



Briefing on the work of GEBCO (GENERAL BATHYMETRIC CHART OF THE OCEANS)

18th North Indian Ocean Hydrographic Commission Meeting, Goa, India
9-12 April 2018



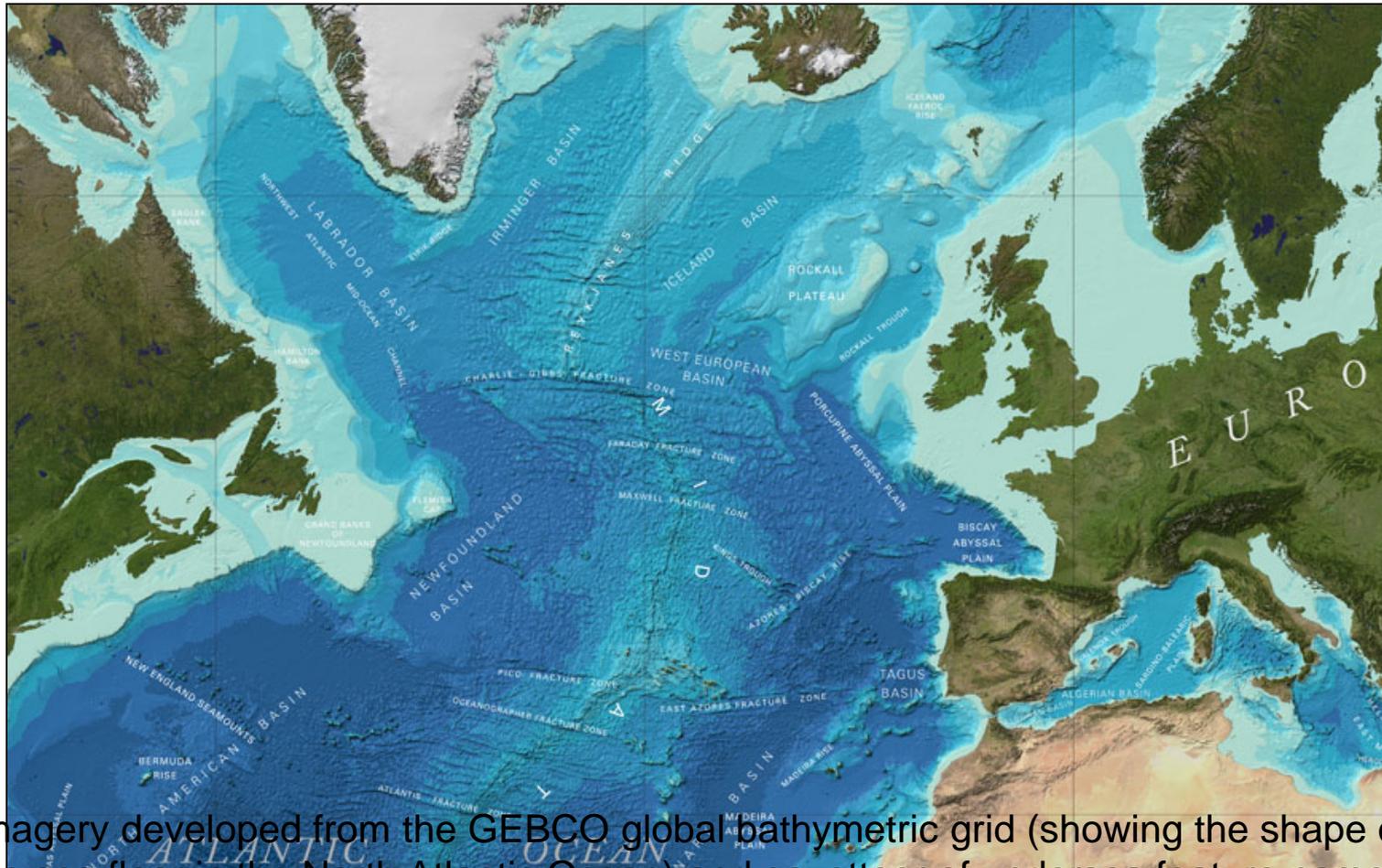
What is GEBCO?



The General Bathymetric Chart of the Oceans (GEBCO) (see www.gebco.net)

- Aims to provide the most authoritative, publicly-available bathymetric data sets for the world's oceans
- Operates under the joint auspices of the
 - International Hydrographic Organization (IHO), and
 - Intergovernmental Oceanographic Commission (IOC) of UNESCO
- First GEBCO paper chart series initiated in 1903
- Forum for Future Ocean Floor Mapping (June 2016):
www.iho.int/mtg_docs/com_wg/GEBCO/FOFF/index.html

What is GEBCO?



Imagery developed from the GEBCO global bathymetric grid (showing the shape of the sea floor in the North Atlantic Ocean) and gazetteer of undersea feature names



GEBCO's organisational structure



- GEBCO is led by a Guiding Committee consisting of five IHO-appointed members; five IOC-appointed members; Sub-committee Chairs and the Director of the IHO-DCDB
- It has 3 sub-committees and a number of working groups:
 - Sub-Committee on Undersea Feature Names (SCUFN)
 - Technical Sub-Committee on Ocean Mapping (TSCOM)
 - Sub-Committee on Regional Undersea Mapping (SCRUM)
 - Working groups on Outreach and the IHO-IOC GEBCO Cook Book

www.gebco.net/about_us/committees_and_groups/



Regional mapping work



GEBCO has setup the Sub-Committee on Regional Undersea Mapping (SCRUM) to:

- Build a closer collaboration with regional mapping efforts and coordinate, as well as encourage, the incorporation of their compilations into GEBCO.
- The Global GEBCO grid is continuously updated in part from these regional grids, benefiting greatly from their local knowledge and expertise.

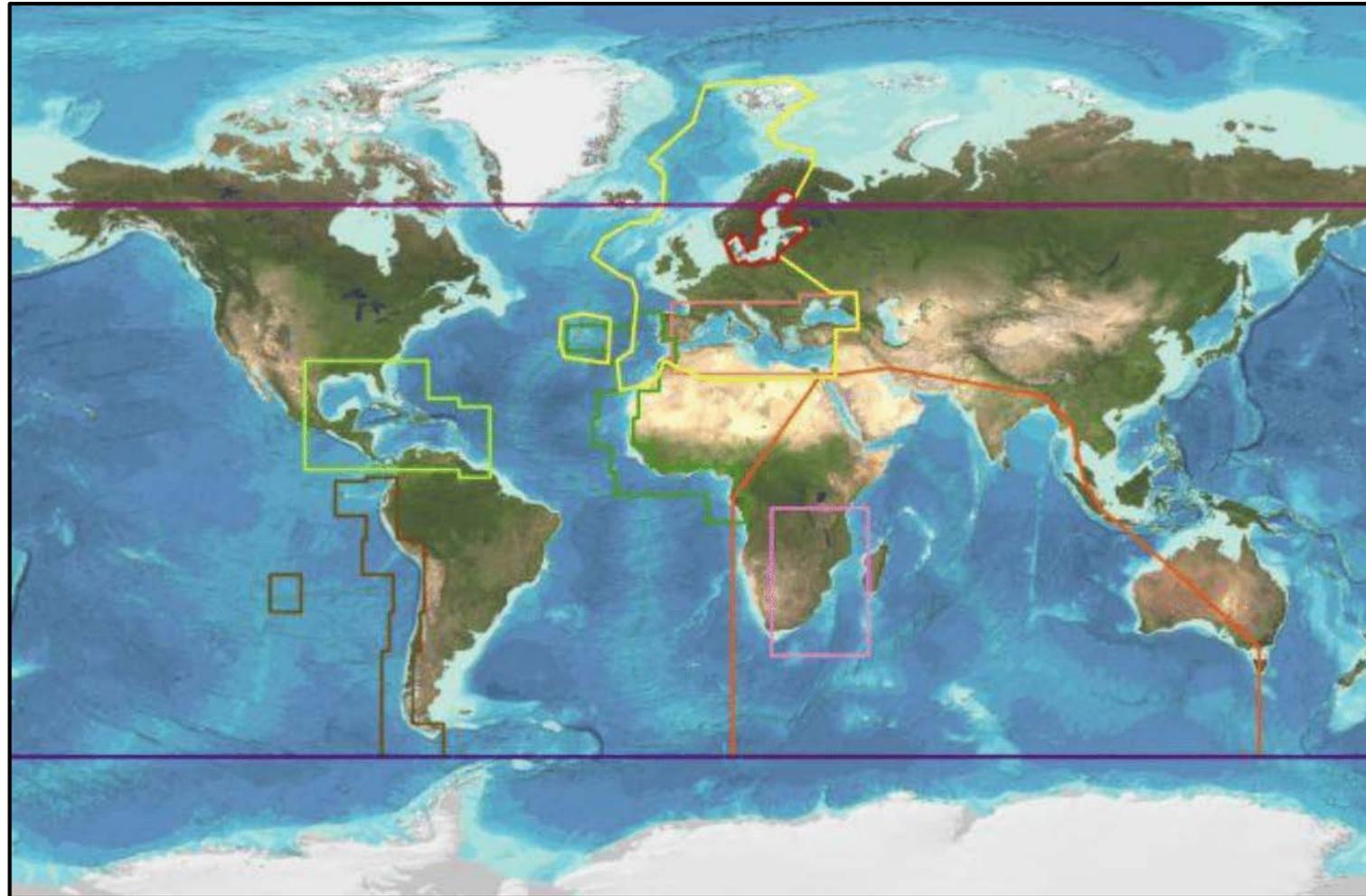
www.gebco.net/regional_mapping/mapping_projects/



