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Vacancy

Chair, Technical Sub-Committee on Ocean Mapping (TSCOM), ex-officio: Dr. Karen Marks

Chair, Sub-Committee on Undersea Feature Names (SCUFN), ex-officio: Dr-Ing. Hans-Werner Schenke

Chair, Sub-Committee on Regional Undersea Mapping (SCRUM), ex-officio: Dr. Martin Jakobsson

Director, IHO Data Centre for Digital Bathymetry (DCDB), ex-officio: Ms. Lisa A. Taylor

Other GEBCO GGC participants

Permanent Secretary/Treasurer: Mr. David M. Clark

GEBCO Bathymetric Editor: Vacant

GEBCO Digital Atlas Manager: Ms Pauline Weatherall

Full information on current membership can be found on the GEBCO website.

GEBCO Products and Projects

Bathymetric grids

GEBCO's latest bathymetric product is a global terrain model at 30 arc-second intervals. The bathymetric portion of the GEBCO Grid is largely based on a database of ship-track soundings with interpolation between soundings guided by satellite-derived gravity data, where they improve on the existing grid, data sets developed by other methods have been included.

It is intended to continually update the grid as new data sets become available. In order to do this, regional expertise is required. Through the Sub-Committee on Regional Undersea Mapping, GEBCO is aiming to build on and extend its collaboration with regional mapping groups in order to improve its bathymetric models. http://www.gebco.net/regional_mapping/

The GEBCO Grid was originally released in January 2009, with updated versions made available in November 2009 and November 2010. Details on the updates included in these releases can be found on GEBCO's web site:

http://www.gebco.net/data_and_products/gridded_bathymetry_data/gebco_08_update_history/

A new release of the GEBCO Grid is planned for Summer 2014 and it is aimed that it will include the following updates:

- IBCAO V3 (www.ibcao.org)
- IBCSO V1 (www.ibcso.org)
- Data from Geoscience Australia's Australian Bathymetry and Topography Grid, June 2009' (www.ga.gov.au/meta/ANZCW0703013116.html)
- Data from Olex (http://www.olex.no/index_e.html) primarily for shallow water regions off West Africa and the North Atlantic and Arctic shelves
- Shallow water data supplied by the East Asia Hydrographic Commission for part of the South China Sea region

- A grid based on multibeam data from a number of cruises for the Gulf of Cadiz region, west of the Strait of Gibraltar (doi:10.1016/j.epsl.2008.12.005)
- Data from the Lamont-Doherty Earth Observatory (LDEO) Global Multi-Resolution Topography (GMRT) data set (<http://www.marine-geo.org/portals/gmrt/>)
- EMODnet Hydrography grids (<http://www.emodnet-hydrography.eu/>) for European waters
- Baltic Sea Bathymetric Database from the Baltic Sea Hydrographic Commission (<http://data.bshc.pro/>)
- Gridded bathymetry data for the waters off Japan supplied by the Japan Coast Guard

The GEBCO Grid is accompanied by a Source Identifier (SID) Grid. This data set shows which of the corresponding cells in the GEBCO Grid are based on soundings or existing grids and which have been interpolated.

GEBCO's grids can be downloaded from the internet; details are given on GEBCO's web site: http://www.gebco.net/data_and_products/gridded_bathymetry_data/.

Free software is available for viewing and accessing data from GEBCO's grids in ASCII as well as netCDF (http://www.gebco.net/data_and_products/grid_display_software/).

Standardization of Undersea Feature Names

Main task of the IHO-IOC GEBCO Sub-Committee on Undersea Feature Names (SCUFN) is to evaluate and select names for undersea features, on the principles contained in the IHO Publication B-6 "Standardization of Undersea Feature Names". Proposal for undersea feature names can be submitted to GEBCO or its parent organizations IHO and IOC, by national and international authorities, individuals and scientific organizations. Based on the accepted undersea feature names, SCUFN compiles and maintains, as major product, the global GEBCO-Gazetteer of Undersea Feature Names (IHO Publication B-8). As of 2014, the IHO-IOC Publication B-6 is published in six separate translations from the English version (Chinese, French, Japanese, Korean, Russian, and Spanish).

