Nippon Foundation / GEBCO projects : current status and looking into the future

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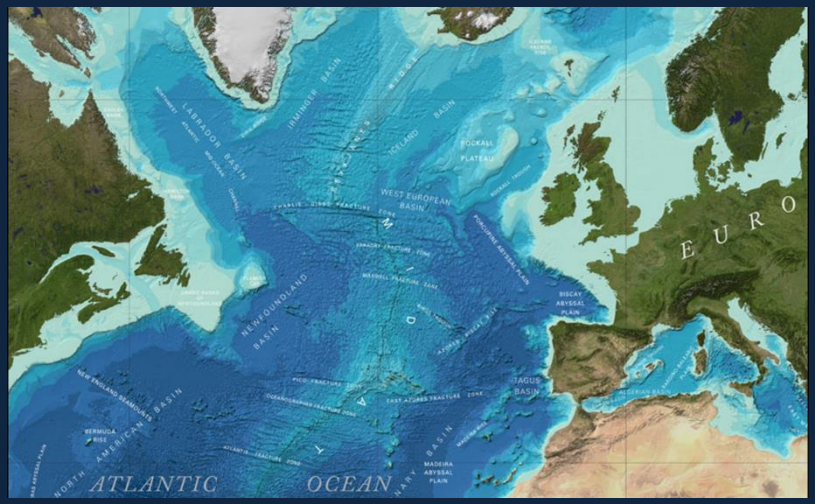
What is GEBCO?

The General Bathymetric Chart of the Oceans

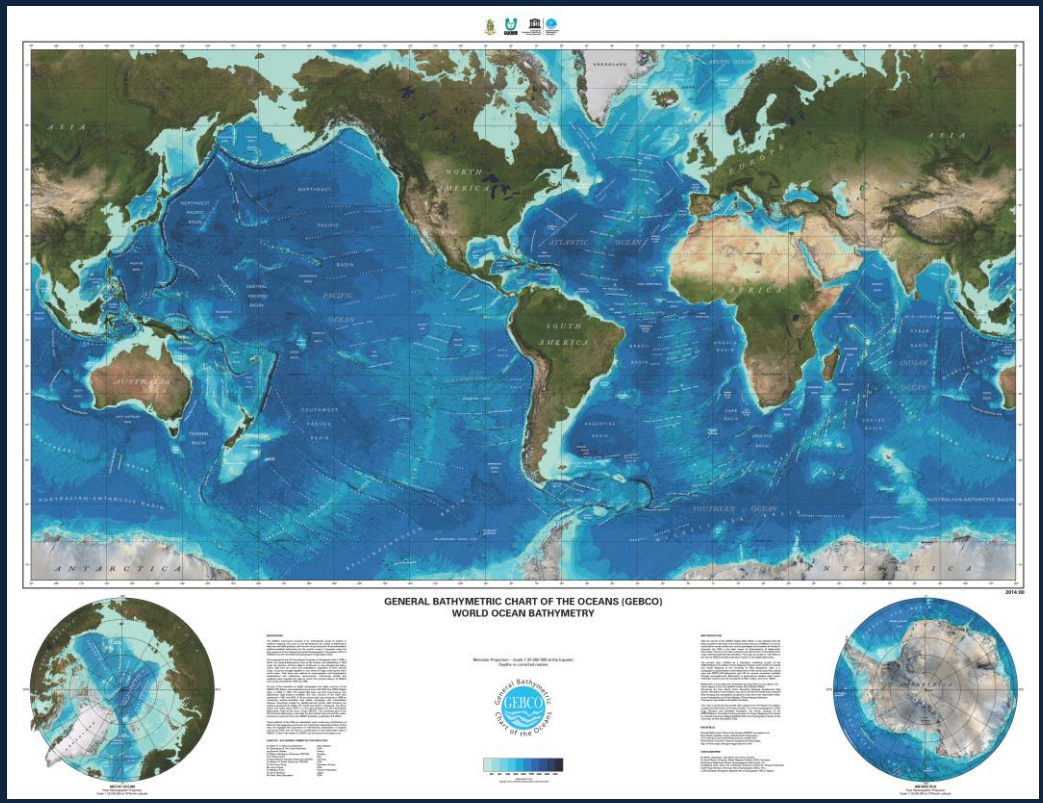
International group of experts who aim to provide the most authoritative, publicly-available bathymetric datasets for the world's oceans

GEBCO operates under the joint auspices of the International Hydrographic Organization and Intergovernmental Oceanographic Commission of UNESCO

