United Nations
Educational, Scientific and
Cultural Organization

Intergovernmental
Oceanographic
Commission

Briefing on the work of GEBCO

(GENERAL BATHYMETRIC CHART OF THE OCEANS)

Representative of GEBCO: Gustavo Adolfo Gómez-Pimpollo Crespo (IHM), Cádiz, Spain

How inappropriate to call this planet Earth when clearly it is Ocean, Arthur C. Clark

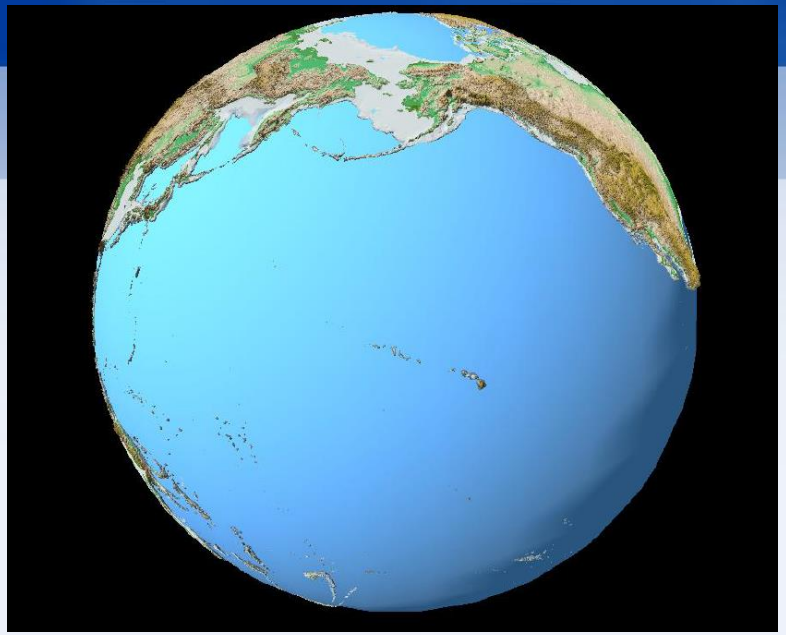
What is GEBCO?

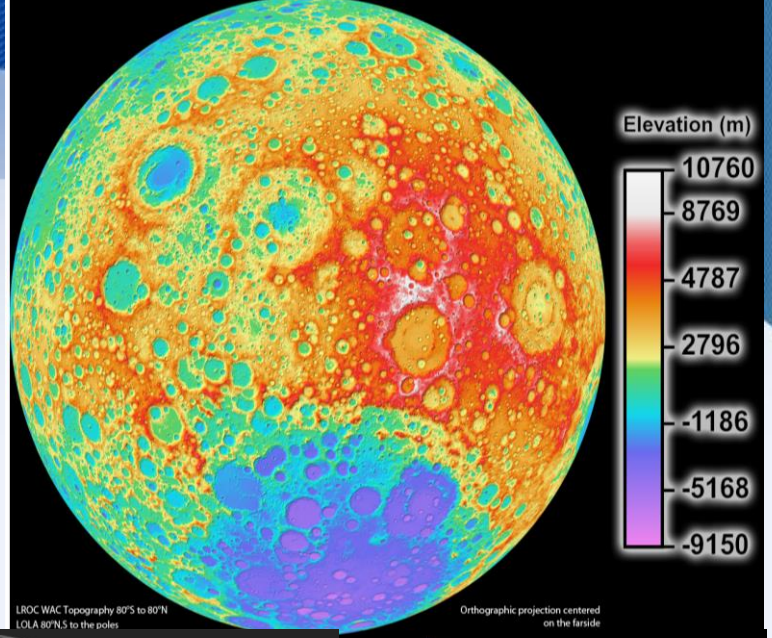
The General Bathymetric Chart of the Oceans (GEBCO), www.gebco.net

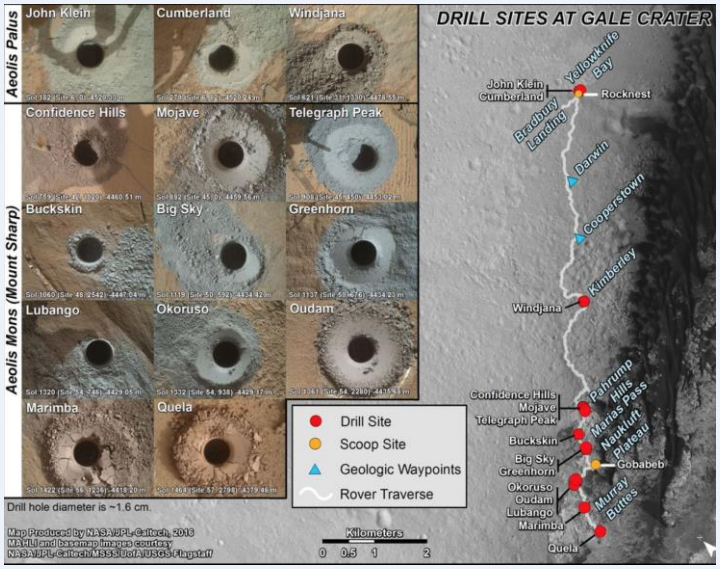
- Aims to provide the most authoritative, publicly-available bathymetric data sets of the world's oceans
- Operates under the joint auspices of the IHO and IOC
- First GEBCO paper chart series initiated in 1903

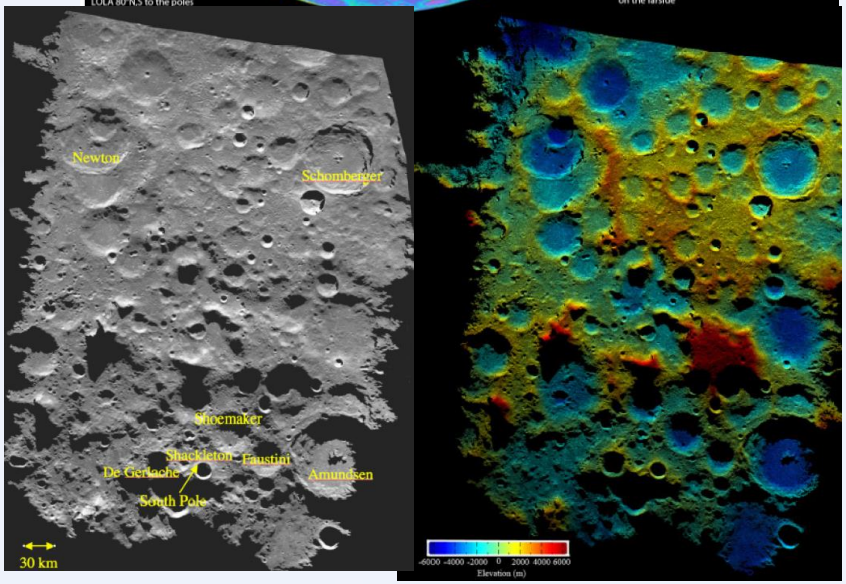
GEBCO's early years

The 7th International Geographic Congress (Berlin, 1899) nominated a Commission on sub-oceanic nomenclature to standardized terminology and underwater feature names, and was also responsible for the publication of a general bathymetric chart. The Commission convened in Wiesbaden (April 15-16, 1903), with Prince Albert I of Monaco in the chair.