Regional mapping projects



Intergovernmental
Oceanographic
Commission



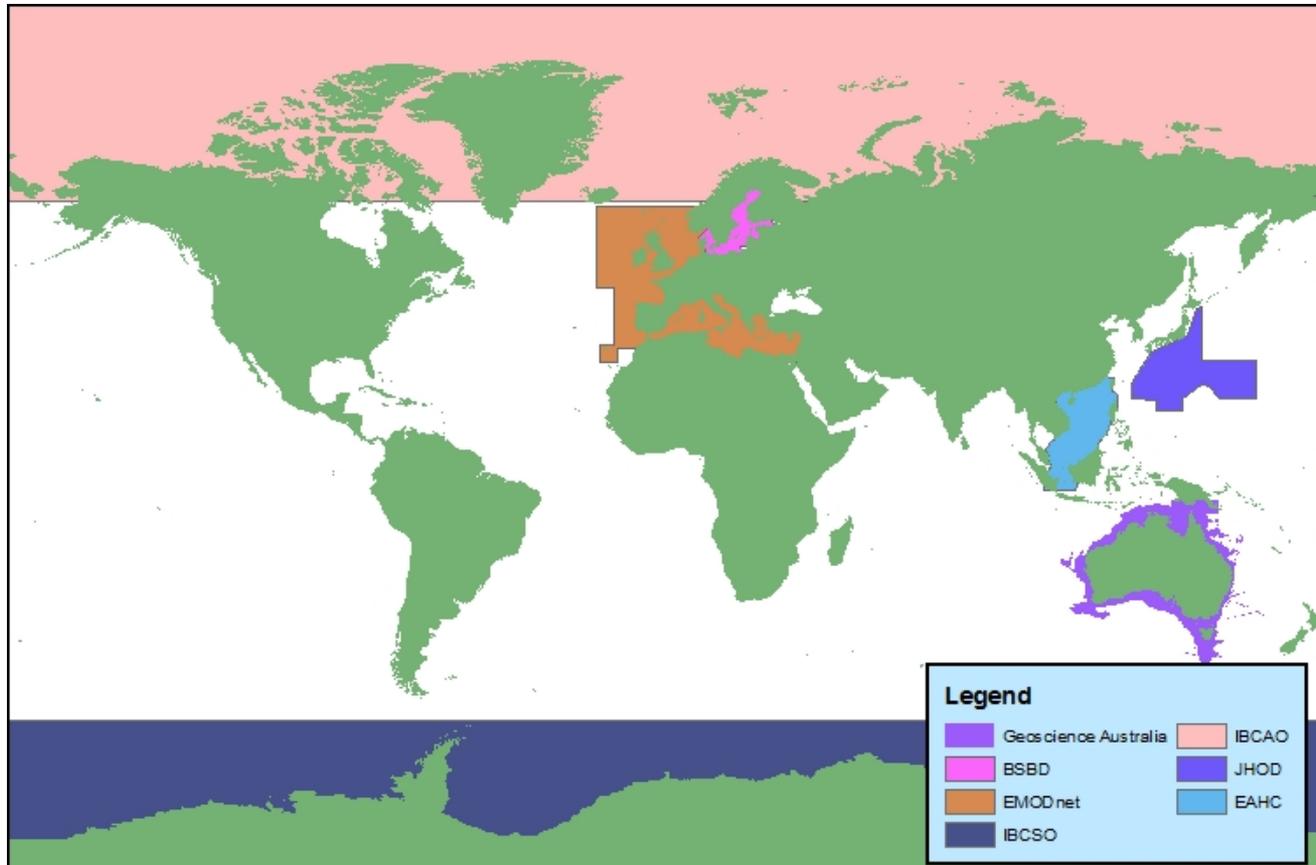
United Nations
Educational, Scientific and
Cultural Organization

Intergovernmental
Oceanographic
Commission

Regional mapping work



Coverage of some of the regional compilations included in the current GEBCO Grid



GEBCO's products



Our bathymetric data sets and products:

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



www.gebco.net/data_and_products/

GEBCO's products: global bathymetric grid



The GEBCO Grid is a global terrain model at 30 arc-second intervals:

- Largely based on a database of ship-track soundings with interpolation between soundings guided by satellite-derived gravity data
- Includes regional grids which may be based on different interpolation models
- Accompanied by a Source Identifier Grid showing which cells are based on soundings or existing grids and which are interpolated



GEBCO's grids are made available for non-navigational purposes:

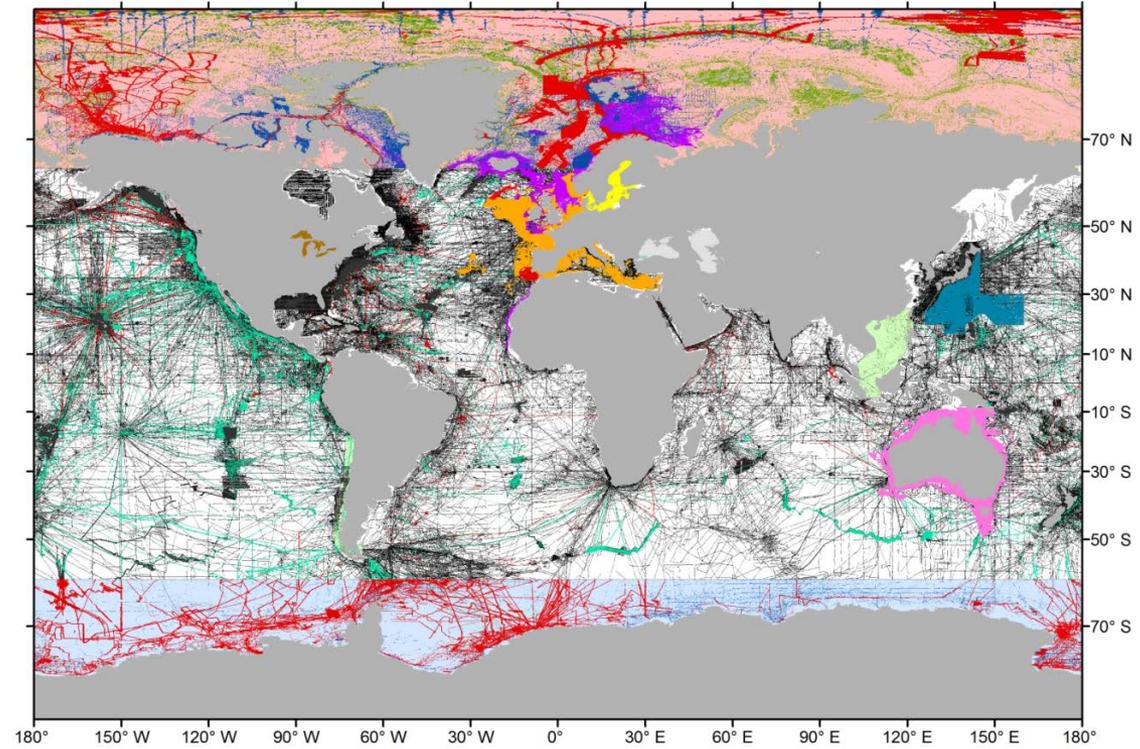
www.gebco.net/data_and_products/gridded_bathymetry_data/

GEBCO's products: Source Identifier Grid



The GEBCO Source Identifier (SID) Grid:

Shows the source of depth value in each grid cell, *i.e.* if it is based on track-line data; pre-existing grids or if it is based on interpolation



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

Filling the data gaps



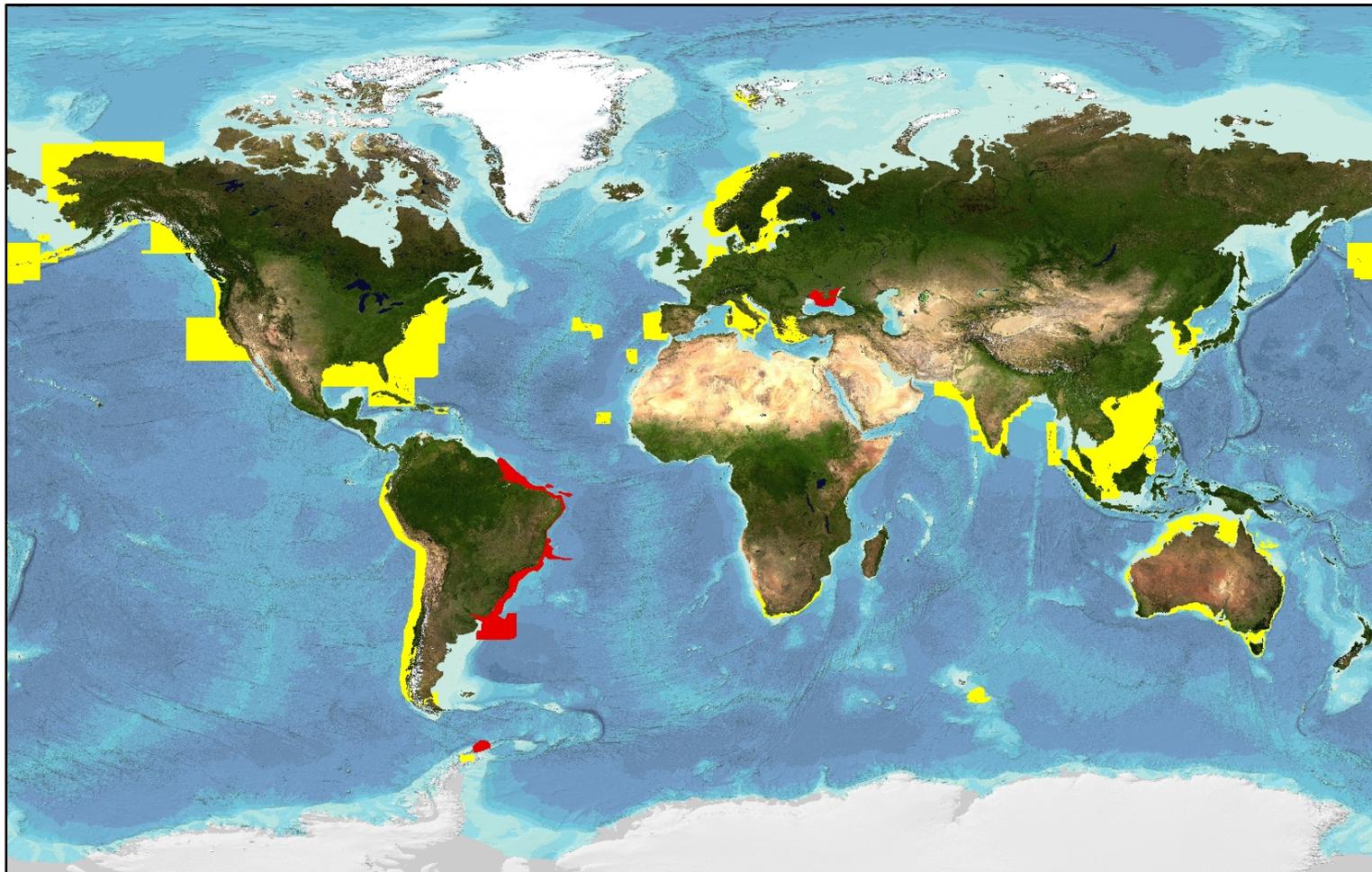
- Raising awareness of the 'data gaps' to encourage data collection in these regions
- Encouraging organizations to make their bathymetric data sets easily discoverable and accessible, either directly or by contributing data to international publically-available databases such as the IHO Data Center for Digital Bathymetry (IHO-DCDB)
- Crowd-sourced bathymetry (CSB) initiatives – such as the IHO CSB Working Group
- GEBCO initiative to request shallow water bathymetry data extracted from Electronic Navigation Charts from the Hydrographic Community