The 26th meeting of SCUFN was conducted in Tokyo, Japan from 23 to 27 September 2013 and was hosted by the Hydrographic and Oceanographic Department of Japan Coast Guard (JHOD). Nine of the twelve SCUFN-Members, the SCUFN Secretary and 25 national and international observers and specialists attended the meeting. At the meeting 137 undersea feature name proposals from Argentina, Brazil, China, Italy, Japan, Rep. of Korea, New Zealand, Russia, United Kingdom, United States, were discussed of which 123 new names of undersea features were accepted. The GEBCO-Gazetteer, after the SCUFN-25 Meeting, includes almost 4000 undersea feature names.

The development of the digital gazetteer of the names, generic feature type and geographic position of features on the sea floor was reported and accepted. The digital gazetteer is now available to view and download via a web map application, hosted by the International Hydrographic Organization Data Centre for Digital Bathymetry (IHO DCDB).

Capacity Building (Wigley/Monahan)

The Nippon Foundation of Japan has provided funding for GEBCO to train a new generation of scientists and hydrographers in ocean bathymetry. The 12-month course, leading to a Postgraduate Certificate in Ocean Bathymetry (PCOB), has been held at the University of New Hampshire, USA since 2004. Students are taught theoretical and practical aspects of ocean mapping, work on a team project, spend time at another ocean mapping institute and participate in a deep sea mapping cruise. The Nippon Foundation funding for the UNH program, of about US\$540,000 per year, pays all tuition and expenses for the students and a modest stipend.

There are now 52 course graduates working back in their home country organizations, two in international industry and six currently at UNH. The new group of Nippon Scholars begin in August 2013.

Education and Outreach

In the course of the meeting of the Outreach and Education Working Group in at the last GGC meeting in Venice, it is necessary to set up a roadmap for outreach program which intended that GEBCO's outreach program should be more systematic, more technical adaptive, more accessible for the public including students, more diverse products beyond maps themselves.

Also it was agreed that GEBCO event and activities should be better advertised, through a number of products and online/offline promotions, in the short, medium and long term. Based on their experience, the members were selected to carry out and/or coordinate the activities for products and promotions.

GEBCO hosts an annual Science Day. It consists of oral presentations and poster displays on topics relating to ocean-floor mapping and its applications and attendance is open to all. It is held during GEBCO's annual TSCOM and SCRUM meetings.

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

In addition, GEBCO colleagues give oral and poster presentations about GEBCO's work and products at many international meetings and events. Links to posters and presentations can be found on GEBCO's web site: http://www.gebco.net/about_us/presentations_and_publications/ and http://www.gebco.net/about_us/posters_and_brochures/

GEBCO also makes available a brochure (at the above link) about GEBCO; its data sets and activities.

GEBCO includes information about bathymetric mapping and bathymetric grid development on GEBCO's web site along with imagery generated from GEBCO's data sets:

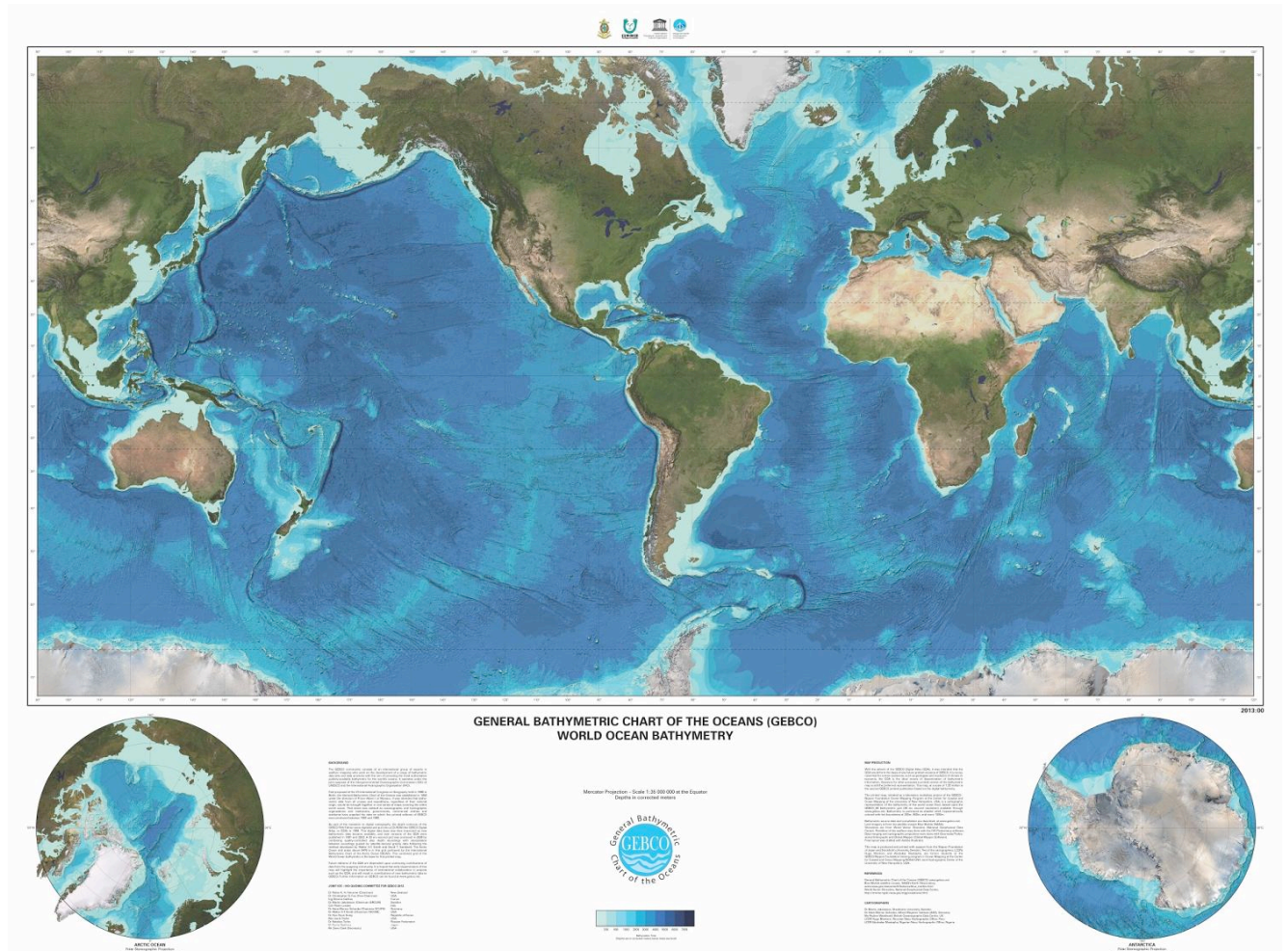
http://www.gebco.net/general_interest/

With the aim of engaging with a wider audience, GEBCO also has a Facebook page where post items about GEBCO news/products/data sets and also about general bathymetry-related news from other sources. <https://www.facebook.com/GEBCO>

GEBCO World Map

A wall poster size world map was produced in 2008 based on the GEBCO 1 min grid. With the support of the Nippon Foundation, The Margaret Blodgett Foundation and Stockholm University, 5000 copies were printed and all were distributed. The World map has now been updated using the new GEBCO_08 grid as the main bathymetric source. The map is available for download from the

GEBCO web site. http://www.gebco.net/data_and_products/gebco_world_map/ Printing is planned to take place by setting up several print shops in different countries in order to avoid the large cost of shipping maps across the World. A version with undersea feature names from the GEBCO SCUFN gazetteer is in preparation



Regional Mapping

Improving bathymetry of all the world oceans is important but in practice significant progress will be made only through addressing it on a regional basis.

Recognising the importance of the contributions of regional experts in improving its global bathymetric models, GEBCO has setup the Sub-Committee on Regional Undersea Mapping (SCRUM) http://www.gebco.net/regional_mapping/scrum/. Its aim is to build a closer collaboration with regional mapping efforts and coordinate, as well as encourage, the incorporation of their compilations into GEBCO. Regional projects also provide opportunity for capacity building and data sharing between countries and organizations.

The following outlines the work of some of the regional mapping projects and groups that GEBCO is collaborating with.

The International Bathymetric Chart of the Arctic Ocean (IBCAO) Version 3.0 was completed at the end of 2012. The International Bathymetric Chart of the Southern Ocean Version 1.0 was completed at the beginning of 2013. Both these IBCs followed the “Arctic and Antarctic Seafloor Mapping Meeting” organized at Stockholm University May 3-5, 2011. At the workshop a new Editorial Board was established for IBCAO and new data were gathered from both the Arctic and Antarctic regions among the participants who came from 15 countries. Gridded bathymetric data sets from these projects will be included in the next release of the GEBCO global grid. The next Arctic and Antarctic Seafloor Mapping Meeting is now being planned to take place during the spring of 2015.

