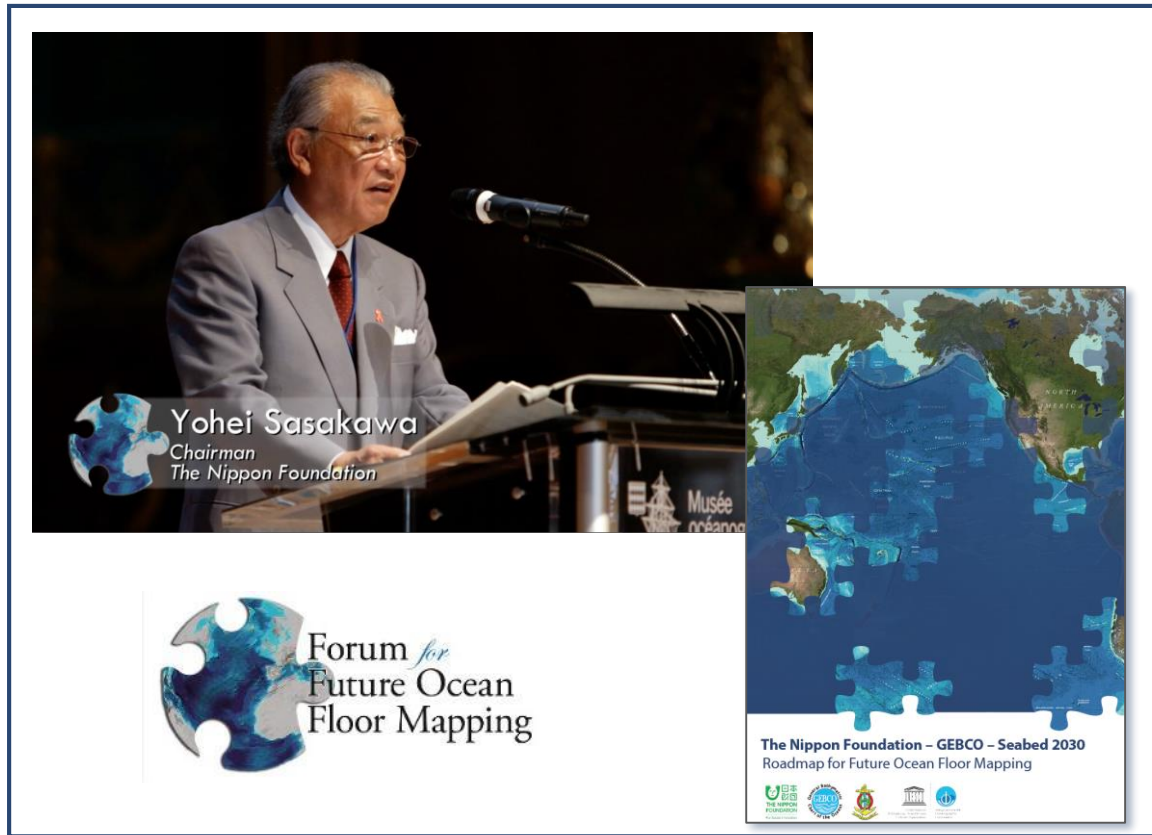
*Only a small portion of the ocean has been mapped with direct measurement.  
~ 50% of the world's coastal waters remain unsurveyed\**

\*IHO publication C-55, Status of Surveying and Charting Worldwide






## Vision Established through 2016 Forum for Future Ocean Floor Mapping



Yohei Sasakawa  
Chairman  
The Nippon Foundation

Forum for Future Ocean Floor Mapping

The Nippon Foundation – GEBCO – Seabed 2030  
Roadmap for Future Ocean Floor Mapping



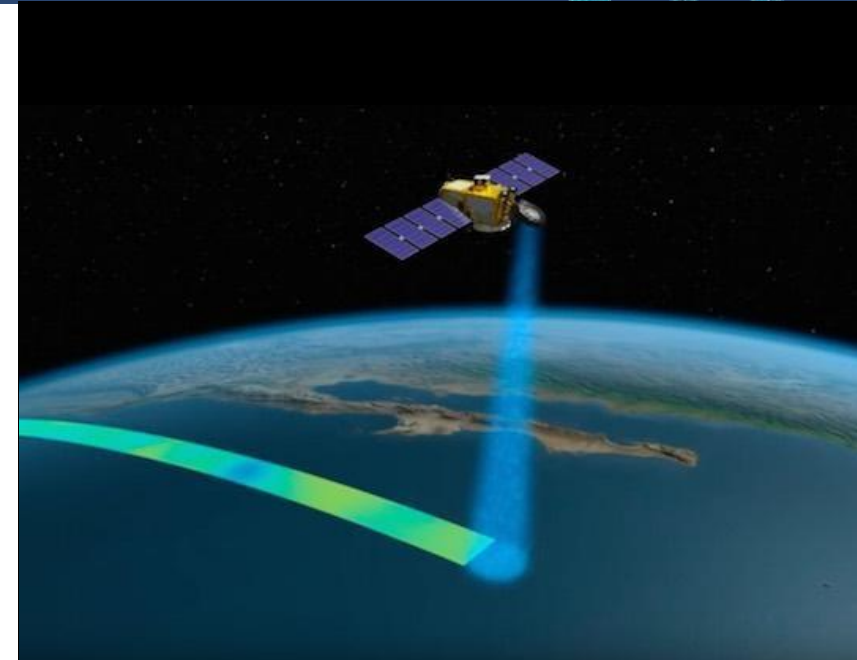
## Project Announced at 2017 UN Ocean Conference