Shallow-water bathymetry data



- To more accurately model the shape of the ocean floor in all areas and serve a wider user community, GEBCO is striving to improve its gridded bathymetric datasets in shallower waters
- In 2006 a request was made to IHO Member States to provide ENC data (usage bands 2 and 3) to GEBCO to help update its global model
- New request to IHO MS for ENC data sent out in March 2016 (circular letter 11/2016)

Shallow water bathymetry – ENC data



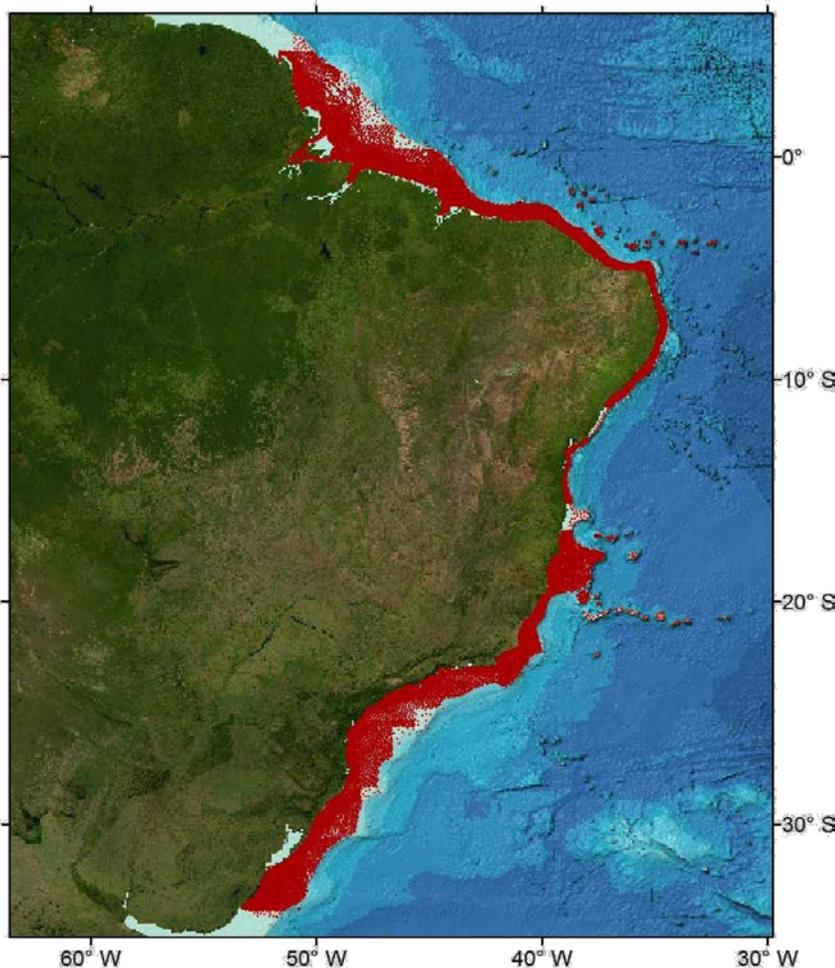
ENC data coverage (usage bands 2 & 3) provided by IHO MS and organizations, to date, to GEBCO for grid updating work after calls in 2006 (yellow) and 2016 (red),



Shallow water bathymetry – ENC data



Data for waters off Brazil

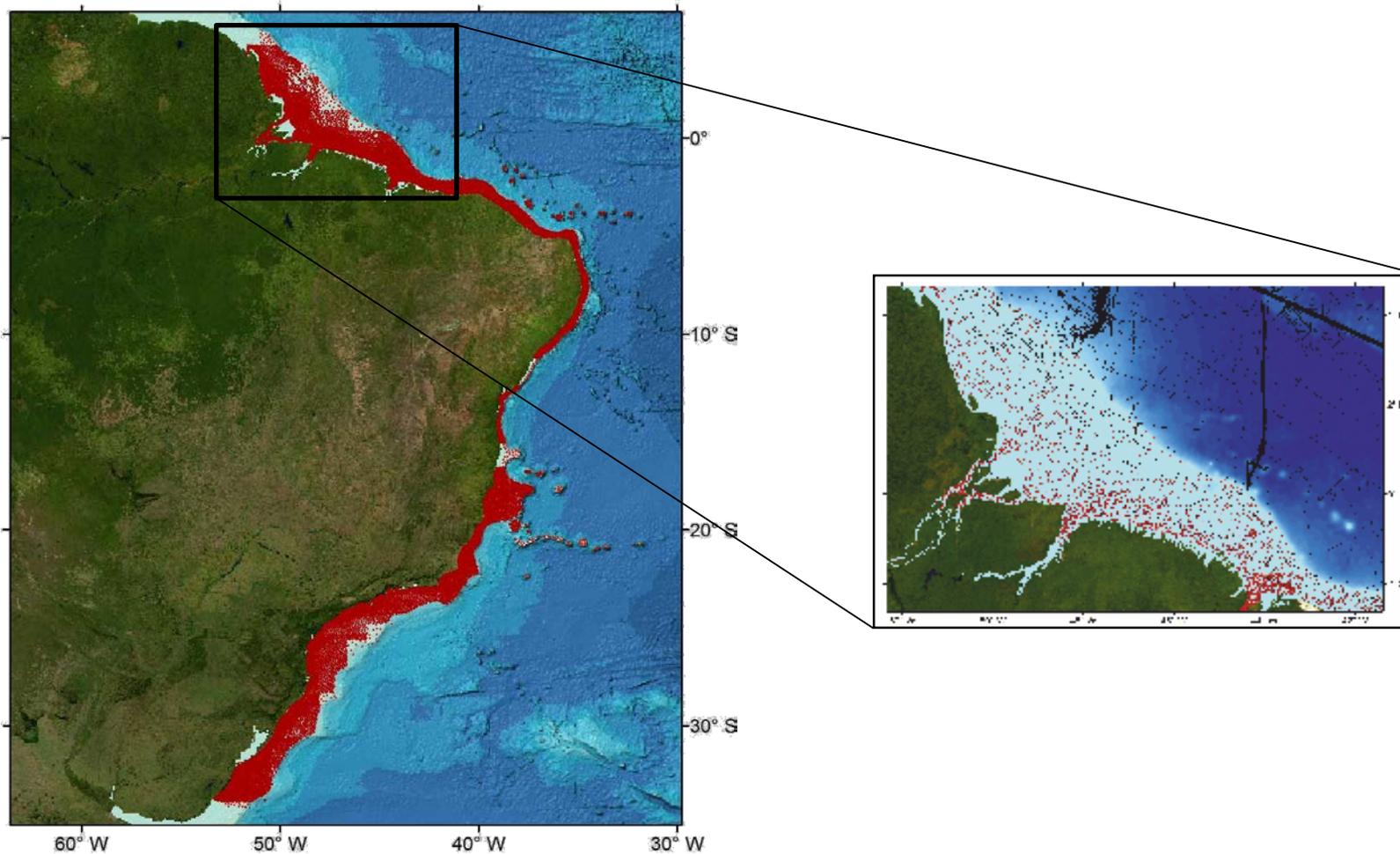


Soundings points extracted from ENCs recently supplied to GEBCO for the waters off Brazil