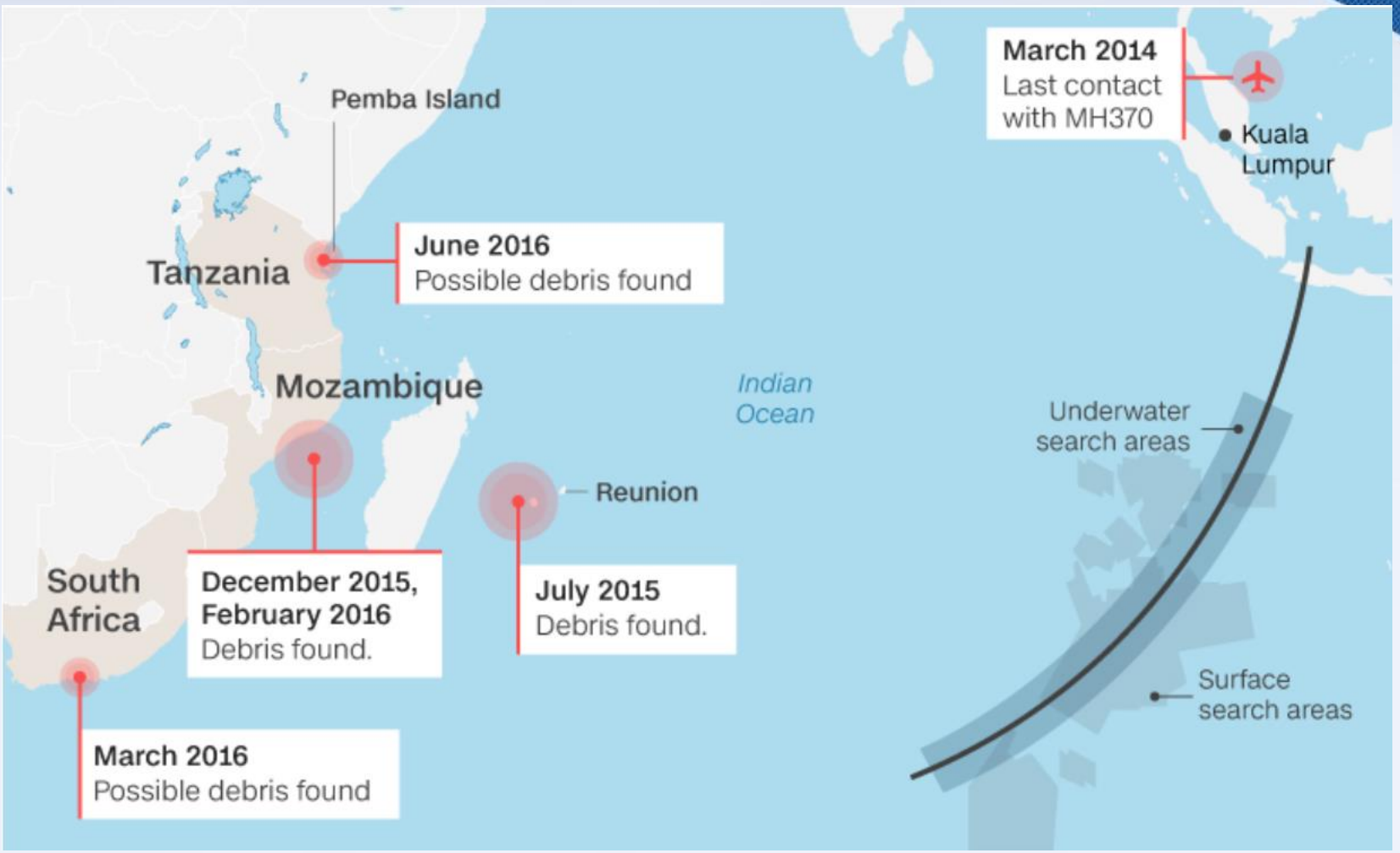






The science team that oversees the imaging system on board NASA's Lunar Reconnaissance Orbiter (LRO) has released the highest resolution near-global topographic map of the moon ever created.

http://www.nasa.gov/mission_pages/LRO/news/lro-topo.html


March 2014
Last contact
with MH370
Kuala
Lumpur
Pemba Island
June 2016
Possible debris found
Tanzania
Mozambique
Indian
Ocean
Underwater
search areas
Reunion
South
Africa
December 2015,
February 2016
Debris found.
July 2015
Debris found.
Surface
search areas
March 2016
Possible debris found

Eos Feature Article

EOS

EOS, TRANSACTIONS, AMERICAN GEOPHYSICAL UNION

VOLUME 95 NUMBER 21 27 MAY 2014

IN THIS ISSUE:

Seafloor in the Malaysia Airlines Flight MH370 Search Area

On the morning of 8 March 2014, Malaysia Airlines flight MH370, from Kuala Lumpur to Beijing, lost contact with air traffic control shortly after takeoff and vanished. While the world waited for any sign of the missing aircraft and the 239 people on board, authorities and scientists began to investigate what little information was known about the plane's actual movements.

As days and weeks passed, the search began to focus on the Indian Ocean to the west of Australia—far from the flight's intended path. Clues to how the plane got so far off course may be in the plane's "black boxes"—its flight data and cockpit voice recorders. Finding the recorders is therefore a top priority.