# Why are Bathymetry Data Important?



- Nautical charts
- Oil and gas exploration
- Safety and storm surge/tsunami inundation models
- Ecosystem identification and management
- Emergency response
- Satellite verification models
- Ocean Models
- Coastal/Marine Spatial Planning
- Coastal Hazard Assessment
- Ocean Exploration
- Coastal Change Analysis
- Sea Level Rise Mitigation
- New Energy Siting
- Marine heritage



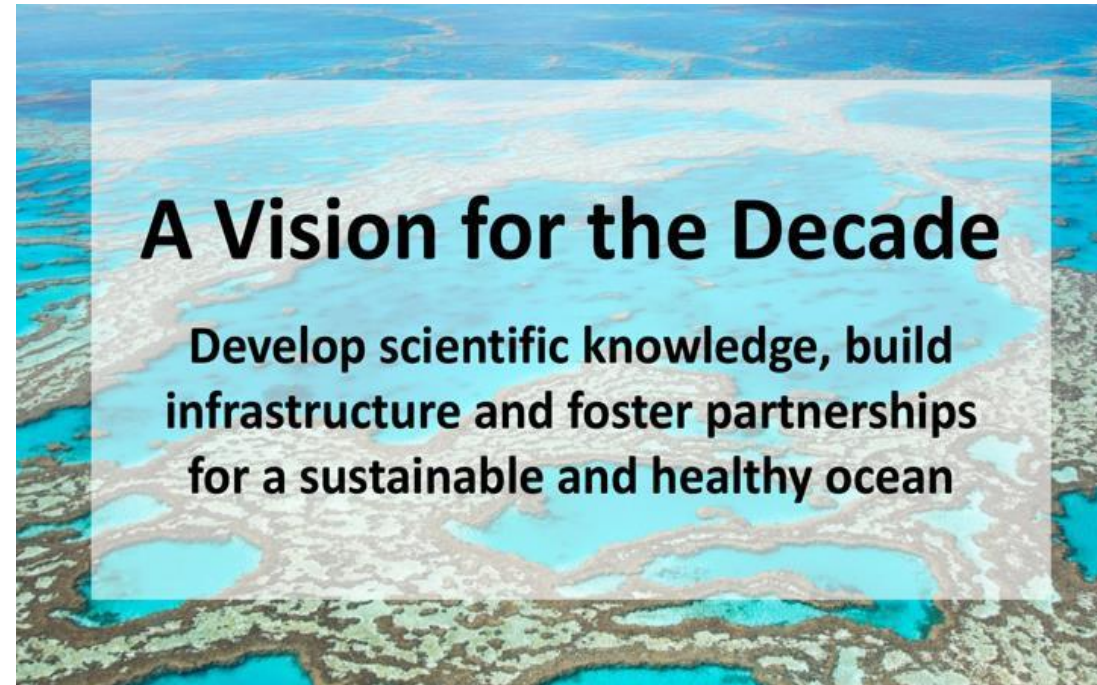


# The UN Decade of Ocean Science for Sustainable Development (2021-2030)



**CONSERVE AND SUSTAINABLY USE THE OCEANS, SEAS AND MARINE RESOURCES FOR SUSTAINABLE DEVELOPMENT**

**14 LIFE BELOW WATER**



## A Vision for the Decade

Develop scientific knowledge, build infrastructure and foster partnerships for a sustainable and healthy ocean

SDG14 will not be achievable without a comprehensive map of the world ocean floor





## Partnership

- Work with all stakeholders to form a global coalition dedicated to giving the world a complete GEBCO Ocean Map.

## Sharing and acknowledging

- Encourage and facilitate the sharing of bathymetric data, giving due acknowledgement to Partners and data contributors.

## Invest in human capacity development

- Invest in capacity development to increase skills and greater capacity in ocean mapping, and meet growing needs of big data analysis and visualization.

## Leverage technology innovation

- Work with technology partners to apply new mapping and data analysis techniques to support Seabed 2030's mission.