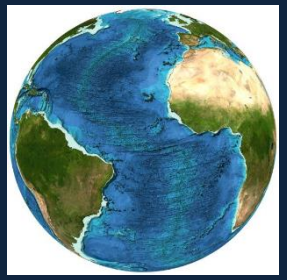
www.gebco.net

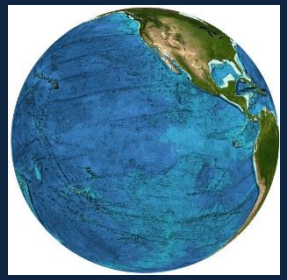


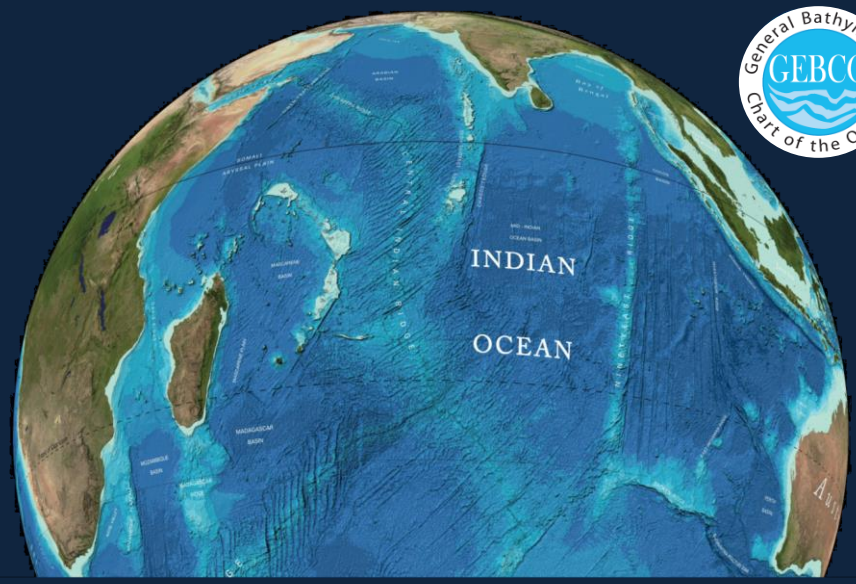
The GEBCO_2014 Grid: global terrain model at 30 arc-second intervals