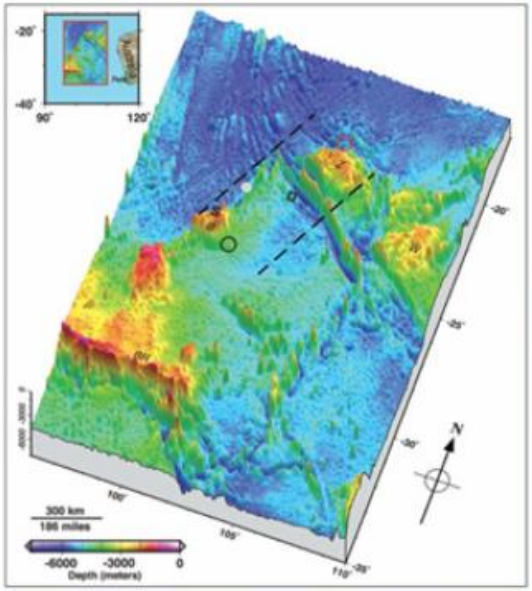
Little is known about the seafloor from ship-borne echo sounder measurements in the region where flight MH370 is believed to have crashed. Available depth measurements cover only 5% of the 2000 by 1400 kilometer area in Figure 1 (a high-resolution copy of this figure may be found in the additional supporting information in the online version of this article), and only a very few of them were acquired with modern acoustic and navigational systems. This lack of data makes the search for MH370 all the more difficult. It also highlights how most seafloor features are very poorly resolved. However, satellite altimeter measurements provide global bathymetry estimates at a

aircraft and the satellite while Doppler shifts in the handshake allowed a rough estimate of the aircraft's velocity away from the satellite.

This analysis, completed about 10 days after the disappearance, was combined with estimates of when the plane might have run out of fuel. Together they suggested that the aircraft might be anywhere in a large area of the Indian Ocean west of Australia.

MH370's black boxes were equipped with "pingers" programmed to emit acoustic signals if the boxes fell into the sea. The expected battery life of these pingers was approximately 1 month, so there were only a few days of expected pings left when it was reported that the Chinese vessel *Haixun 01* had detected pings on 4 and 5 April in the water above the east flank of the Batavia Plateau (see black circle in Figure 1). Over the next 3 days the Australian vessel *Ocean Shield* reported three other contacts, one contact apparently hearing pings emitted by two distinct devices, in an area above the north flank of the Zenith Plateau (see red circle in Figure 1).

The Batavia and Zenith contact locations are approximately 600 kilometers apart, and it seems unlikely that pingers at the end of their battery life could be heard over such distances, yet sound propagation in the ocean is quite complex. Nonetheless, Chinese and Australian authorities seemed confident that the carrier frequency, duration,

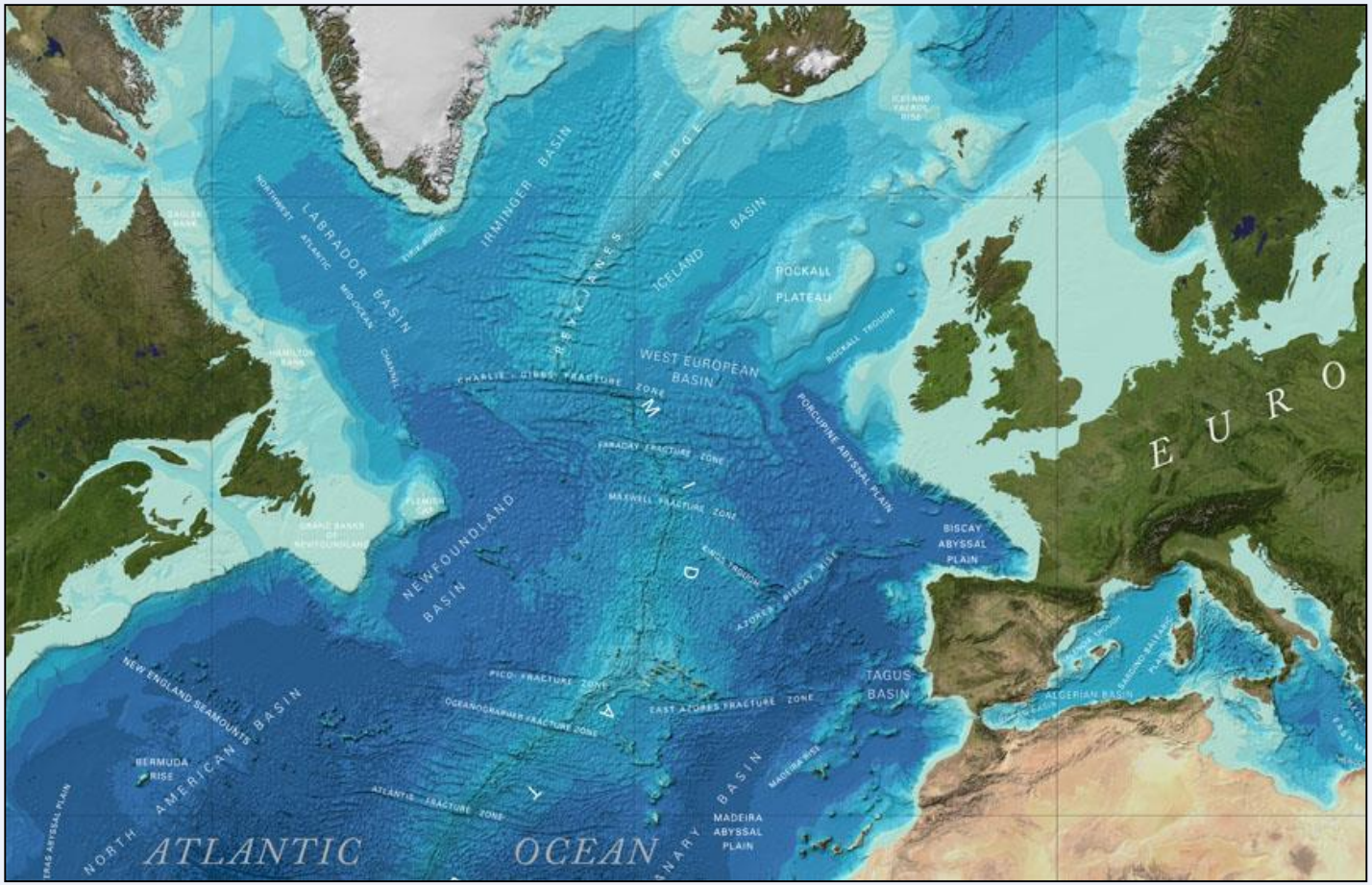


- GEBCO data used in Eos Feature Article on seafloor in the MH370 search area (Smith and Marks, Eos, 27 May 2014)

- In this area:
  - Only 5% of seafloor depths constrained by soundings
  - Remainder are depths estimated from satellite altimetry