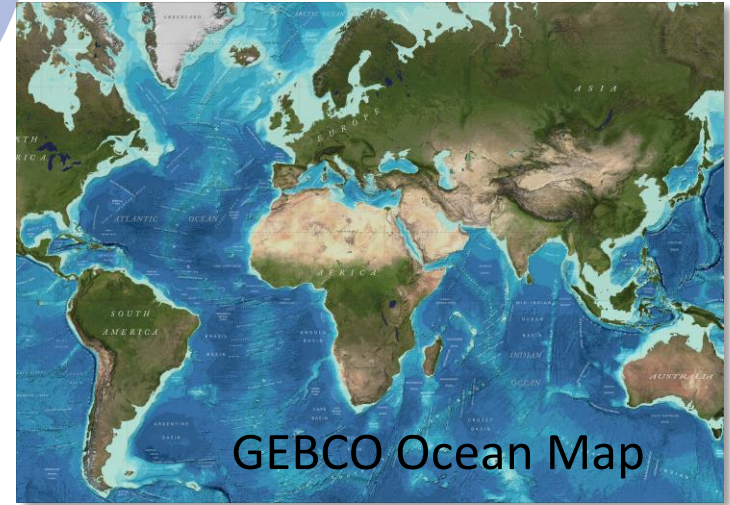
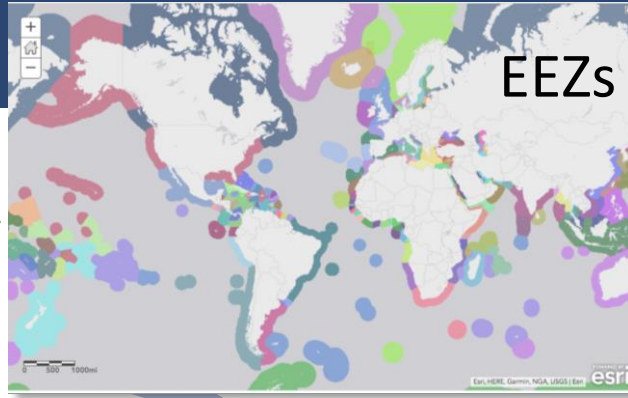
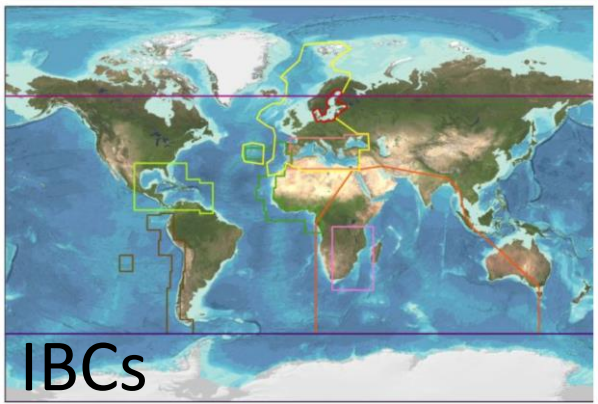
# Seabed 2030: Data Centers







# Data Assembly



Collaborate with national and regional efforts to build regional and global communities & products



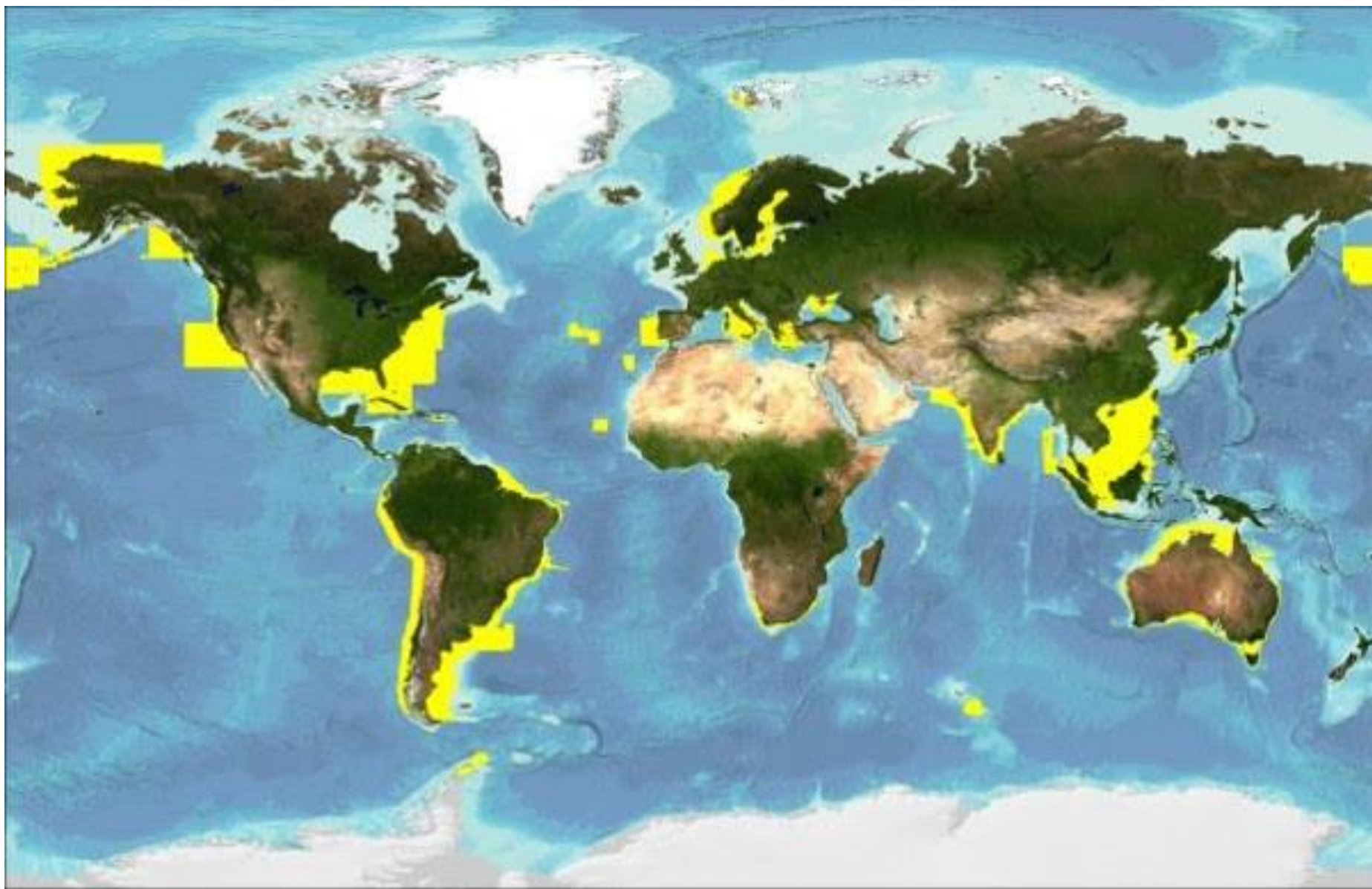
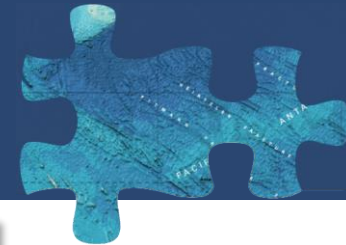
# Data Sources: *Power of the Crowd*