Shallow-water bathymetry – ENC data

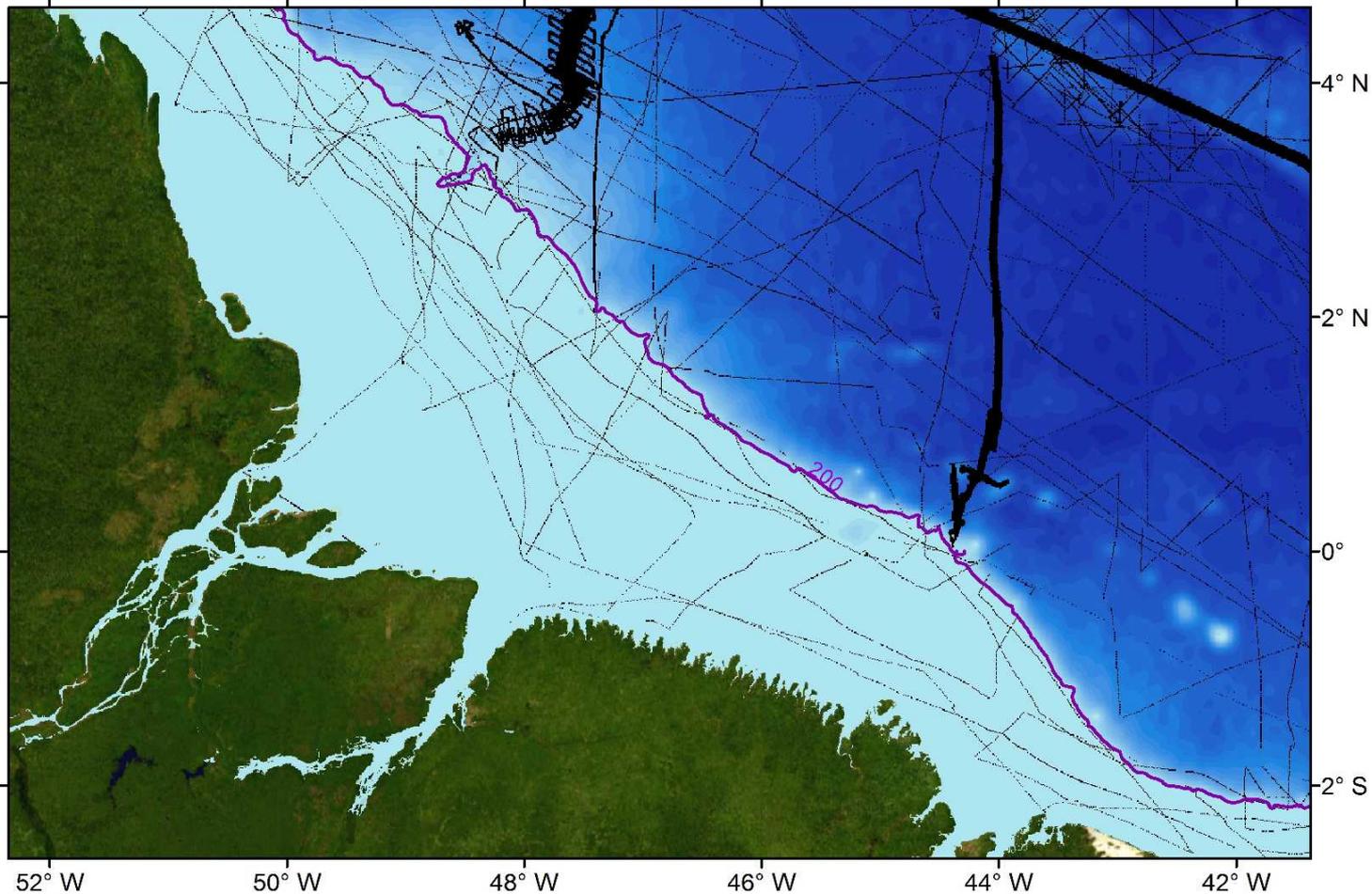
Data for waters off Brazil



Shallow-water bathymetry data



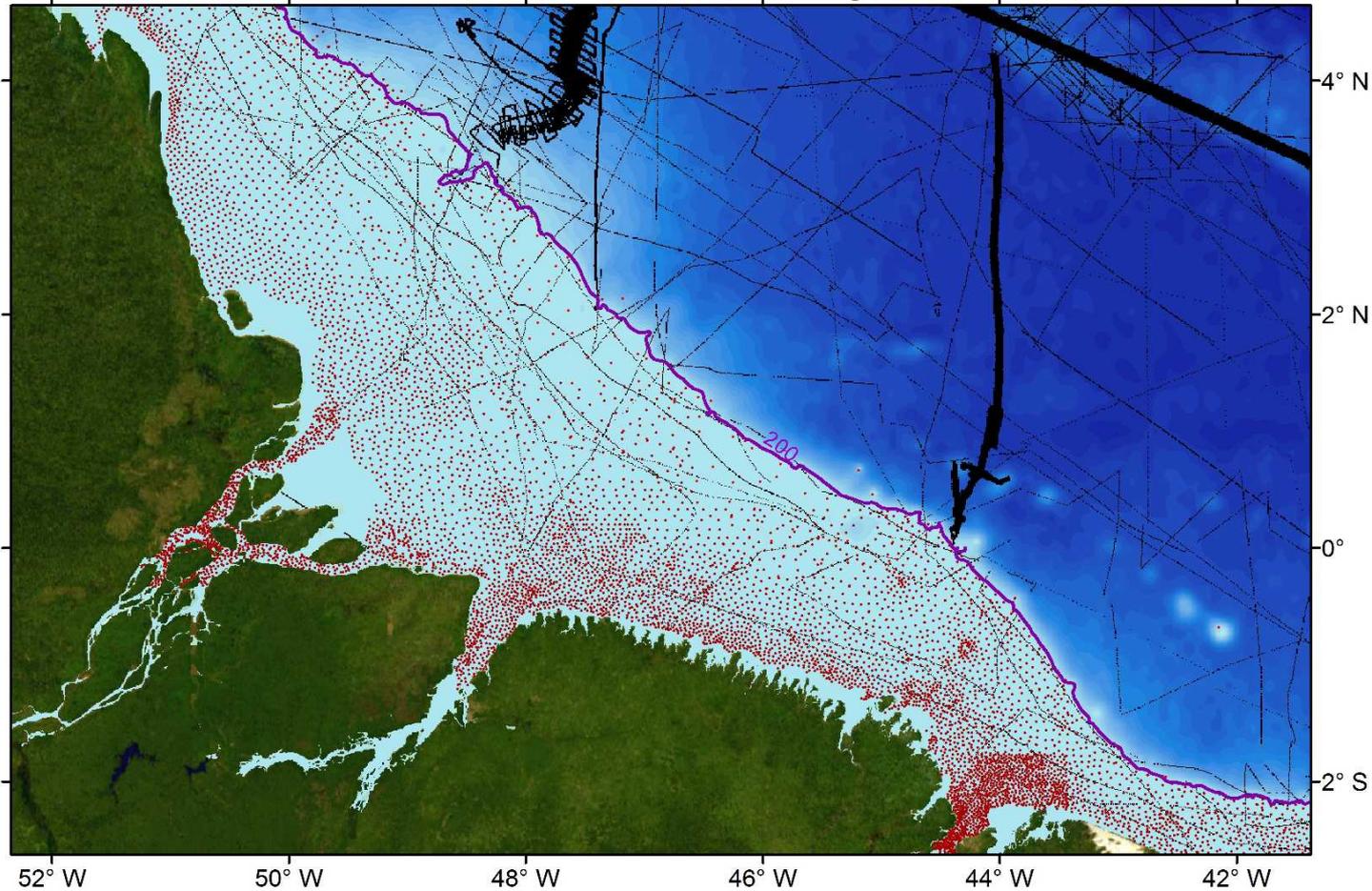
Current GEBCO trackline coverage (black lines)



Shallow-water bathymetry data



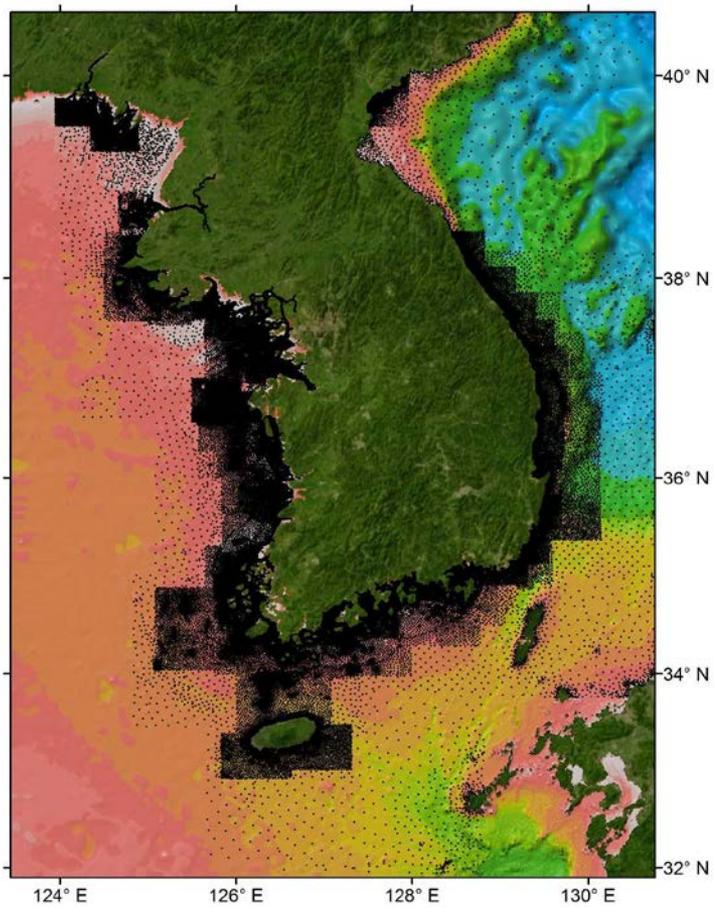
GEBCO trackline coverage (black lines)
PLUS ENC soundings (red)



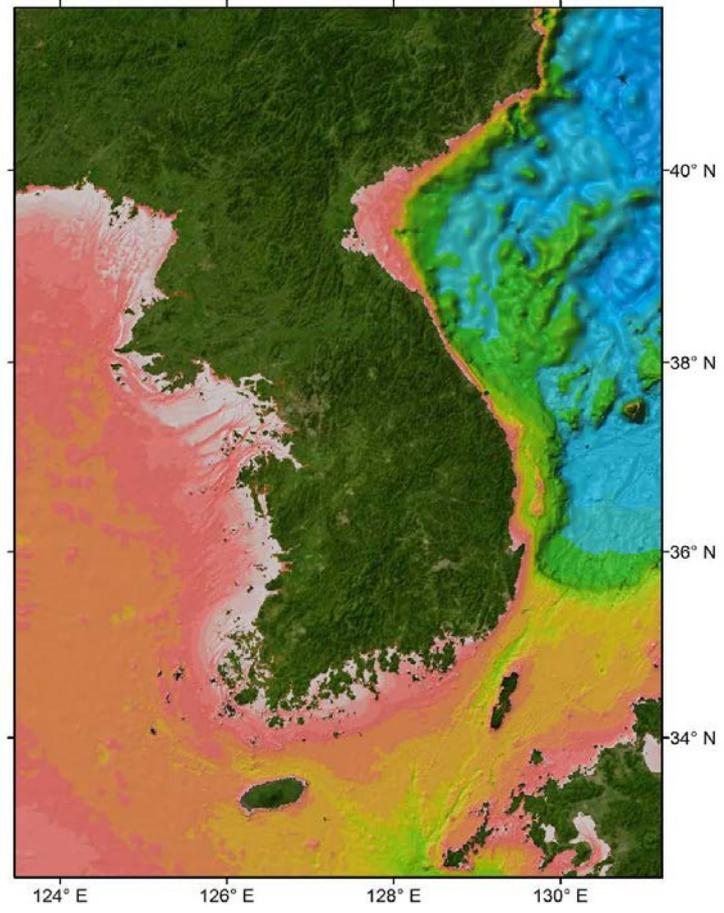
Shallow-water bathymetry data



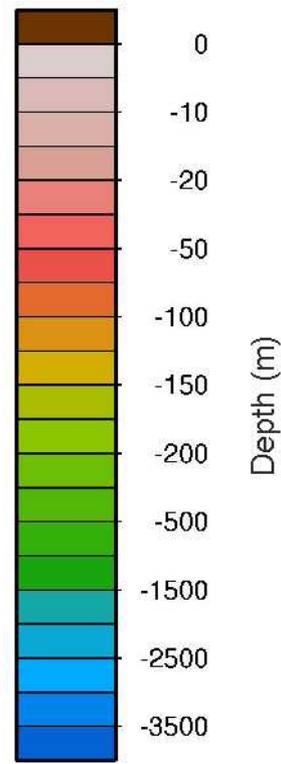
Region off the Korean Peninsula



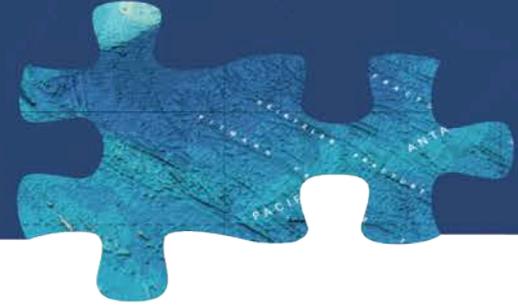
Coverage of ENC soundings supplied to GEBCO