- 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 model





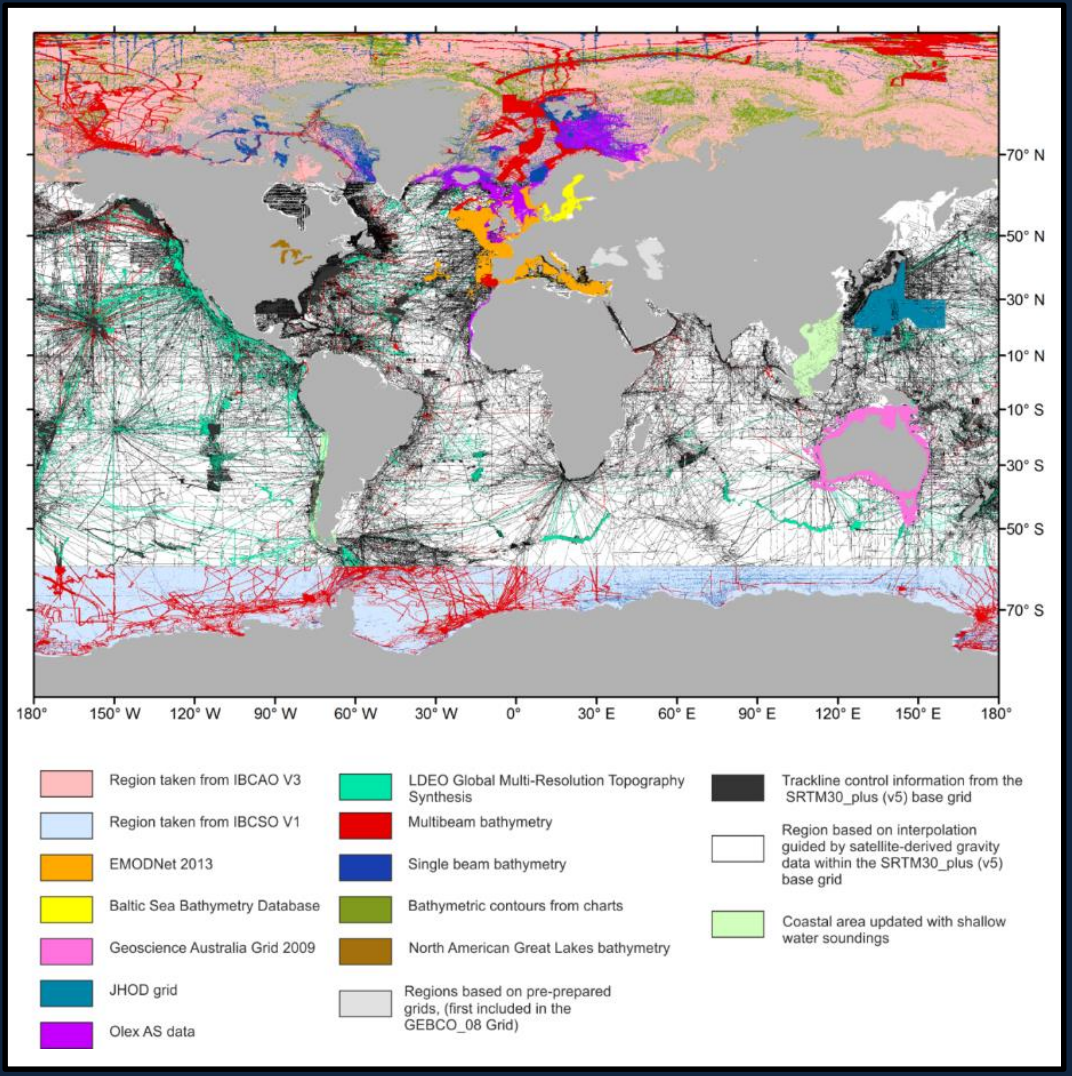


GEBCO_2014 products:

www.gebco.net/data_and_products/

United Nations Educational, Scientific and Cultural Organization

Intergovernmental Oceanographic Commission



- **SID showing the source of depth value in each grid cell:**
  - **Node based on trackline data**
  - **Pre-existing grids or**
  - **Based on interpolation**

- **IHO-IOC GEBCO Cook Book**

  https://www.gebco.net/data_and_products/gebco_cook_book/

- **GEBCO Sub-Committee on Undersea Feature Names (SCUFN) digital gazetteer of the standardized names, is available via a webmap application**

  http://www.ngdc.noaa.gov/gazetteer

New and existing GEBCO projects:

- Nippon Foundation / GEBCO Seabed 2030
- Nippon Foundation / GEBCO training program
- GEBCO-NF Alumni Team for the Shell Ocean Discovery XPRIZE Challenge

The Nippon Foundation

Charitable organization since 1962 – whose goal is to help build a society where people support one another

日本財団
THE NIPPON FOUNDATION
For Social Innovation

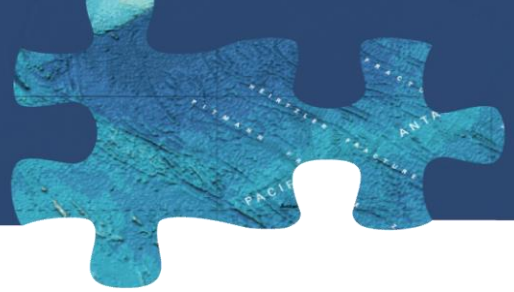
Guiding Principles:

*** Discover * Prioritize * Be creative**
*** Do it now * Be open * Grow**
*** Expand networks**

"THE FUTURE OF OUR OCEAN"

- ***1 of 4 main international activity focuses***
- ***10 funded programs under this banner***

Nippon Foundation - GEBCO Seabed 2030: Mission



- Aims to bring together all available bathymetric data to produce the definitive map of the world ocean floor by 2030 and make it available to all.
- Builds on more than 100 years of GEBCO's history in global seafloor mapping.
- Focus for data compilation and co-ordination activities for Seabed 2030 is carried out at four Regional Centers.

https://seabed2030.gebco.net

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General Bathymetric Chart of the Oceans GEBCO

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 GEBCO data products
- **Global Community Engagement**
  - Identify & engage the GEBCO community as well as other stakeholders through community events, traditional & digital media
- **Consolidate Technical and Human Capacity**
  - Explore and leverage new technology
  - Engage Nippon Foundation / GEBCO Training Project Alumni
- **Cross-cutting area of Corporate Governance**
  - Strong stakeholder communication
  - Legal and accounting standards

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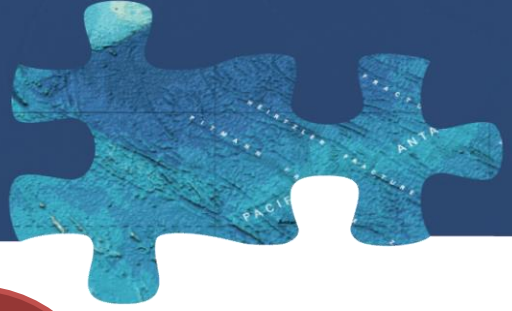
General Bathymetric Chart of the Oceans GEBCO