- Government
  - Survey Vessels
- Academic
  - Research Vessels
- Industry
  - Survey Vessels
  - Cruise Ships
  - Fishing Boats
- Public
  - Private Boats and Yachts
  - Recreational Mariners



# ENC Data in GEBCO Products







- Seabed 2030 Atlantic/Indian Oceans Data Center
  - IBC of the Caribbean Sea & Gulf of Mexico (IBCCA)
  - IBC of the Central Eastern Atlantic (IBCEA)
  - IBC of the Mediterranean (IBCM)
  - IBC of the Western Indian Ocean (IBCWIO)
- Seabed 2030 South & West Pacific Data Center
  - IBC of the South Eastern Pacific (IBCSEP)
- Seabed 2030 Arctic/North Pacific Data Center
  - IBC of the Arctic Ocean (IBCAO)
  - IBC of the Caribbean Sea & Gulf of Mexico (IBCCA)
- Seabed 2030 Southern Ocean Data Center
  - IBC of the Southern Ocean (IBCSO)

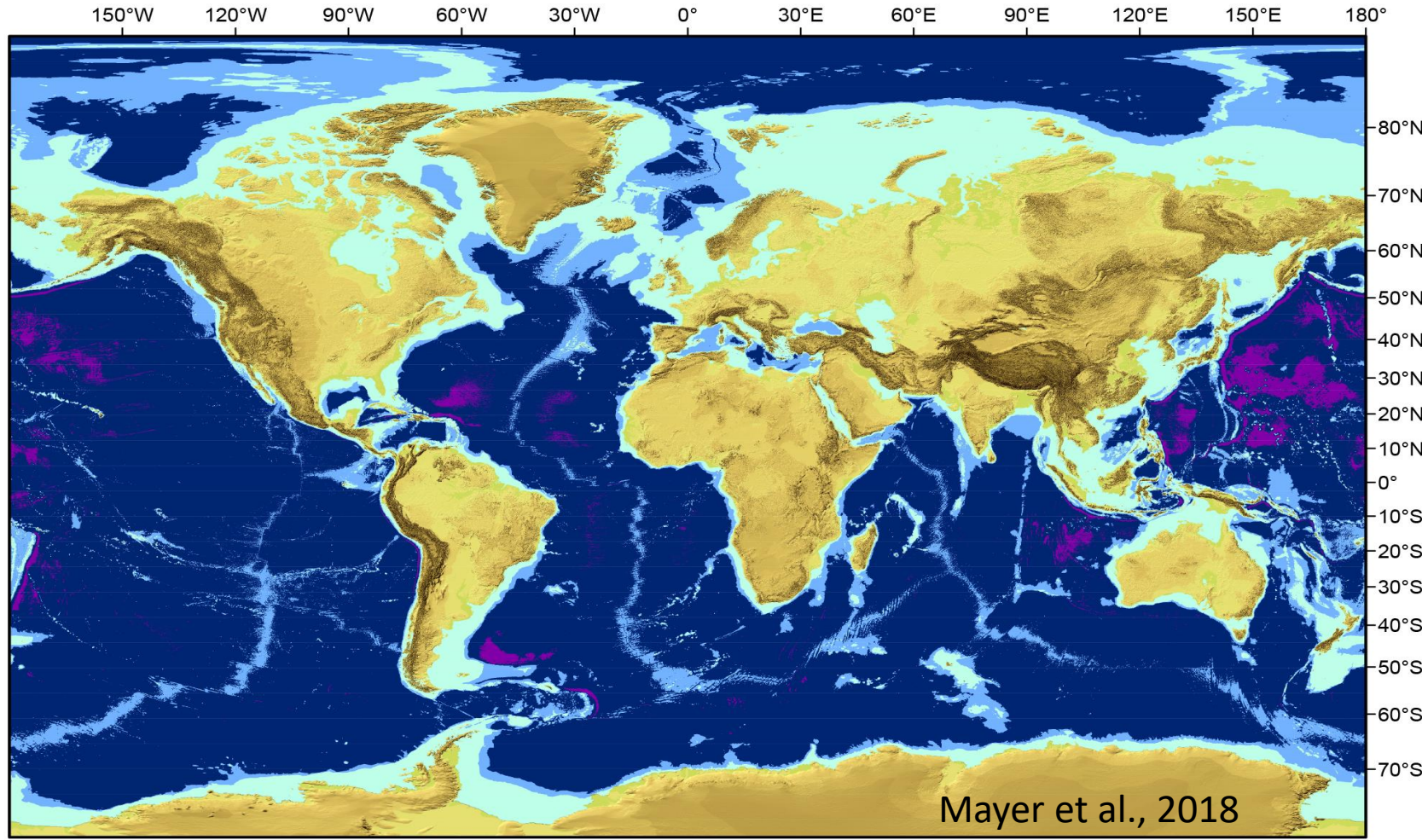








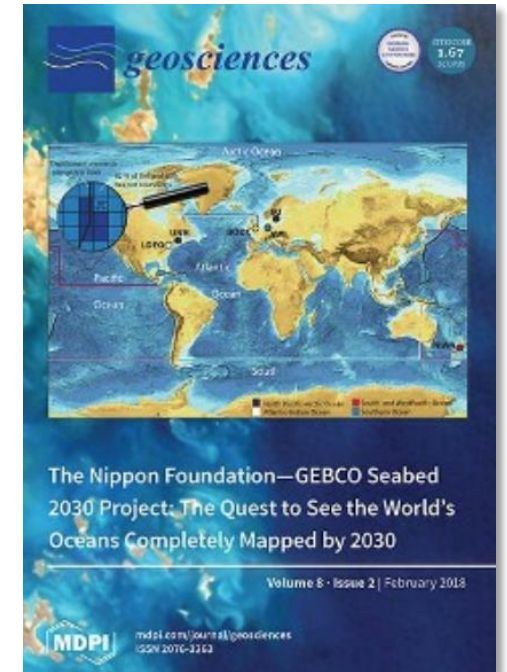
# What does “100% mapped” mean?



## Depth-dependent resolution goals

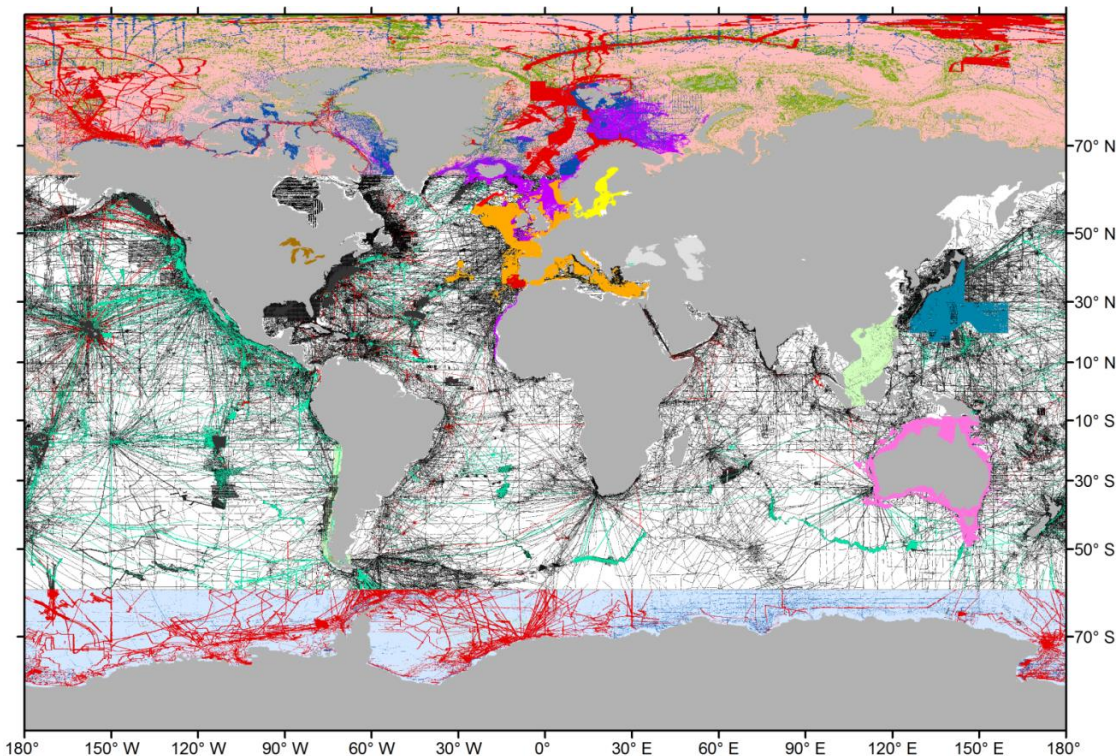
















-  100x100 m (0-1500 m)
-  200x200 m (1500-3000 m)
-  400x400 m (3000-5750 m)
-  800x800 m (5750-11000 m)