GEBCO_2014 Grid



Seabed 2030



June 2016



Mr Sasakawa, Chairman of the Nippon Foundation proposed ‘...to map 100% of the topography of the World Ocean by 2030’



June 2017

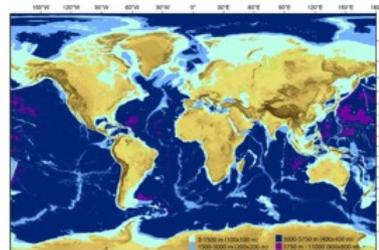
**Nippon Foundation - GEBCO
Seabed 2030 Project
announced**



*Mr Sasakawa – 1 of 8 IOC-UNESCO
“Champions of Global Ocean Science”*



Project Operational

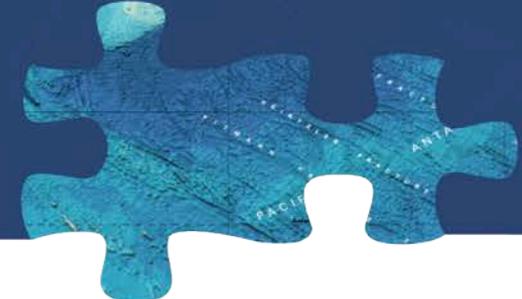


1st February 2018

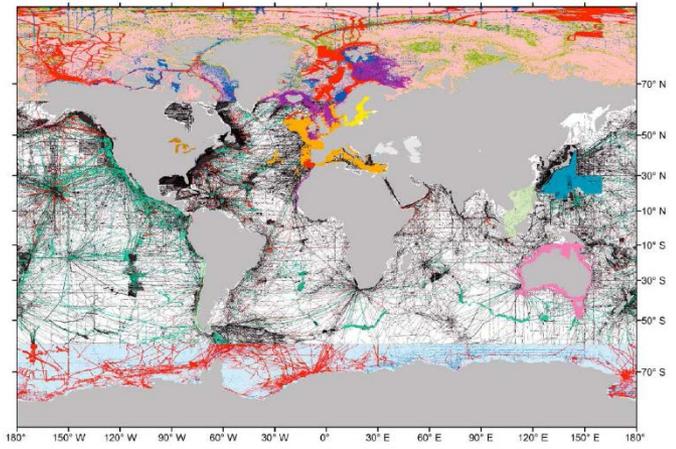
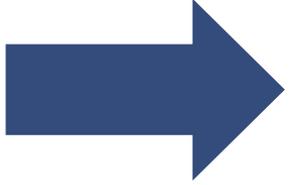
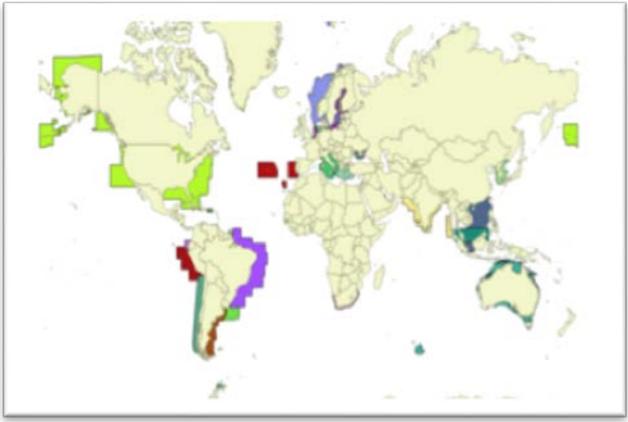


2030

100% of ocean mapped



GEBCO_2014 bathymetric grid: 18% *direct measurement*



GEBCO_2014 Source Identifier (SID) grid identifies grid cells based on soundings

ENC data provided to GEBCO after requests in 2006 and 2016



GEBCO_2014 World Map

Seabed 2030: Mission



To empower the world to make *policy decisions*,
use the ocean sustainably and *undertake scientific
research* based on detailed bathymetric
information of the Earth's seabed

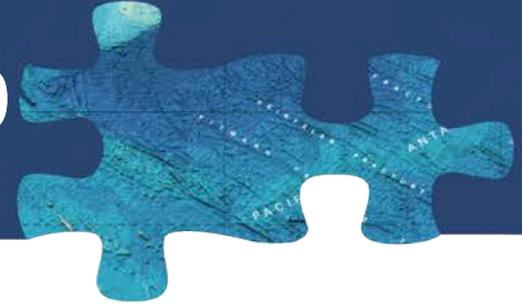
**Supports United Nations Sustainable Development Goal 14: to
conserve and sustainably use the world's oceans,
seas and marine resources**

**SDG14 will be impossible to achieve without a
comprehensive map of worlds ocean floor**



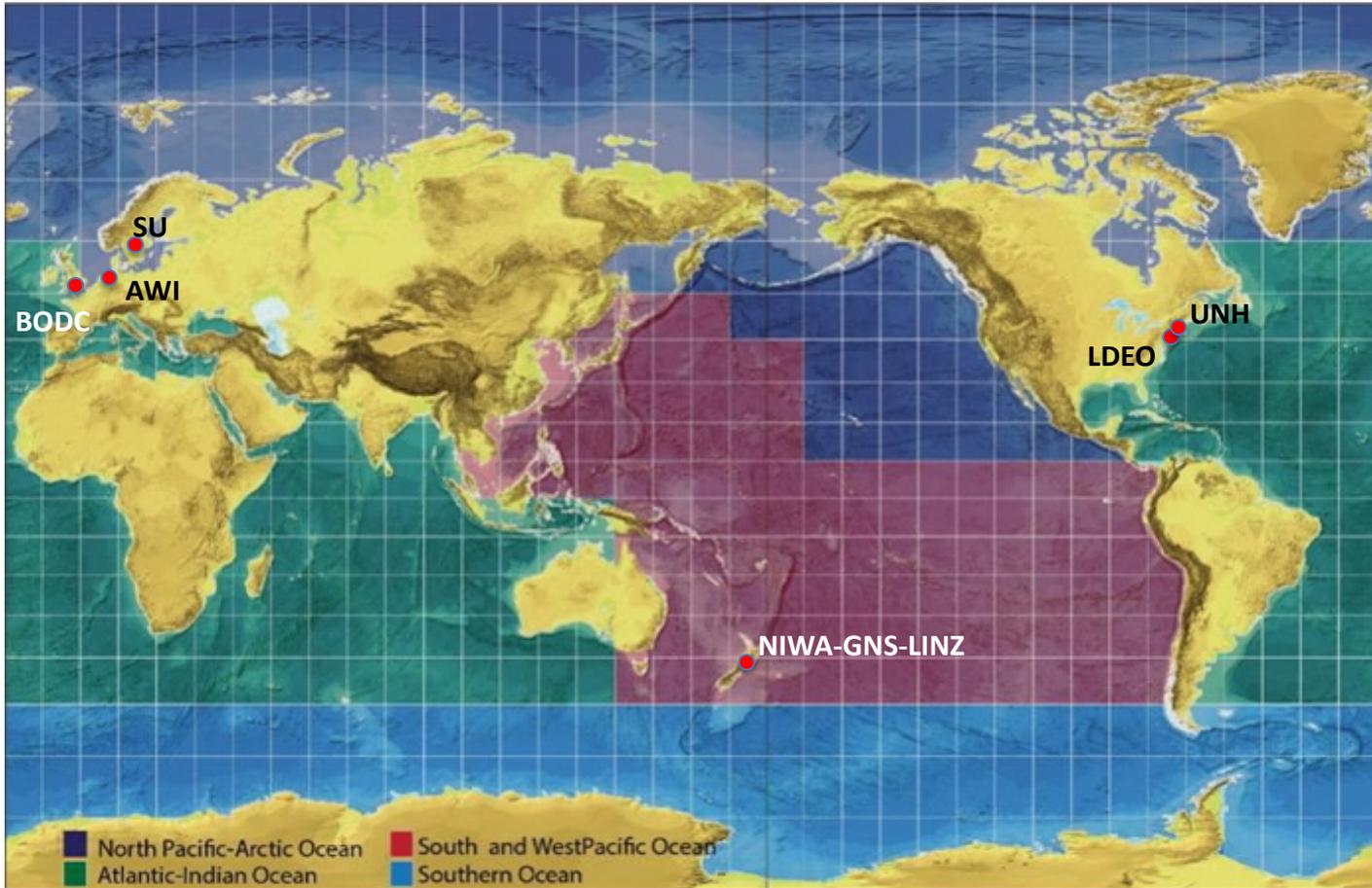
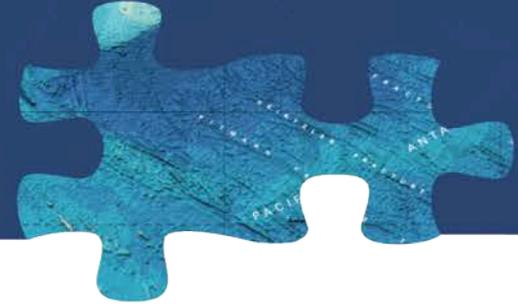
**SUSTAINABLE
DEVELOPMENT
GOALS**