Seabed 2030 Structure



GEBCO Guiding Committee

Review Panel

THE NIPPON FOUNDATION
For Social Innovation

Project Team

SCRUM

SCUFN

TSCOM

Advisory Group

N Pacific & Arctic Ocean Regional Center

Atlantic & Indian Ocean Regional Center

Global Center

Southern Ocean Regional Center

South & West Pacific Regional Center

IHO - DCDB

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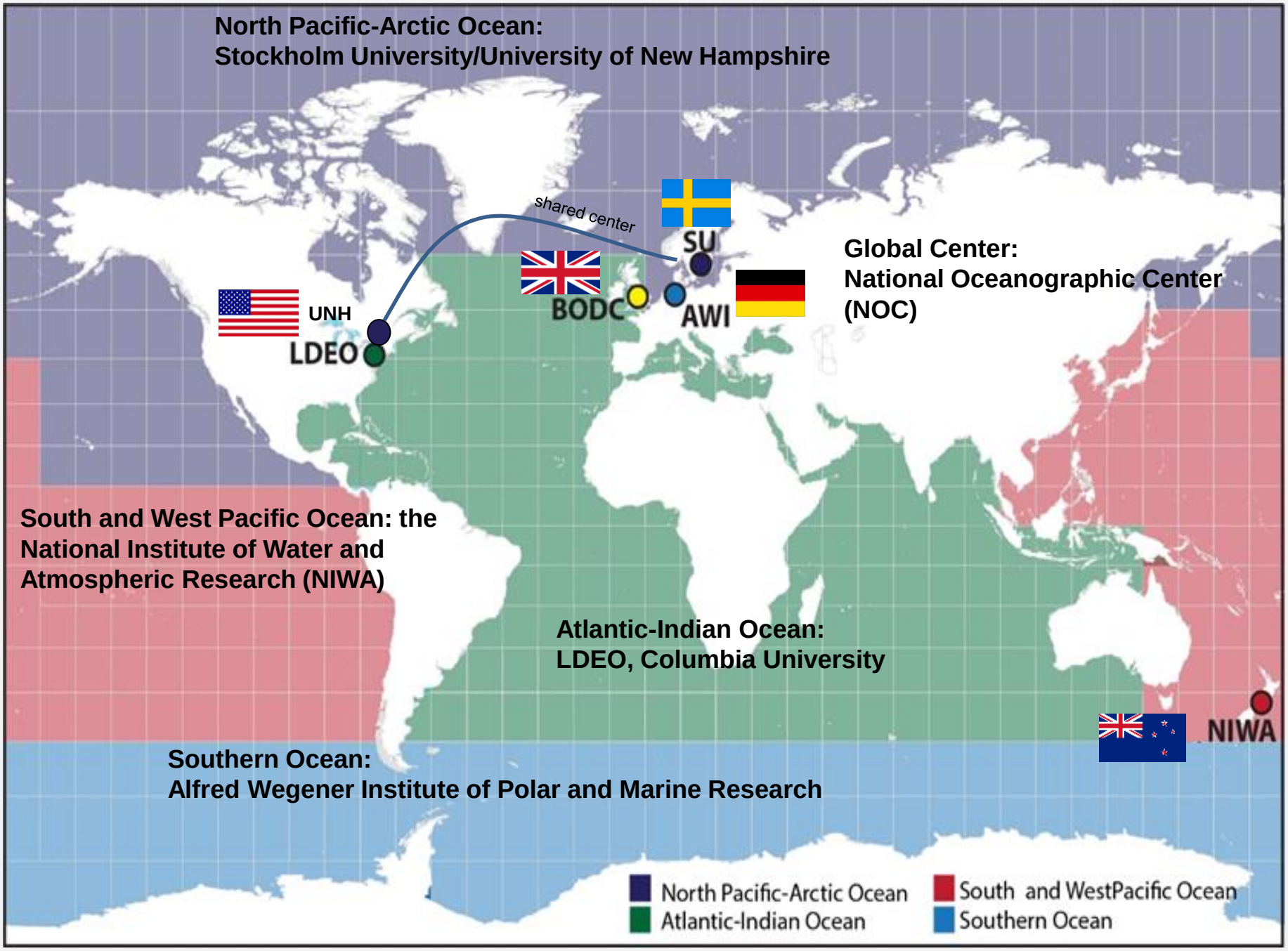
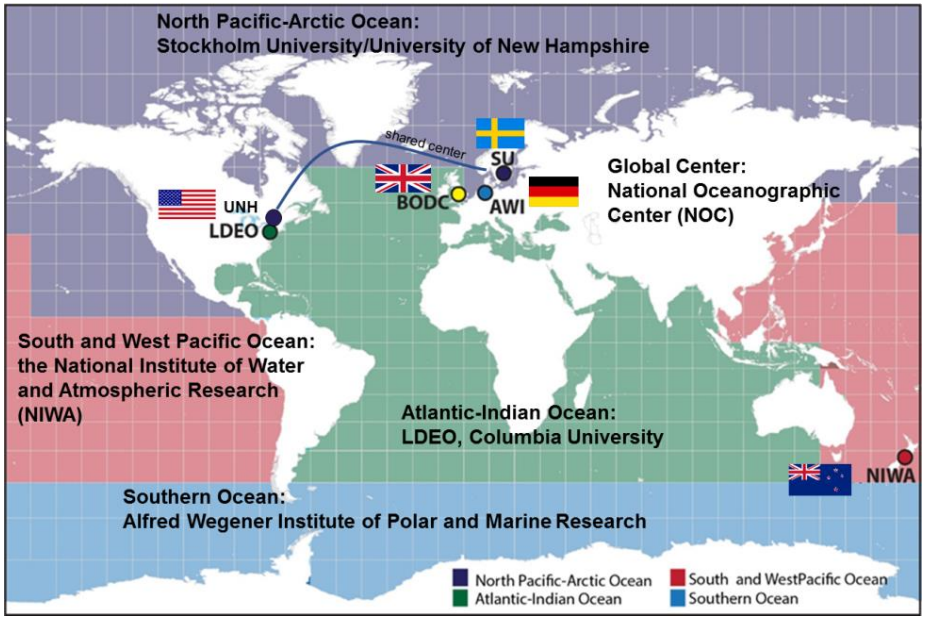
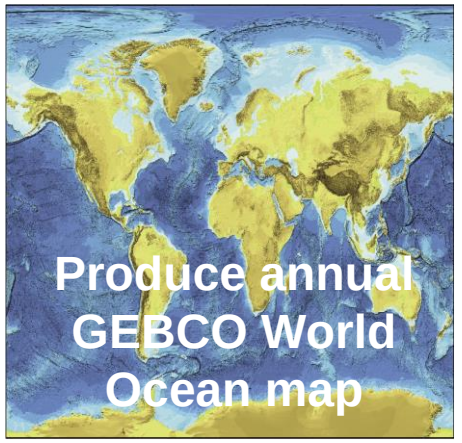
General Bathymetric Chart of the Oceans
GEBCO