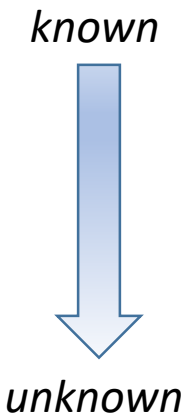


# How much of the ocean is mapped?



- |   |  |  |
|---|--|--|
|  Region taken from IBCAO V3     |  LDEO Global Multi-Resolution Topography                                    |  Trackline control information from the SRTM30_plus (v5) base grid  |
|  Region taken from IBCSO V1     |  Multibeam bathymetry   |  Region based on interpolation guided by satellite-derived gravity data within the SRTM30_plus (v5) base grid |
|  EMODNet 2013                   |  Single beam bathymetry   |  Coastal area updated with shallow water soundings  |
|  Baltic Sea Bathymetry Database |  Bathymetric contours from charts   |  |
|  Geoscience Australia Grid 2009 |  North American Great Lakes bathymetry                                      |  |
|  JHOD grid                      |  Regions based on pre-prepared grids, (first included in the GEBCO_08 Grid) |  |
|  Olex AS data                   |  |  |

$$A + B + C = 100\%$$



- A: Data in GEBCO products
- B: Data that exists but are not yet integrated
  - Public
  - Embargoed
- C: Data that must be acquired

# Completing the Map



## Existing data not yet integrated

- Gather information about existing data even if embargoed
- Reveal gaps to inform new acquisition
- Promote data sharing