Four Pillars of Seabed 2030

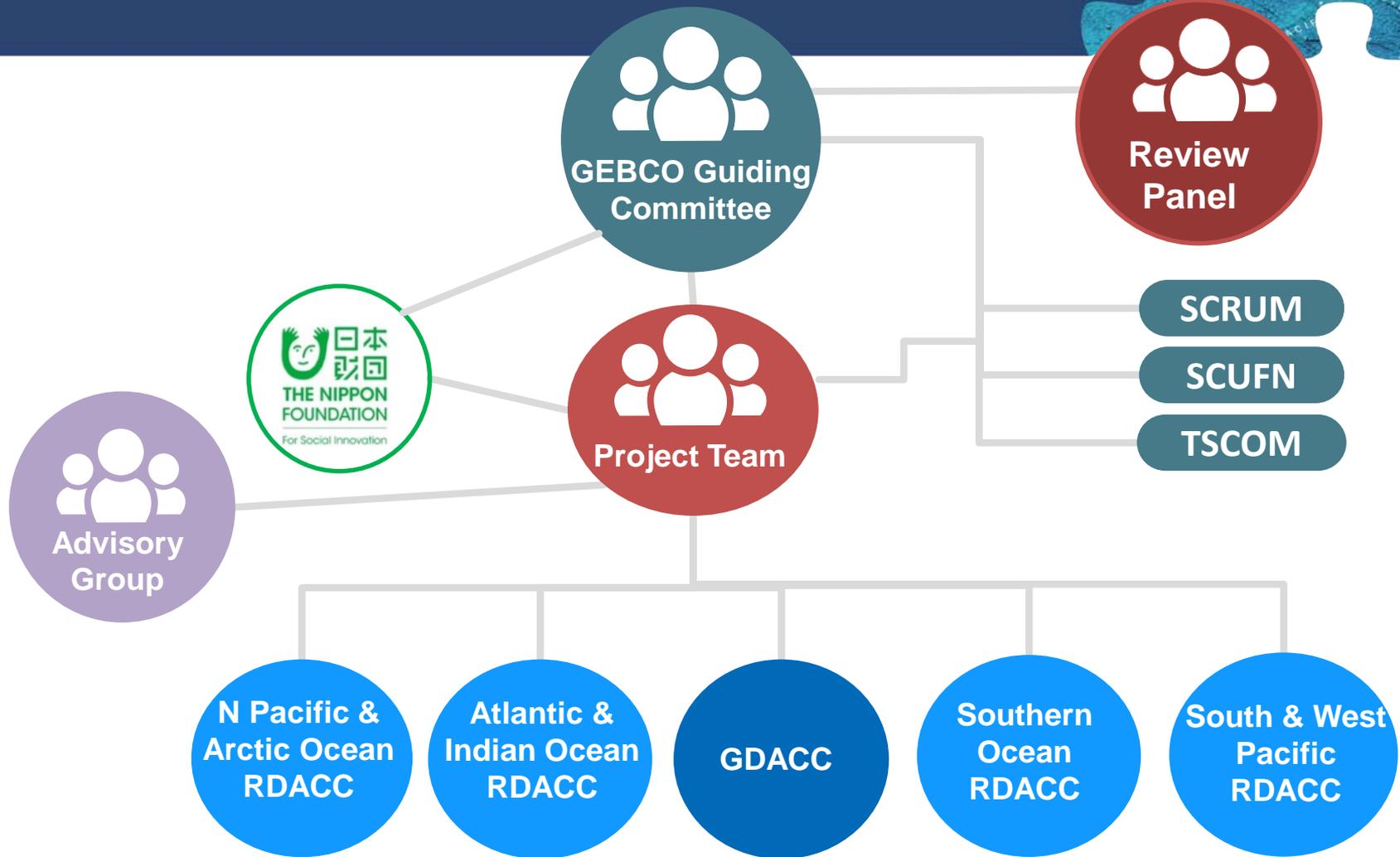


- Data Assembly and Coordination
 - Integrate and process existing data & identify data gaps to inform future mapping missions
 - Promote data sharing by encouraging contribution of data to the IHO DCDB
 - Create new data products – distribute through GEBCO
- Global Community Engagement
 - Identify & engage stakeholders through community events, traditional & digital media
- Consolidate Technical and Human Capacity
 - Explore and leverage new technology
 - Engage GEBCO Nippon Foundation Training Project Alumni
- Cross-cutting area of Corporate Governance
 - Strong stakeholder communication
 - Legal and accounting standards

Data Assembly and Coordination Centres

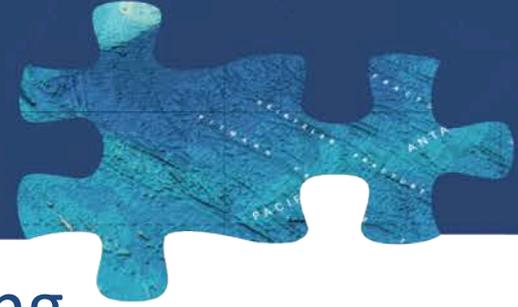


Seabed 2030 Structure



4 Regional Data Assembly & Coordination Centres (RDACC)
 1 Global Data Assembly and Coordination Centre (GDACC)
 Data Archive: IHO DCDB

Seabed 2030 Culture



- **Co-operation and Community Building**
 - 3,000 individuals, 40 organizations, 50 countries and growing
- **Coordination**
 - Initial Seabed 2030 focus on > 200 meters water depth
 - Hydrographic Offices critical < 200 meters water depth
- **Crowdsourcing**
 - Fishing boats, cargo, passenger and cruise ships, private yachts...
- **Credit and Attribution**
 - Recognize data contributions, in-kind services, promotion, capacity building...



<https://seabed2030.gebco.net>

@seabed2030 

Capacity-building initiative:

The Postgraduate Certificate in Ocean Bathymetry

Designed to train a new generation of scientists and hydrographers in ocean bathymetry

is funded by:



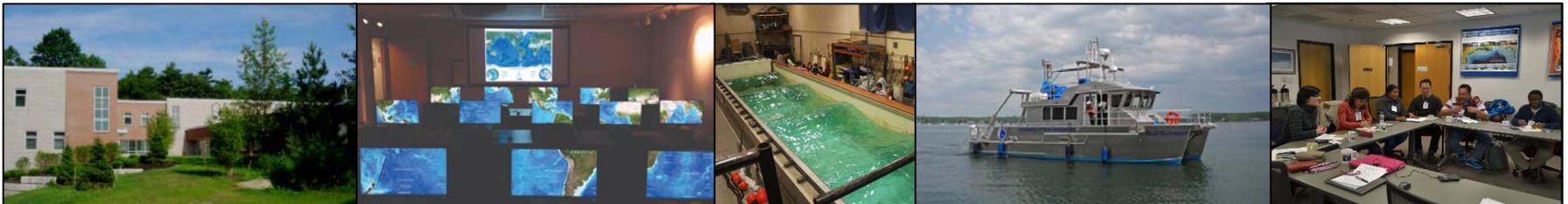
The Nippon Foundation of Japan

www.nippon-foundation.or.jp/en/

and taught at:

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

SEE CIRCULAR LETTER 17/2018 - 14 February 2018

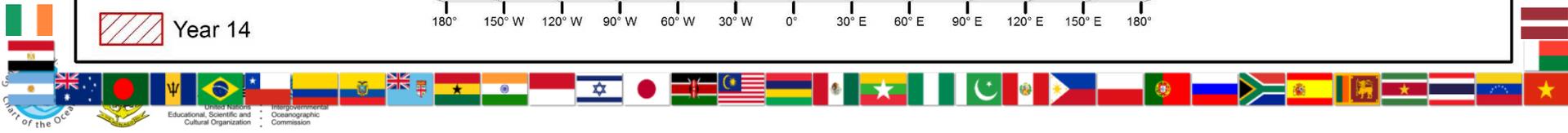
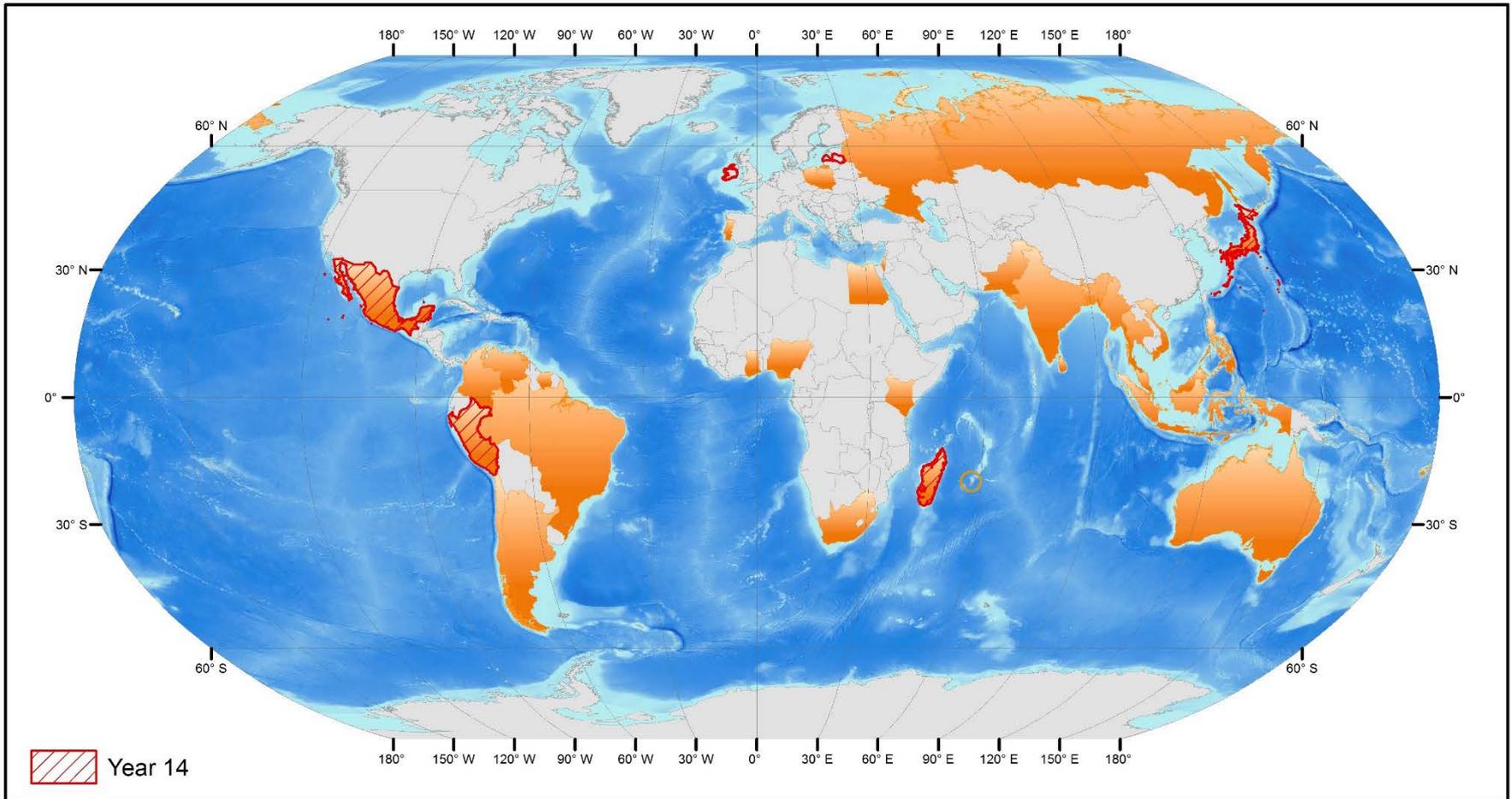