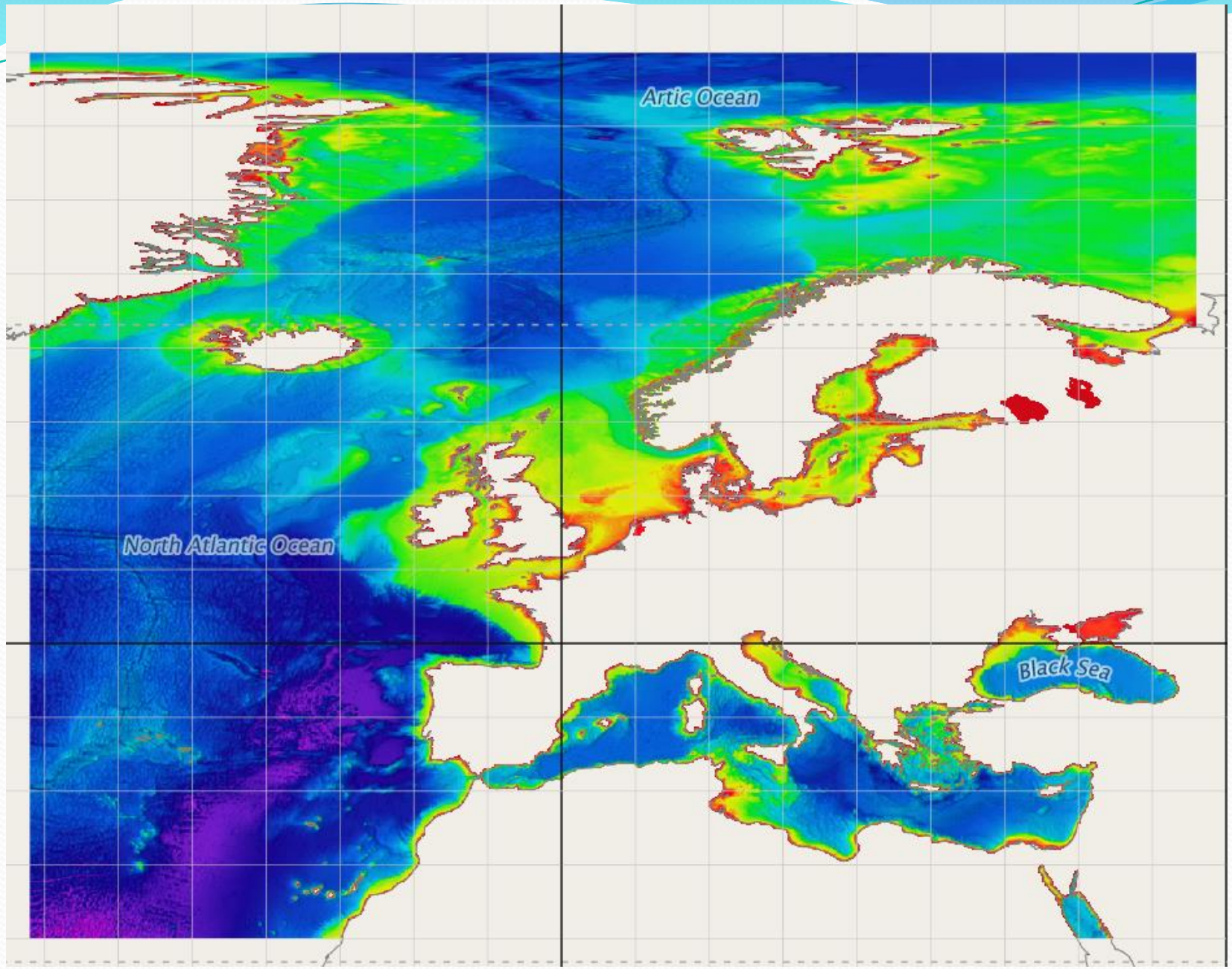
Improve the General bathymetric chart continually.

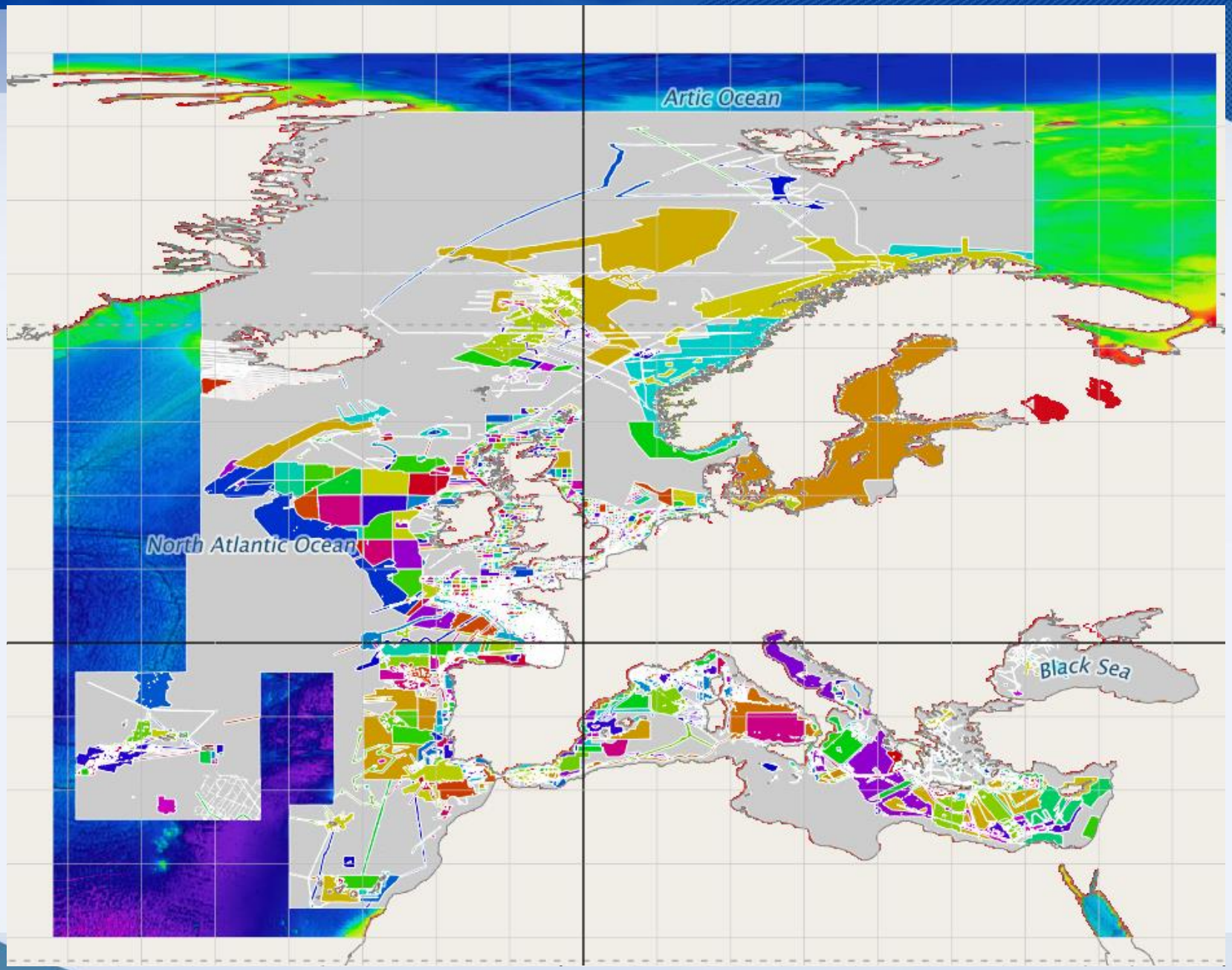
The higher resolution of the chart, the better