Indian Ocean Bathymetric Compilation Project is now beginning and will result in a new bathymetric map and grid of the Indian Ocean, north of -60° S, the east-west extent will probably extend from 10° E (to include information available around South Africa) to 147° E (to the IHO S23 defined edge of Indian Ocean south of Australia). Data will be collated from all available sources, utilizing the contacts generated through GEBCO members, including the Nippon Scholar networks, to access data. The produced map and grid will be constructed from scientific cruise data obtained in both shallow and deep water, as well as hydrographic survey data in shallow water, combined with satellite altimetry as required, to complete the grid at the highest possible resolution.

The first Indian Ocean Bathymetric Compilation Project meeting was held in Chittagong, Bangladesh, from 20-22 January 2013. Six GEBCO Nippon scholars attended this inception meeting. The project director attended the North Indian Ocean and Middle East regional hydrographic commission meetings to request data and to emphasize the importance of the shallow water bathymetric data from hydrographic offices in order to ensure best possible seamless GEBCO dataset

A new regional mapping project has been initiated under the auspices of the Baltic Sea Hydrographic Commission. The project has been established with strong links to GEBCO and the primary goal is to create a digital gridded model representing the bathymetry of the entire Baltic Sea. A gridded bathymetric data set for the region was released in 2013. This data set will be included in the next release of the GEBCO global grid.

EMODnet is a project, funded by the European Commission, to bring together marine data into interoperable, continuous and publicly available data sets for selected maritime basins in European waters in the form of Digital Terrain Models (DTM). In regions where high resolution DTMs are not available, bathymetry data from the GEBCO_08 Grid is used to ‘gap-fill’ in order to provide a complete bathymetric model for the region.

Through collaboration with the EMODnet Hydrography team, the next release of the GEBCO’s global bathymetric grid will include bathymetry data from EMODnet’s high resolution DTMs. In addition, the next EMODnet DTM regional model will use the latest GEBCO grid for ‘gap-filling’ work between their high resolution data sets.

The East Asia Hydrographic Commission have provided shallow water bathymetric soundings from some of their ENC data sets in the South China Sea area. These data have been used to improve the GEBCO grid and will be included in its next release.

IHO-IOC GEBCO Cook Book

The IHO-IOC GEBCO Cook Book provides an educational resource for preparing gridded datasets and bathymetric data. It contains chapters that span basic to advanced topics, written by expert

GEBCO contributors from international research organizations, universities, governments, and companies. It is a “living document” this is continuously updated and expanded as new or amended techniques and software become available.

Started in 2009, the IHO-IOC GEBCO Cook Book was published in 2012 as IHO Publication B-11 and IOC Manuals and Guides 63. It is available for free download from the GEBCO website:

<http://www.gebco.net>

An announcement for the availability of the IHO-IOC GEBCO Cook Book was published as an EOS News Brief in EOS, Trans. AGU, V. 94, No. 9, 26 Feb. 2013, pg. 88.

The current Cook Book release is November 2013.

An article was published in Hydro International (April, 2014) that highlights the Landsat Satellite-derived Bathymetry Procedure chapter in the Cook Book.

Shallow water bathymetry

Knowledge of the bathymetry of shallow water areas is important for coastal zone development and management, maritime safety and marine hazards. The impact of tsunamis in particular is strongly influenced by shallow water bathymetry. Modelling of tsunami run up for mitigation and preparation requires detailed shallow water bathymetric data.

Traditionally GEBCO had been focused on waters deeper than 200m but that has changed. Firstly because of the importance of the coastal zone but secondly because bathymetric grids used by modellers, even on a global scale, have to be complete and consistent up to the coastline. GEBCO has therefore increased its work on shallow water areas.

Through the IHO, data has been sought from coastal countries; a special project was initiated to extract data from Electronic Navigation Charts (ENCs). Through this initiative, shallow water bathymetry data has been supplied by twenty hydrographic offices/organisations and the majority is either included in the existing GEBCO_08 Grid or will be included in the next release and has helped to significantly improve the GEBCO grid in shallow water regions. There are however many areas in which there is valuable data but nations or organizations have not yet made it available.

Data obtained from a database held by a fishing industry organisation has also been obtained and has helped to improve GEBCO's global grid in shallow water.