North Pacific-Arctic Ocean:
Stockholm University/University of New Hampshire
shared center
SU
Global Center:
National Oceanographic Center
(NOC)
UNH
LDEO
BODC
AWI
South and West Pacific Ocean: the
National Institute of Water and
Atmospheric Research (NIWA)
Atlantic-Indian Ocean:
LDEO, Columbia University
NIWA
Southern Ocean:
Alfred Wegener Institute of Polar and Marine Research
North Pacific-Arctic Ocean
Atlantic-Indian Ocean
South and WestPacific Ocean
Southern Ocean

What will the centers do?



- **Responsible for compiling bathymetric information**
- **Co-operate and work closely with existing regional mapping initiatives**
- **Develop bathymetric data processing and assembly tools**



Seabed 2030 Culture

- **Co-operation and Community Building**
- **Coordination**
  - Initial Seabed 2030 focus on >200 m water depth
  - Hydrographic Offices concentrate on < 200 m water depth
- **Crowdsourcing**
  - Fishing boats, cargo, passenger and cruise ships, private yachts…
- **Credit and Attribution**
  - Recognize data contributions, in-kind services, promotion, capacity building…

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General Bathymetric Chart of the Oceans GEBCO

Capacity-building initiative:
Ocean Mapping Training Program

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/

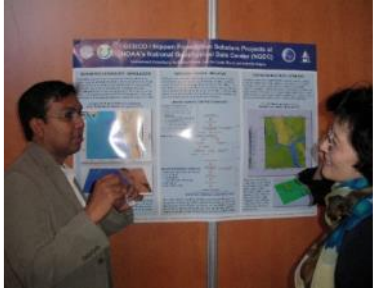
and taught at:

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









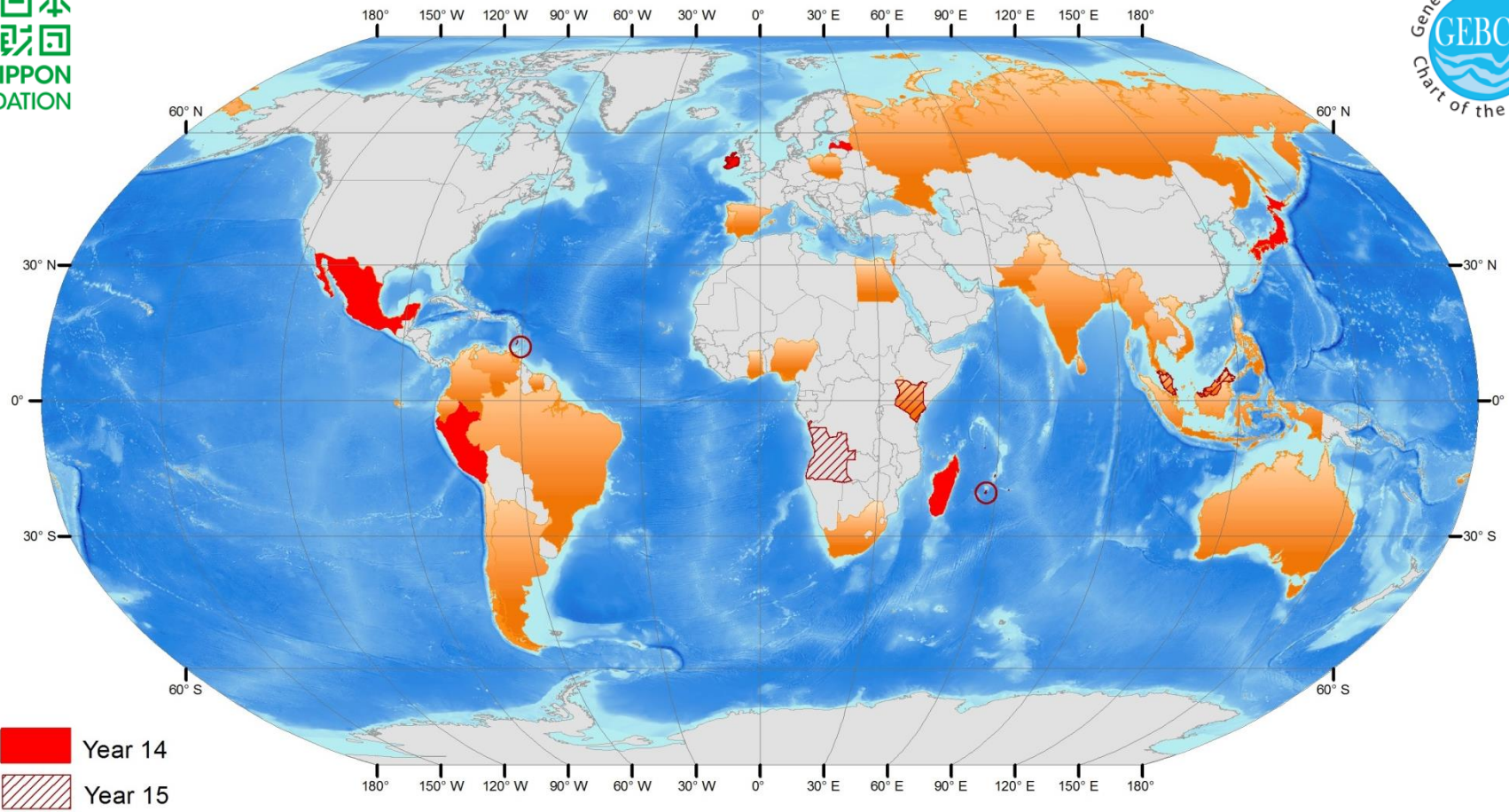

The aim of this program is to build a **<u>global network of young ocean mappers</u>**, who can use the skills, knowledge and network of contacts they acquired during their training to build capacity within their own country and to keep the Nippon Foundation / GEBCO community growing.

This will ensure that a new generation of ocean mappers will continue to build on our knowledge of the world's oceans.

Capacity-building initiative:

Nippon Foundation / GEBCO Alumni

84 scholars from 37 coastal states over last 14 years with the current class coloured red
Add incoming Year 15 class (hatch) – up to 90 people from 38 coastal states



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 NCEI 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 • Geological Oceanography for Hydrographers
Summer (June-August)	• Software training (QinSy/CARIS/Hypack • Hydrographic Field Course
Lab Visit & Cruise	• Working visit to a research organization and / or a cruise 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