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

EMODNet Portal




Artic Ocean
North Atlantic Ocean
Black Sea

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

www.gebco.net/about_us/committees_and_groups/

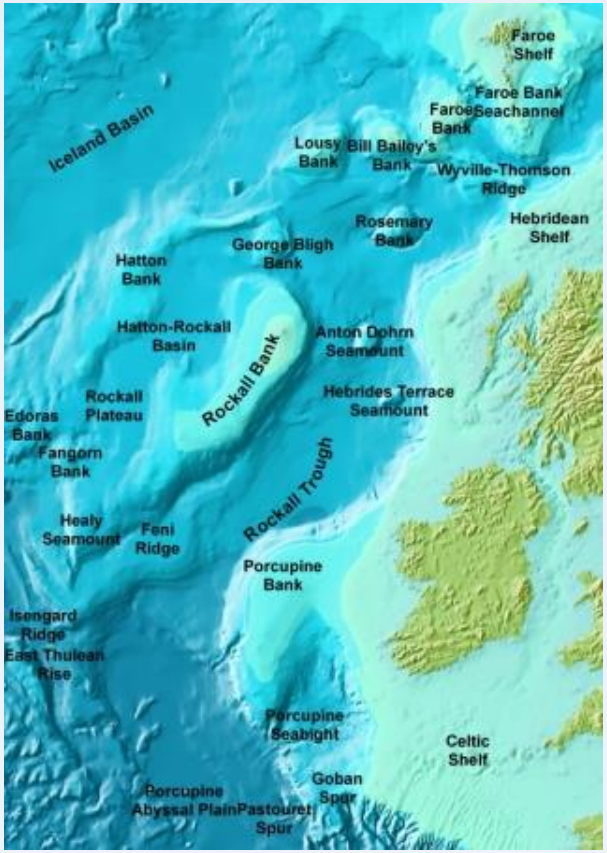
Sub-Committee on Undersea Feature Names (SCUFN)

-Works to maintain and update the features on the seafloor with names.

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

-The group meets once a year to consider submitted name proposals for newly-discovered seafloor features. Through this review process, SCUFN ensures that features are given unique and appropriate names, reducing the possibility of confusion.

An average of more than 50 new features are proposed every year.



Regional mapping work

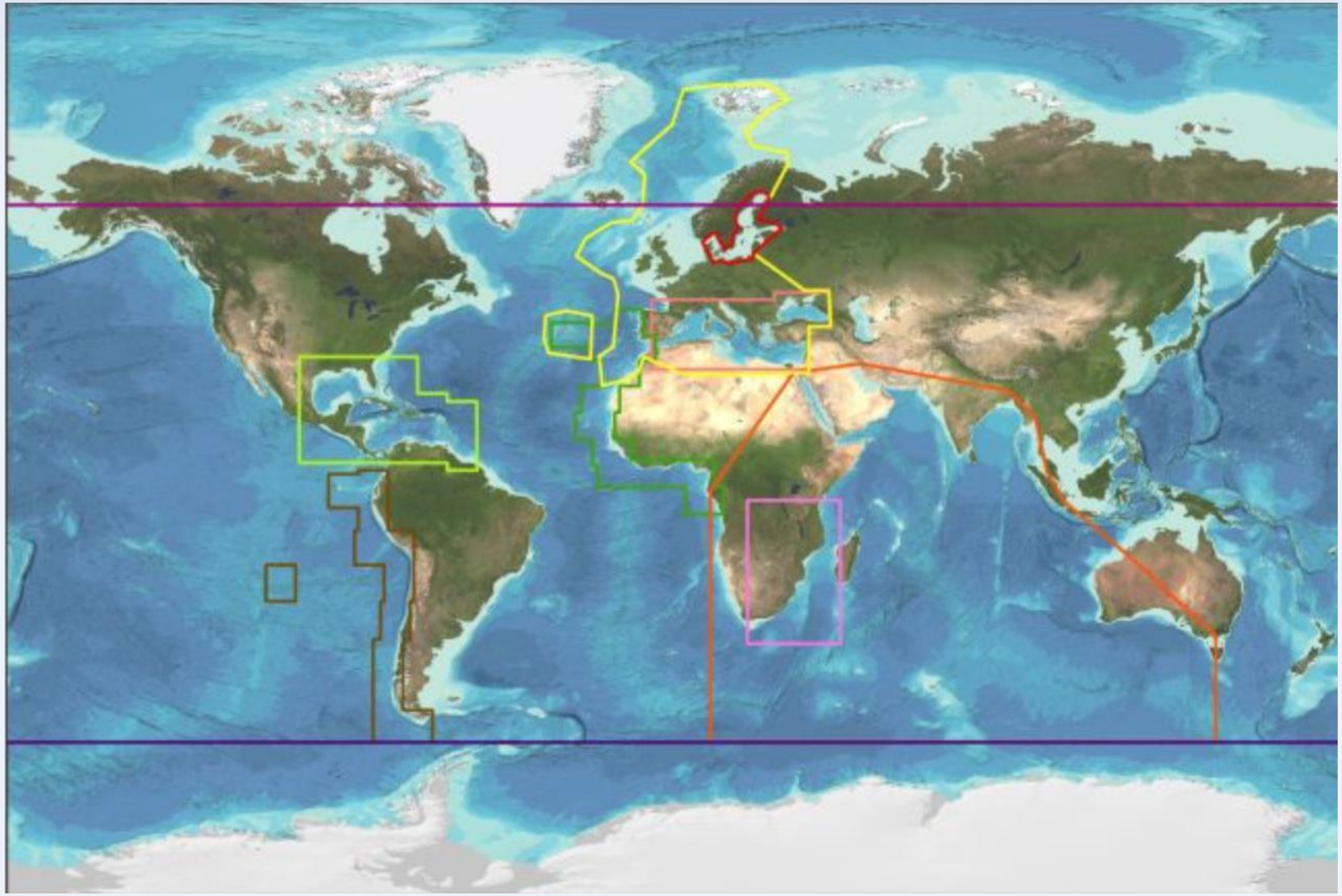
GEBCO has set up the Sub-Committee on Regional Undersea Mapping (SCRUM) to:

•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 work

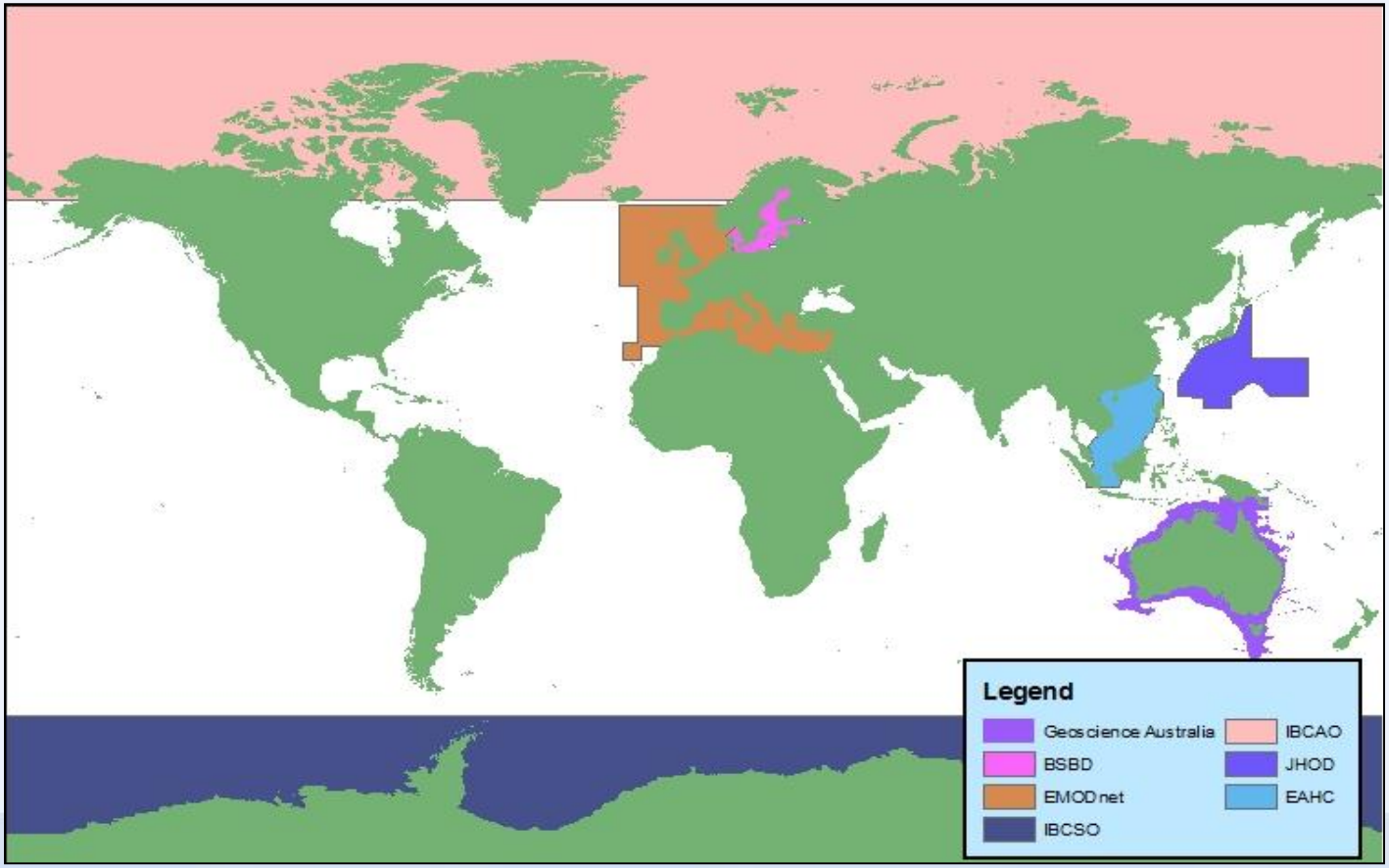


GEBCO collaborates with:

- **IOC Regional Mappings Projects**
- **International Bathymetric Chart of the Arctic Ocean (IBCAO)**
- **International Bathymetric Chart of the Southern Ocean (IBCSO)**
- **International Bathymetric Chart of the Caribbean Sea & Gulf of Mexico (IBCCA)**
- **International Bathymetric Chart of the Central Eastern Atlantic (IBCEA)**
- **International Bathymetric Chart of the Mediterranean (IBCM)**
- **International Bathymetric Chart of the South Eastern Pacific (IBCSEP)**
- **International Bathymetric Chart of the Western Indian Ocean (IBCWIO)**
- **International Bathymetric Chart of the Western Pacific (IBCWP)**
- **European Marine Observation and Data Network (EMODnet) Hydrography**