The Nippon Foundation / GEBCO Postgraduate Certificate in Ocean Bathymetry

Designed to train a new generation of scientists and hydrographers in ocean bathymetry



84 scholars from 37 coastal states over last 14 years



Postgraduate Certificate in Ocean Bathymetry Training Program content

Fall Semester
(August-December)

- Fundamentals of Ocean Mapping I
- Applied Tools in Ocean Mapping
- Math for Mapping etc

J-term

- Visit NGDC in Boulder, Co.
- Physical Oceanography for Hydrographers
- Software training (QinSy/CARIS/Hypack)

Spring Semester
(January-May)

- Fundamentals of Ocean Mapping II
- Bathymetric Spatial Analysis
- Geodesy & Positioning for Ocean Mapping
- Seamanship and Marine Weather
- Physical Oceanography for Hydrographers

Summer
(June-August)

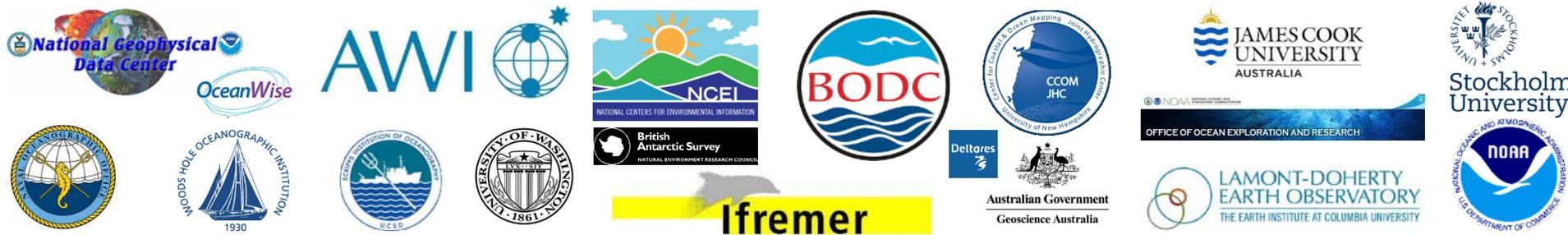
- Students will take the Hydrographic Field Course

Lab Visit & Cruise

- The working visit to a research organization and / or a cruise is selected by student and their home organization in a field of mutual interest.

Nippon Foundation / GEBCO Training program

- Students **MUST** also undertake a working visit to another research organization and a research cruise over the summer (selected by student and home organization in field of interest)
- The lab is included to round out the students training, to help them build their new make new contacts and to deepen some of their newly-acquired theoretical knowledge.
- This training includes familiarization with the programs the visited organization is engaged in, as well as some directed work under supervision.
- **BUILDS ALUMNI NETWORK**



Qualifications attainable

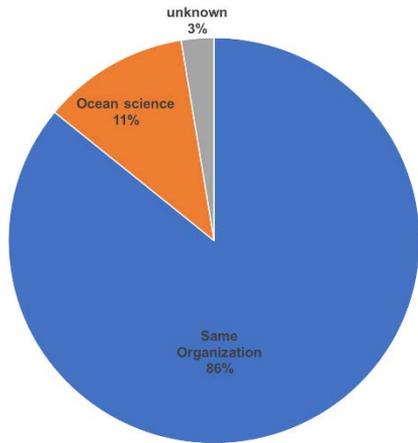
- *GEBCO Postgraduate certificate in Ocean Bathymetry*
- *UNH Graduate Certificate in Ocean Mapping*
- *FIG/IHO/ICA Category A hydrography (theory)*
- **Networks they develop are most significant**
 - amongst GEBCO scholars and CCOM graduate students as well as other alumni of the training program
 - through interactions with academic, scientific and business leaders at CCOM through lab visits, internships, cruises and other GEBCO meetings and projects



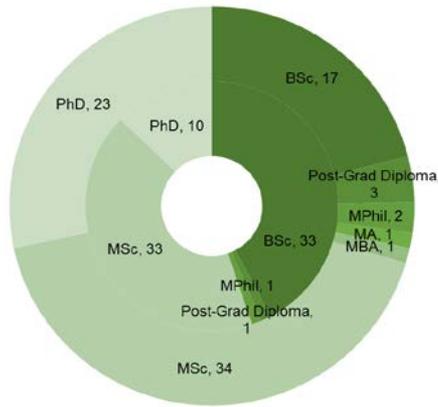


ALUMNI

ORGANIZATIONAL CONTINUITY

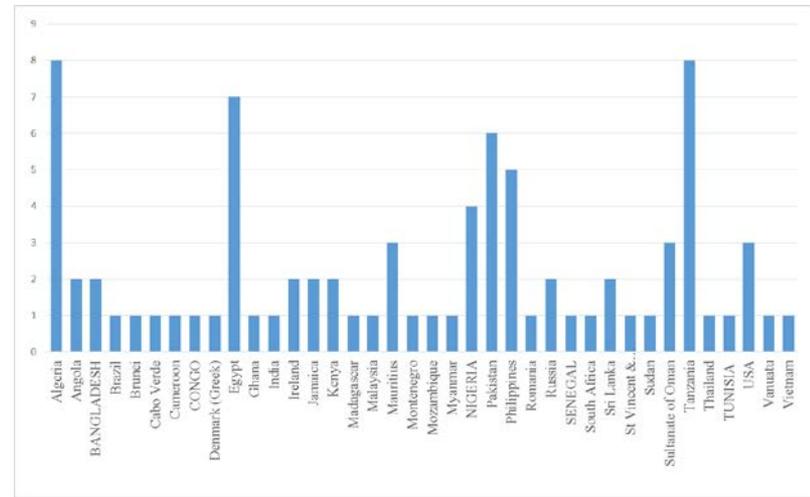


CONTINUED EDUCATION



Note:
 Inner ring values: Pre-Training Education
 Outer ring values: Post-Training education achieved with 12 Master degrees obtained (6 at UNH) and 13 new doctorates

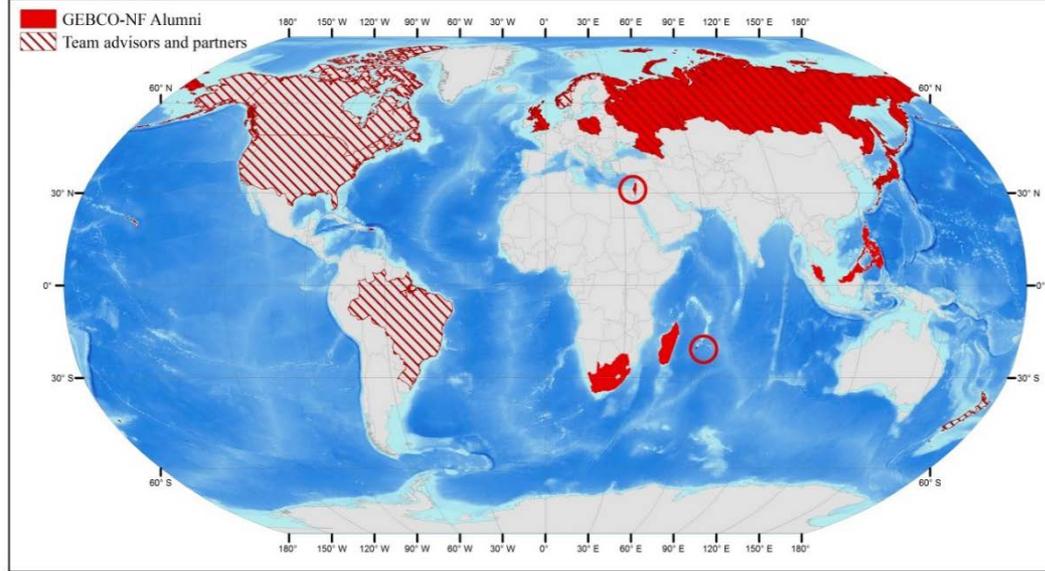
83 applications from 38 countries for 2018/2019





GEBCO-NF Alumni Team

1 of 9 Teams through to Round 2 of



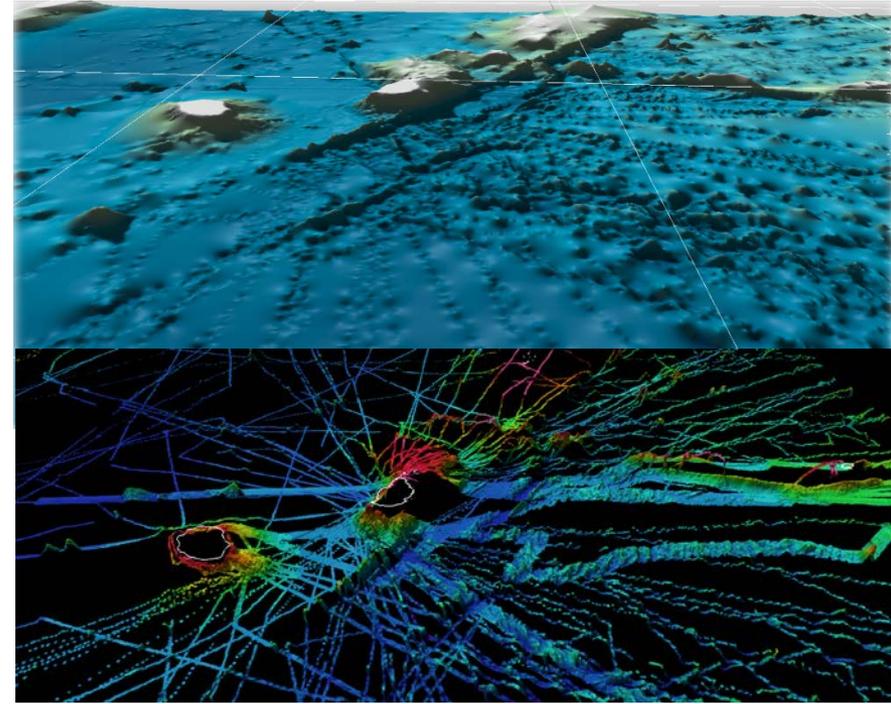
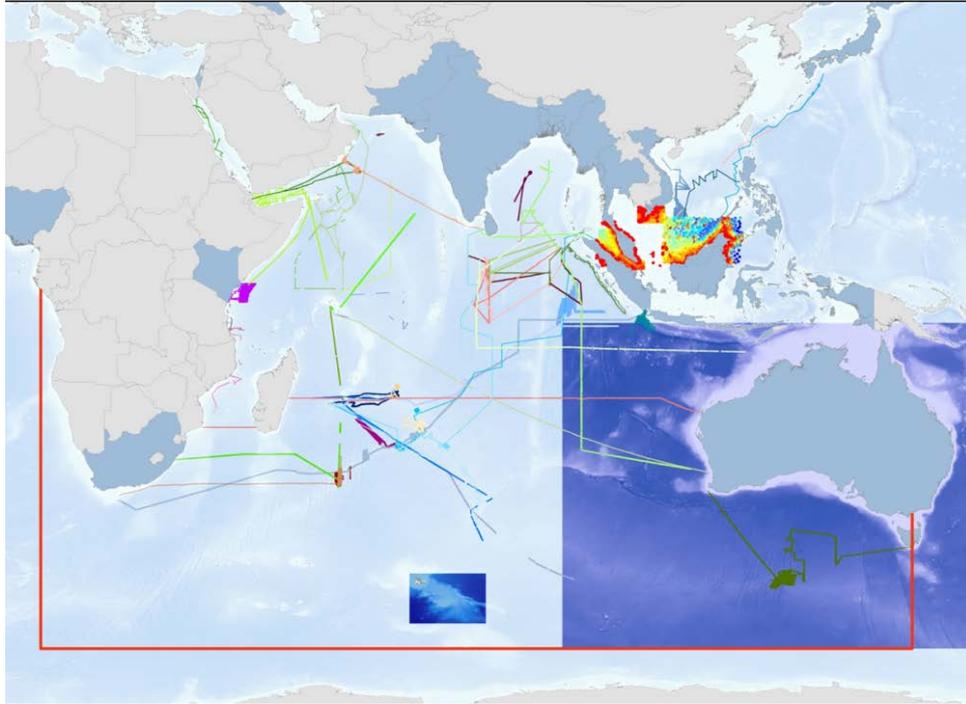
Nippon Foundation / GEBCO Indian Ocean Bathymetric Compilation