## New Data Acquisition

- Coordination and communication
- Share information about planned surveys

## Technology Innovation & Acceleration

- Data Acquisition
- Processing/Integration

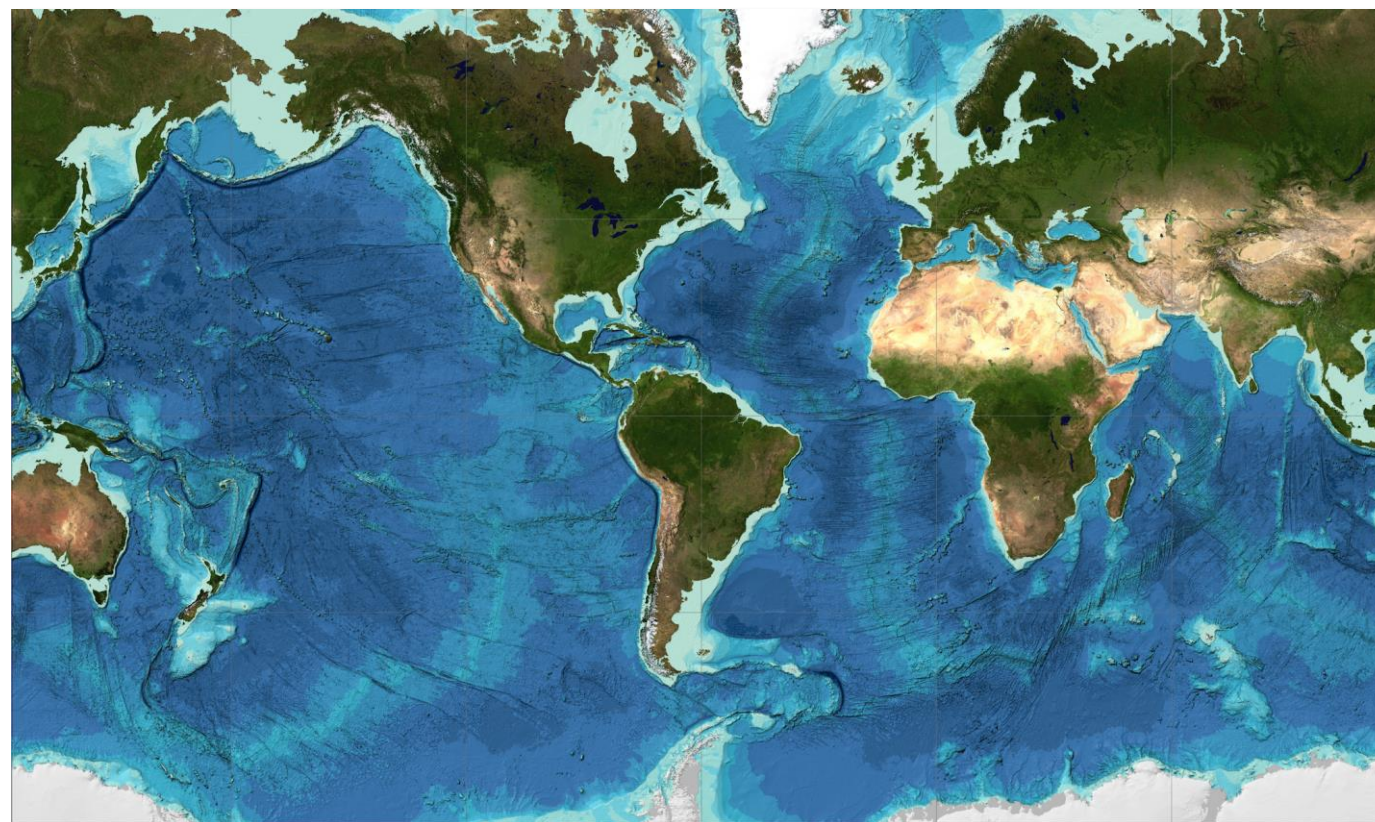


$$A + B + C = 100\%$$



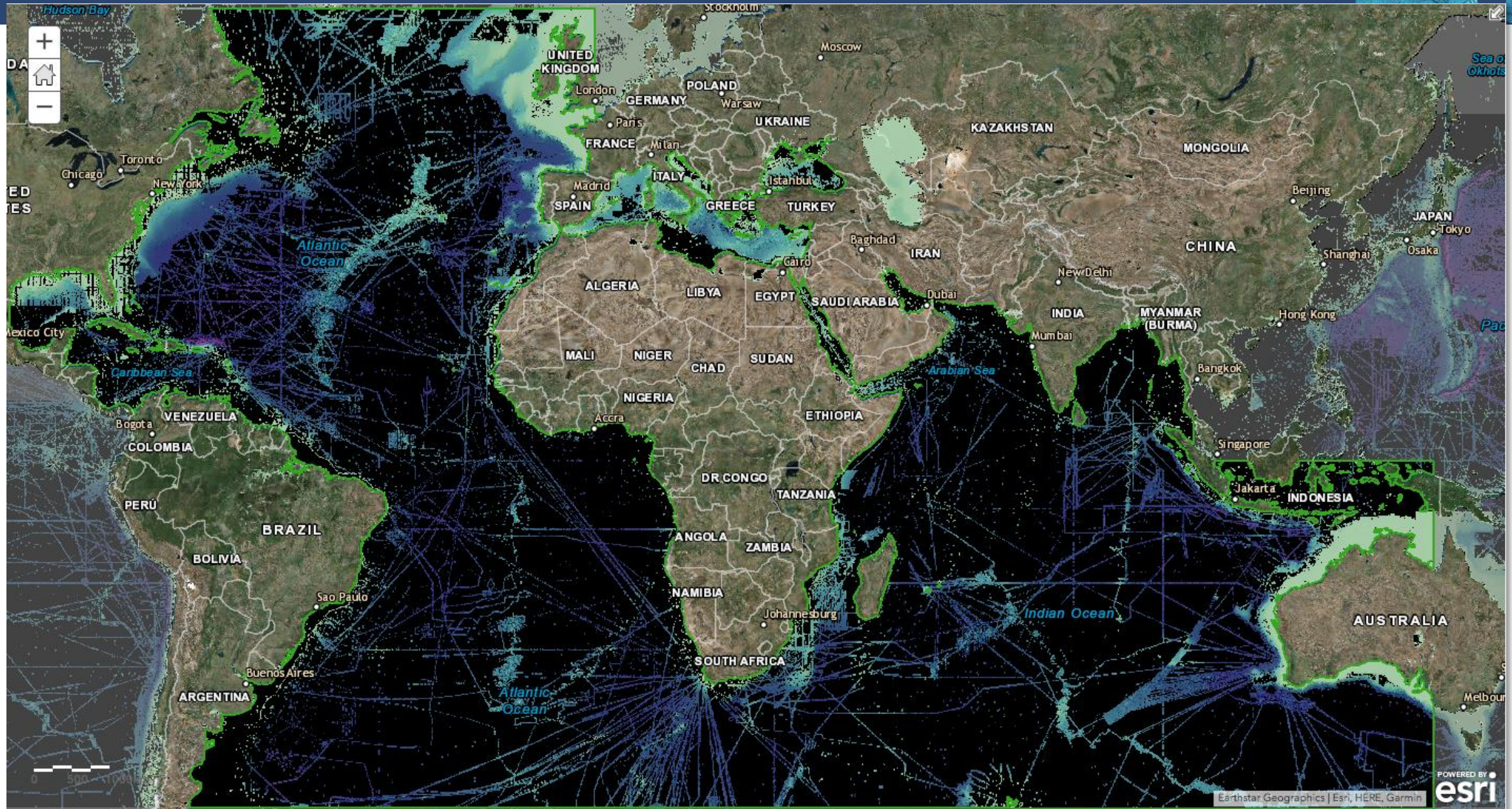


- Released April 2019
- 15 arc second grid
- Coverage more than doubled
  - GEBCO 2014: 6% of goal
  - GEBCO 2019: 15% of goal
- New data from all sectors
  - Government
  - Academia
  - Industry
  - Private





# GEBCO 2019 – Atlantic/Indian Region





# Research vessel strengths

- Professional scientific staff.
- High quality, fit for purpose equipment (both for measuring and recording).
- Sail where no or few other vessels sail.