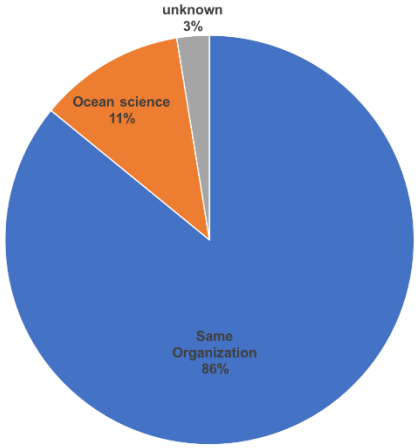
- amongst GEBCO scholars and CCOM graduate students as well as other alumni of the training program
- through interactions with academic, scientific and business leaders at CCOM
- through lab visits, internships, cruises and other GEBCO meetings and projects



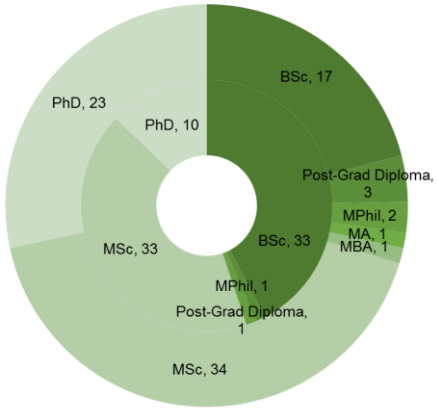

Measure of our success

ONGOING INVOLVEMENT AND COMMUNICATION

ORGANIZATIONAL CONTINUITY

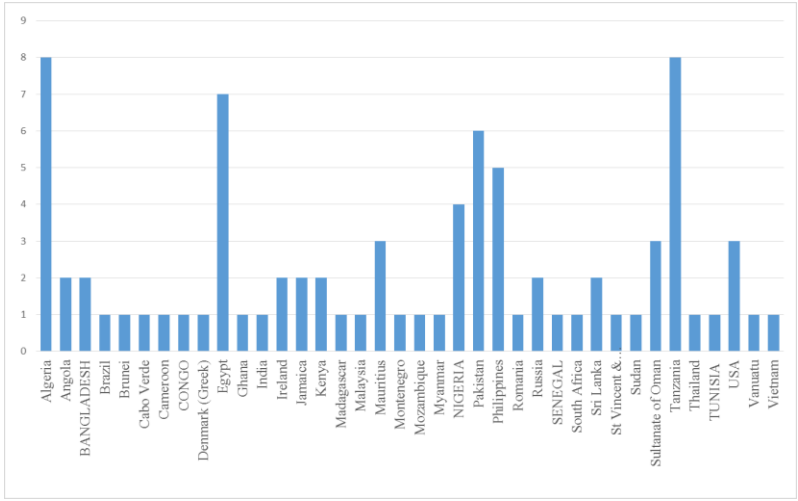


CONTINUED EDUCATION



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



Shell OCEAN DISCOVERY XPRIZE®

A $7 million global competition challenging teams to advance deep-sea technologies for autonomous, fast and high-resolution ocean exploration.

Create solutions that advance the autonomy, scale, speed, depths and resolution of ocean exploration