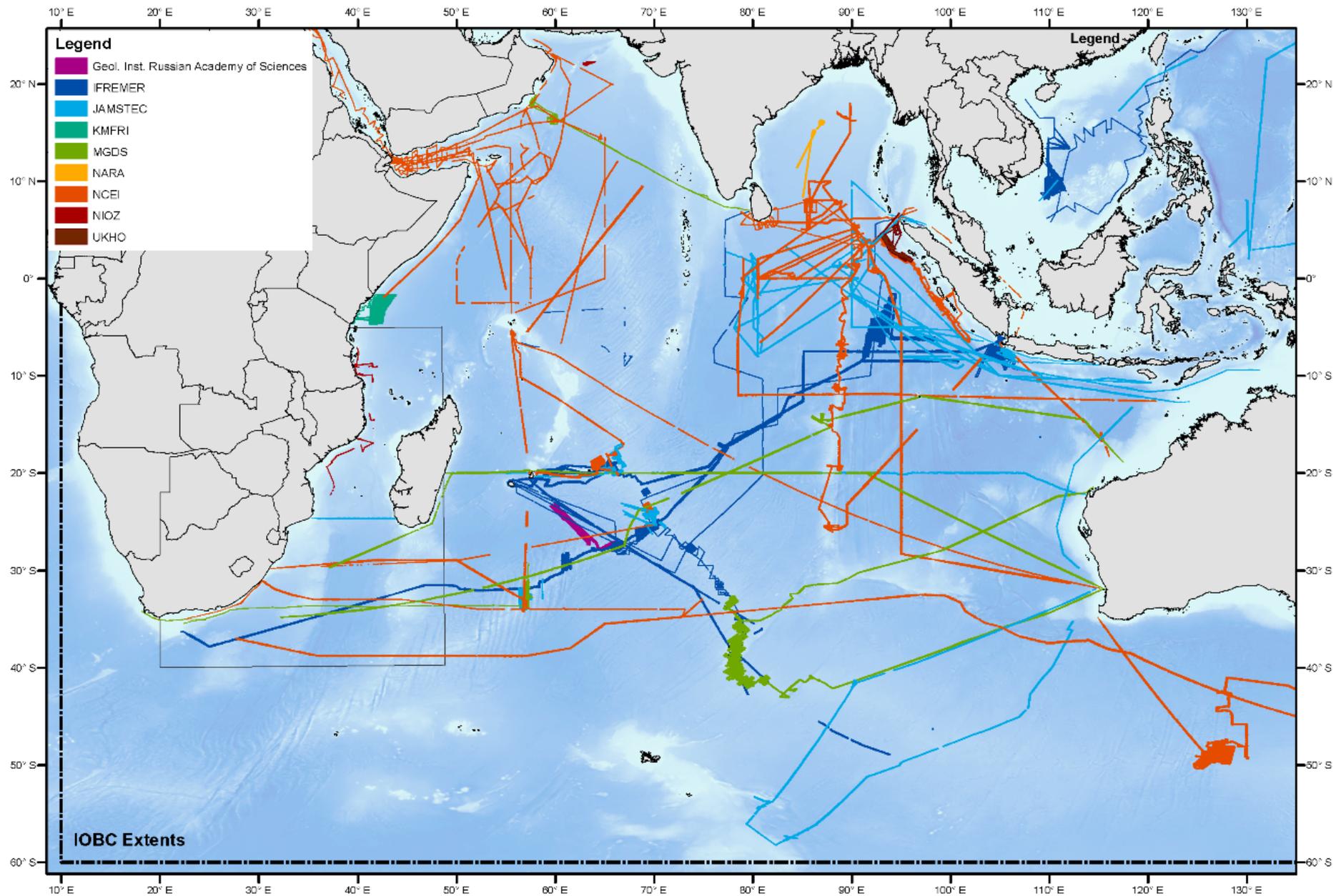
- Assemble all bathymetric data from the different research cruises and hydrographic surveys undertaken in the Indian Ocean
- Publish a regional bathymetric grids that will also be integrated into the next world ocean map and grid by GEBCO
- **UTILISE SCHOLARS NETWORKS**



Inception meeting in Bangladesh from 20 - 22 January 2013

Second workshop in Kuala Lumpur from 5 - 9 May 2014

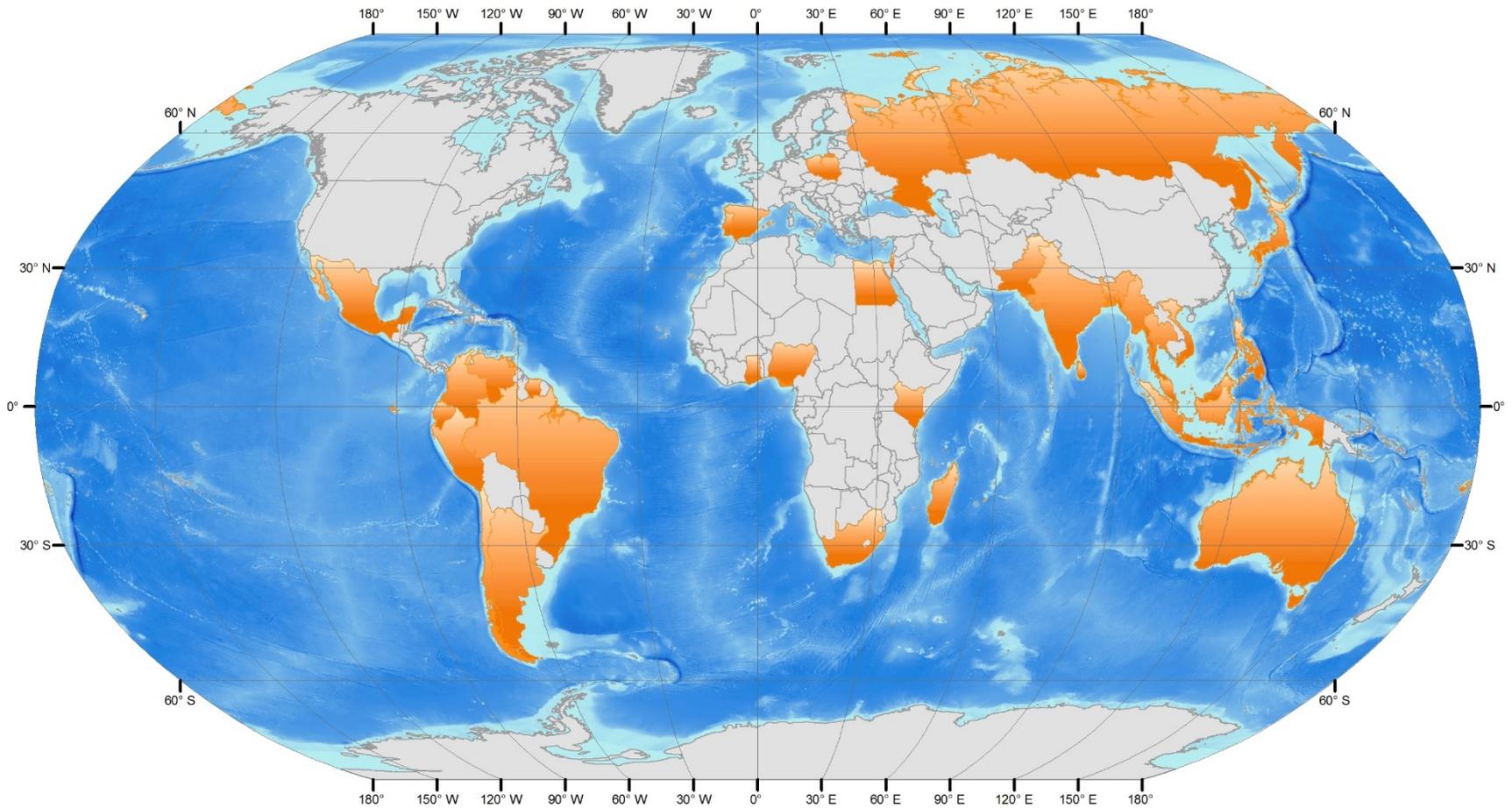




Current status of IOBC: 95 MBES surveys

78 scholars from 35 coastal states over last 13 years

Nippon Foundation / GEBCO scholars (Includes Year 1 to 13)



Summary

GEBCO aims to:

- Continually update and improve its global bathymetric model and collaborate with regional mapping groups to help achieve this
- Encourage (where possible) the contribution of bathymetry data to publicly-available national or international databases

How to contribute data to help update GEBCO's global grid:
www.gebco.net/about_us/contributing_data/

Thank you

Any questions?