# Research vessel challenges

- Financed per mission for specific scientific task.
- No or little time / resources available for other activities.
- Equipment interference.





# Research vessel opportunities

- Cooperation between Research vessel operators / scientific institutions and hydrographic offices
- Commitment from relevant leadership
- Engagement with industry to overcome technical challenges



**Contribute to global seabed knowledge!**

# Engagement with industry

## Norwegian seismic survey company PGS

- Contribute with existing data to Seabed 2030
- Facilitate contribution of data owned by others
- Develop routines for future contributions
- Set an example for other seismic survey companies to follow through IAGC (be the seismic survey branch ambassador for Seabed 2030)





# Norway sets example through interdisciplinary cooperation



XLII Antarctic Treaty  
Consultative Meeting  
Prague • Czech Republic • 2019

(type) (number)

# ENG

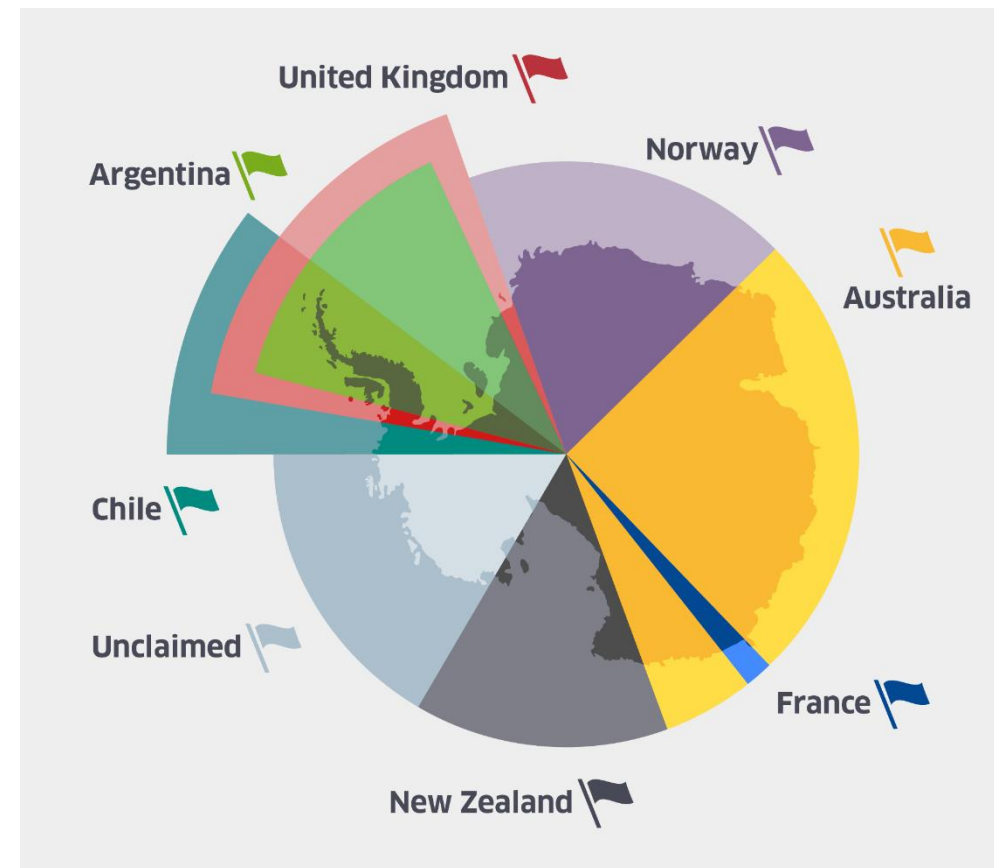
Agenda Item: (agenda item)  
Presented by: Norway  
Original: English  
Submitted: (date submission)

## Recommendation

Norway [Italy, NZ, USA <sup>OSV</sup>] recommends that the ATCM adopt the attached resolution on Hydrographic Mapping of Antarctic Waters.

**Resolution XXX (2019)**

**Hydrographic Mapping of Antarctic Waters**



Norwegian Mapping Authority

# And hopefully creates a snowballing effect



what's the  
opposite of  
snowballing?



decrease, lessen, weaken, lower,  
narrow, cut, shorten, subtract,  
undermine, curtail



 Thesaurus.plus

# To map the seabed of this planet



# How to participate



- Contribute data to IHO DCDB
  - Gridded data products
  - Points from ENCs
- Contribute information about existing data coverage
- Share information about future mapping plans
- Engage with Data Centers
- Support and promote GEBCO activities and products



[seabed2030.org](https://seabed2030.org)

@seabed2030 





Thank you!