http://oceandiscovery.xprize.org

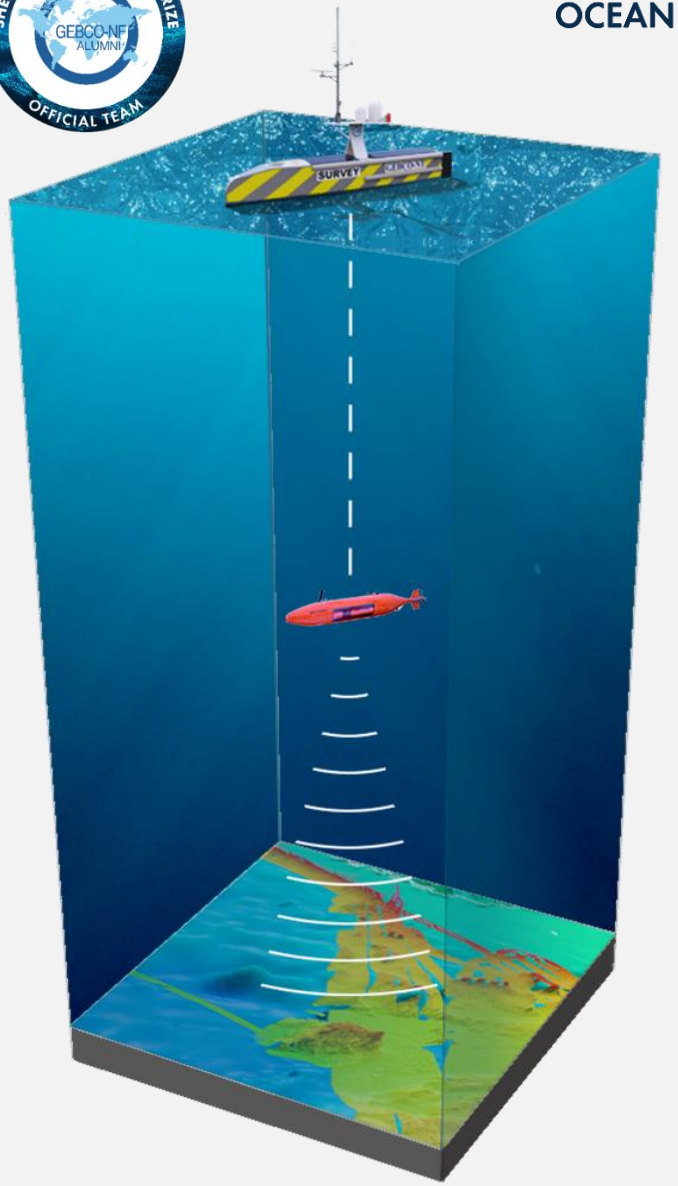
Shell OCEAN DISCOVERY XPRIZE®

The key elements of the Round 1 / 2 challenge

1. Create an autonomous solution to collect data
2. All components used for data gathering must fit within a standard 40 ft shipping container
3. Produce a high-resolution bathymetric map of an area of 100 km^2 / 250 km^2 (5 m horizontal and 0.5 m vertical resolution)
4. Produce images of a specified object
5. Identify and image five / ten archeological, biological or geological features

Data collection must be completed in 16 / 24 hours with 48 hours for product generation

Shell OCEAN DISCOVERY XPRIZE FINALIST



New autonomous surface vessel capable of deployment & retrieval of AUV

- Hushcraft Limited SEA-KIT USV *Maxlimer* with KM HiPAP
- Remote and Autonomous operations facilitated by Kongsberg Maritime K-MATE.

Commercially available Kongsberg Maritime HUGIN AUV

- Round 1: Ocean Floor Geophysics *Chercheur* AUV: 3,000 m
- Round 2: Kongsberg Maritime: 4,500 m

Autonomous and Cloud based data processing for fusion of seafloor bathymetry and imagery

- Fusion of EM2040 MBES, HISAS real aperture bathymetry, HISAS synthetic aperture side-scan imagery, and spot-focused synthetic aperture HISAS imagery and bathymetry.

International team of volunteers, scholars, industry experts, advisors, partners and suppliers.

GEBCO-NF Alumni Team
1 of 9 Teams through to Round 2 of

Shell OCEAN DISCOVERY XPRIZE

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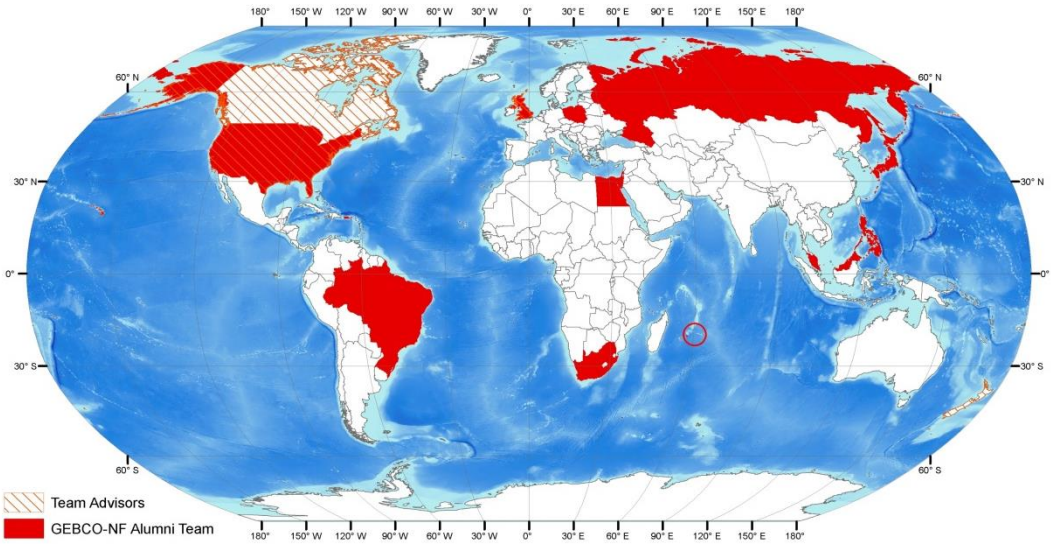


Shell
OCEAN DISCOVERY
XPRIZE
UTV MÅLØMER
MALOON

> 50 team members from 14 countries


UNH
OCEANOGRAPHY
UNH
NATGEO