Globes

In 2009, GEBCO initiated a project to produce a terrestrial globe featuring GEBCO bathymetry. All flat map projections suffer distortion since they are an attempt to portray a three-dimensional database in two dimensions. The larger the area portrayed, the greater is the distortion. A terrestrial globe is a map of the earth printed onto a sphere, which closely approximates the true shape of the earth. As such, a map of the earth presented as a globe suffers no distortion.

As of October 2012, GEBCO has worked with a globe company in China to produce the GEBCO globes. The seafloor data portrayed on the globes is derived from the GEBCO one-half-arc-minute digital database; the land areas portrayed on the globe are NASA's Blue Marble Next Generation cloud free photo mosaics. The GEBCO Globes have been well received by academia (primary schools through university), government organizations, Non-government organizations and commercial companies. The GEBCO Globes will be a good addition to the IHO suite of educational materials. The globes come in sizes of 14cm, 32cm and 68cm.

IHO Data Center for Digital Bathymetry

Since 1990, the U.S. National Geophysical Data Center (NGDC) in Boulder, Colorado, has operated the IHO Data Centre for Digital Bathymetry (DCDB) on behalf of the Member Countries of the International Hydrographic Organization (IHO). The IHO DCDB:

- Focuses on oceanic regions with depths greater than 100 meters.
- Provides IHO Member Countries bathymetric data free of charge for their national and international projects.
- Maintains a quality control facility whereby data provided to the IHO DCDB are checked for violation of physical principles (e.g., instantaneous changes in ship position, high ship speeds, etc.) and completeness of metadata.
- Maintains digital inventories of all the digital bathymetric data it holds.
- Collaborates with various international organizations in the development of exchange formats and standards to expedite bathymetric data exchange.

Online Interface to GEBCO Gazetteer of Undersea Feature Names

In 2013, the IHO DCDB migrated the GEBCO Gazetteer of Undersea Feature Names to a geospatially-enabled database. Working closely with the IHB and the GEBCO Sub Committee on Undersea Feature Names, the IHO DCDB performed data quality control, enhanced feature geometries, and developed an online interface for public and administrative access. The Gazetteer is now available as a web service so that other organizations can programmatically access the feature names and attributes for use in their specific applications (e.g., Google Earth, ESRI base maps, Marine Regions interface, etc.).

Technology - Data and Information Distribution

New technology for disseminating information is proliferating: Internet, websites, cell phones, Wikipedia, Google, blogs, Facebook, Twitter etc. GEBCO has to embrace those that are relevant but that can raise issues with respect to copyright, quality control, timeliness, "brand", revenue, scale and users understanding the limitations of the data.

One of GEBCO's mandates is to be an authoritative source of bathymetry and undersea feature information. Many users rely on that stamp of authority and associated quality. GEBCO's role is to facilitate knowledge of the oceans and that means making GEBCO's data sets and products easily accessible and in a form that is helpful for users. Increasingly GEBCO needs to get data and information out free or at very low cost or users will go to other sources. GEBCO has to balance reward, recognition and relevance.

The GEBCO's web site provides access to information about GEBCO's products and work. Since its launch in July 2008, there have been over 1,226,000 pages viewed on the web site.

The GEBCO Digital Atlas (GDA) contains a collection of GEBCO's bathymetric data sets (grids and contours) and is made available on DVD. It includes software for viewing and accessing the data sets in a variety of formats. http://www.gebco.net/data_and_products/gebco_digital_atlas/

GEBCO's data sets are accessed and used by a wide user community from the commercial and academic sectors and also by the general public. A number of copies of the GDA are regularly made available to participants on IODE training courses.

GEBCO makes available its bathymetric grids either via the internet or on DVD as part of the GDA. The following summaries access to GEBCO's data sets:

Downloads of data from GEBCO's global 30 arc-second interval grid since its release in January 2009: 30,438

Downloads of data from the GEBCO SID Grid since its release in November 2009: 6,331

Number of copies of the GDA distributed since 2003: 1,678

The GEBCO Web Map Service provides a means of accessing geo-referenced map images over the internet. It is based on the GEBCO grid and was released in 2011.

http://www.gebco.net/data_and_products/gebco_web_services/web_map_service/

Google Earth has produced a large increase in interest and understanding of the world's ocean. GEBCO has provided its data to Google for its all-important bathymetric base and GEBCO is also working with them on feature names and the mechanisms for update. Update at the global scale is not a trivial issue even for powerful systems.