Regional mapping work

Last regional compilations included in the current GEBCO Grid

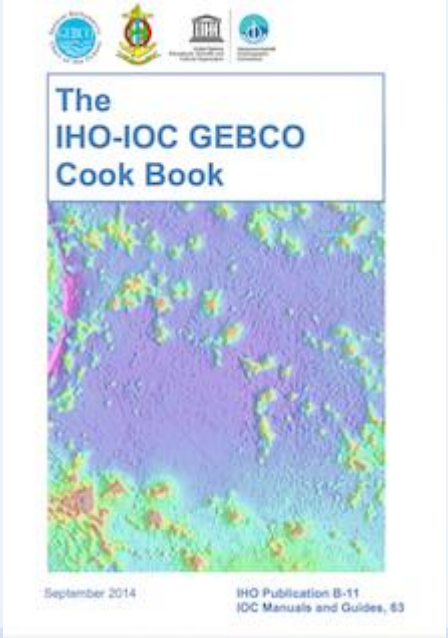


GEBCO products

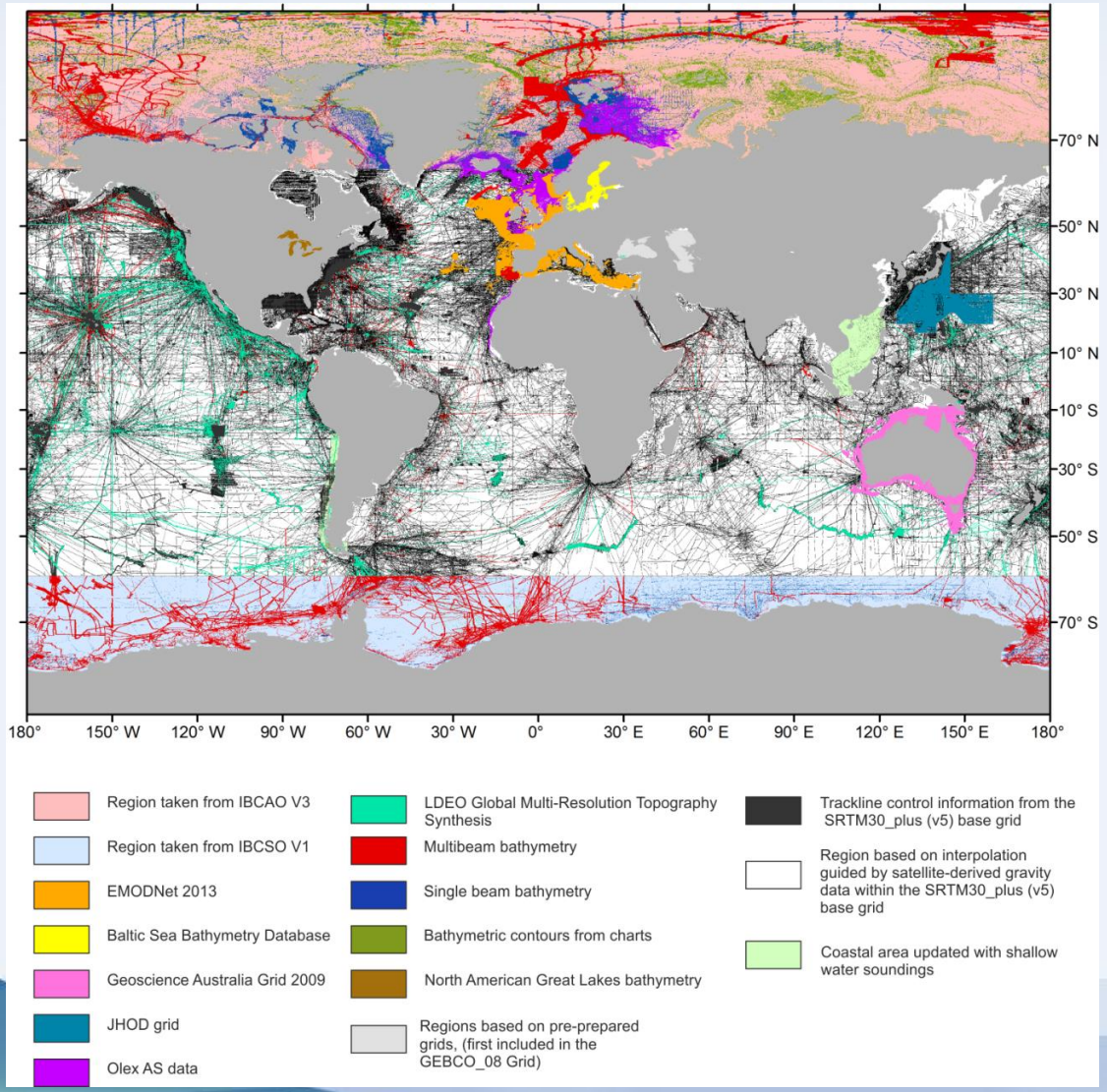
Our bathymetric data sets and products:

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

www.gebco.net/data_and_products/

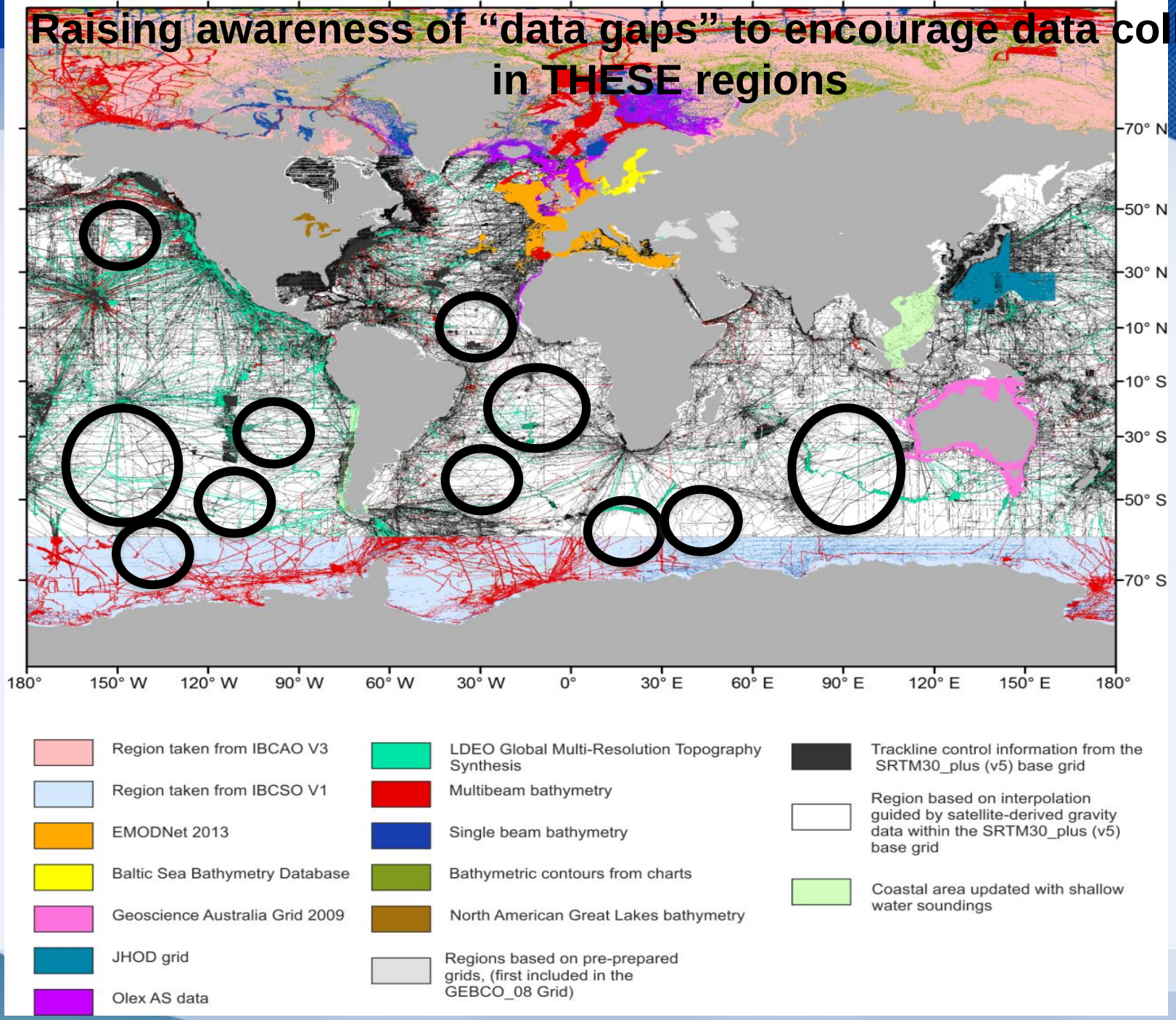


GEBCO products: Source Identifier Grid



Example of the GEBCO Source Identifier (SID) Grid showing the source of depth value in each grid cell, i.e. if it is based on trackline data; pre-existing grids or if it is based on interpolation

Raising awareness of "data gaps" to encourage data collection in THESE regions



http://www.gebco.net/training/

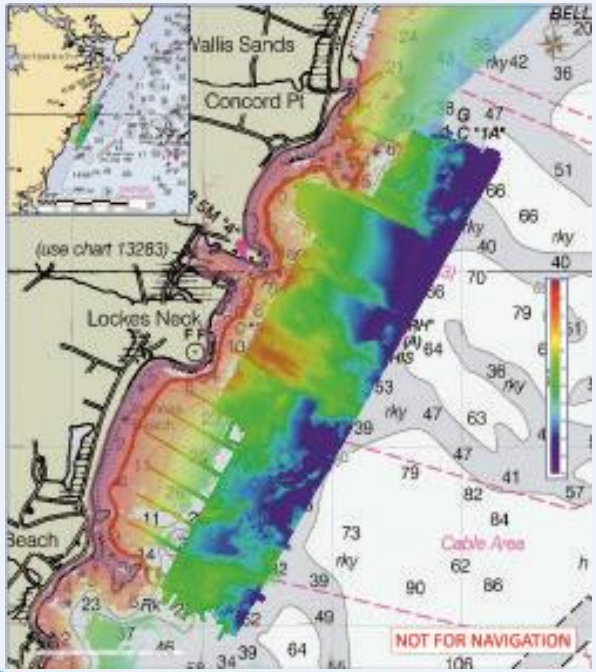
NIPPON FOUNDATION FUNDS

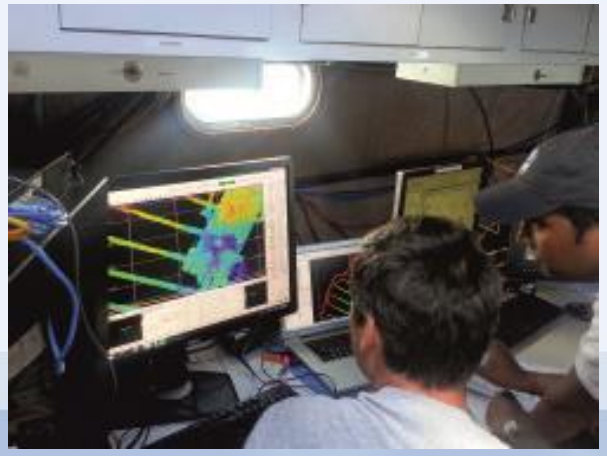
The Nippon Foundation of Japan, based in Tokyo, has provided funding for GEBCO to train a new generation of scientists and hydrographers in ocean bathymetry every year.

"Category A" certificate in hydrographic surveying
Postgraduate Certificate in Ocean Bathymetry

is funded by:
The Nippon Foundation of Japan

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





Summary

GEBCO aims to:

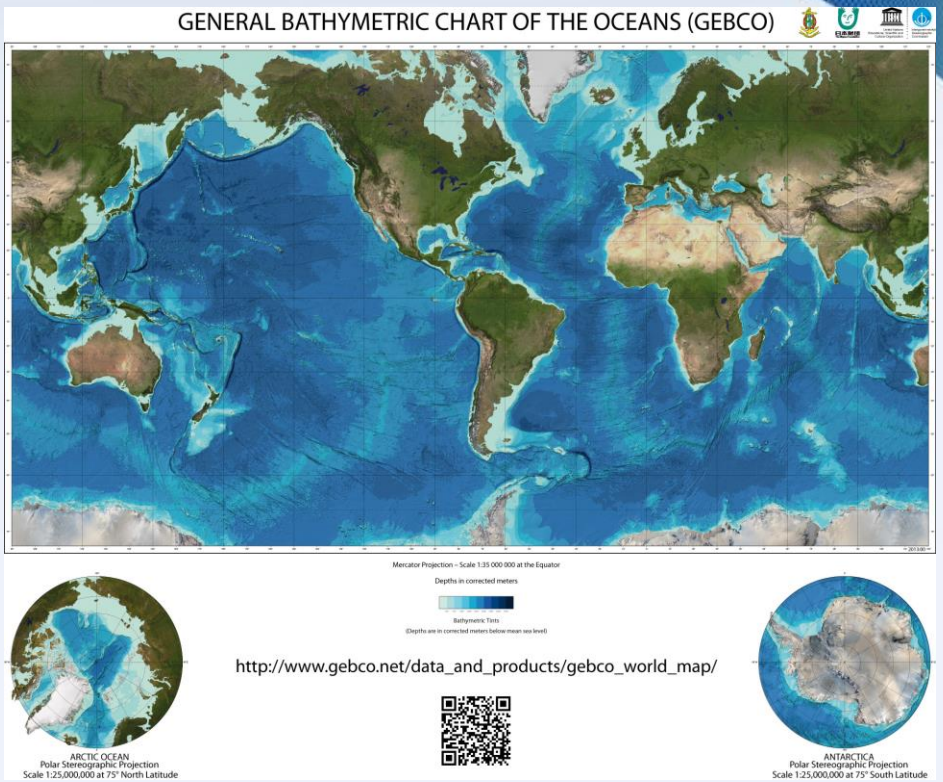
- **Update and improve its global bathymetric model continually and collaborate with regional mapping groups to help achieve this.**

- **Encourage (where possible) the contribution of bathymetry data to this global bathymetric model.**

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

Thank you

Any questions?



http://www.gebco.net/about_us/contact_us/