GEBCO has also provided data to a mobile phone company for cell phone applications and GEBCO supplies conventional book and map publishers, software system manufacturers and education product suppliers.

Resources

GEBCO relies largely on the voluntary efforts of an international community of scientists and hydrographers supported by their organizations or personally.

The UK Natural Environment Research Council provides 0.5 man-years of personnel at the British Oceanographic Data Centre supporting database editing and updating, data delivery, web site maintenance and support for other groups worldwide.

The USA National Ocean and Atmospheric Administration maintains the IHO Data Centre for Digital Bathymetry (DCDB) and contributes 0.5 man yrs for that and other GEBCO activities.

The IHO supports GEBCO tasks under the IHO 2013-2017 Workplan with 16K Euro for the Principality of Monaco and 16K Euro from IHB. In addition, IHB has a reserve account (63K Euro) for priority GEBCO activities. The IHO also supports the SCUFN secretariat, some regional projects and some data compilation. It provided 20,000 Euros for 2008 – 2012 for special projects and education and outreach.

The IOC previously supported some regional mapping projects.

The Nippon Foundation of Japan has, for ten years, provided US\$540,000 per year for the training of six students each year in the GEBCO ocean mapping course at the University of New Hampshire (UNH). In 2010 Nippon Foundation also provided additional funds of US\$400,000 for capacity building of existing UNH scholars and other development and outreach programs.

2013 GEBCO MEETINGS

The Thirtieth meeting of the GEBCO Guiding Committee, Technical Sub-Committee on Ocean Mapping (TSCOM), Sub-Committee on Regional Undersea Mapping (SCRUM) and Nippon Foundation/GEBCO Training Project Management Committee met at the Istituto di Scienze Marine

in Venezia, Italy, October 7-11, 2013. It was sponsored by the Italian Consiglio Nazionale delle Ricerche

The GEBCO Sub-Committee on Undersea Feature Names (SCUFN) held its annual meeting, SCUFN 26 in Tokyo, Japan (23-27 September 2013)

2014 GEBCO MEETINGS

The GEBCO Guiding Committee will hold its Thirty-first meeting at, the International Hydrographic Bureau, in the Principality of Monaco, June 13-15, 2014. Technical Sub-Committee on Ocean Mapping (TSCOM), and Sub-Committee on Regional Undersea Mapping (SCRUM) will hold its annual meeting in Mountain View, California, USA, sponsored by Google. The GEBCO Bathymetric Science Day will be held the following week at this venue or in conjunction with the American Geophysical Union's meeting in San Francisco, CA, USA and Nippon Foundation/GEBCO Training Project Management Committee will meet at the Istituto di Scienze Marine in Venice, Italy, October 7-11, 2013. The GEBCO Bathymetric Science Day will also be held this week at this venue. .

The GEBCO Sub-Committee on Undersea Feature Names (SCUFN) will hold its annual meeting at the International Hydrographic Bureau, in the Principality of Monaco, June 16-20, 2014. Information on these upcoming events can be found on the GEBCO website: http://www.gebco.net/about_us/meetings_and_minutes/.

GEBCO actions from IRCC5

ACTION: IRCC5/06 Invite GEBCO Guiding Committee Bathymetric Regional Project Chairs to attend corresponding RHCs meetings, aiming at strengthening collaboration with a priority on improving high resolution shallow water bathymetry at the regional level. GEBCO Nippon Foundation Scholars attended the 12th Conference of the South-West Pacific Hydrographic Commission (SWPHC)- Port Vila, Vanuatu (12-14 November 2013); the 5th Meeting of the ROPME Sea Area Hydrographic Commission (RSAHC) in Riyadh, Kingdom of Saudi Arabia (4-6 March 2013).

ACTION: IRCC5/36 Provide material to the IHB to promote the achievements of IRCC Bodies including CBSC, GEBCO. GEBCO produced a series of GEBCO Globes and transferred them to IHB for distribution. GEBCO produced a new World Map for distribution.

Action Required of IRCC6

The IRCC is invited to

- note this report.
- endorse the revised GEBCO Guiding Committee Terms of Reference - Rules of Procedure
- urge Regional Hydrographic Commissions to support GEBCO regional projects
- encourage Regional Hydrographic Commission member states to submit data to GEBCO.