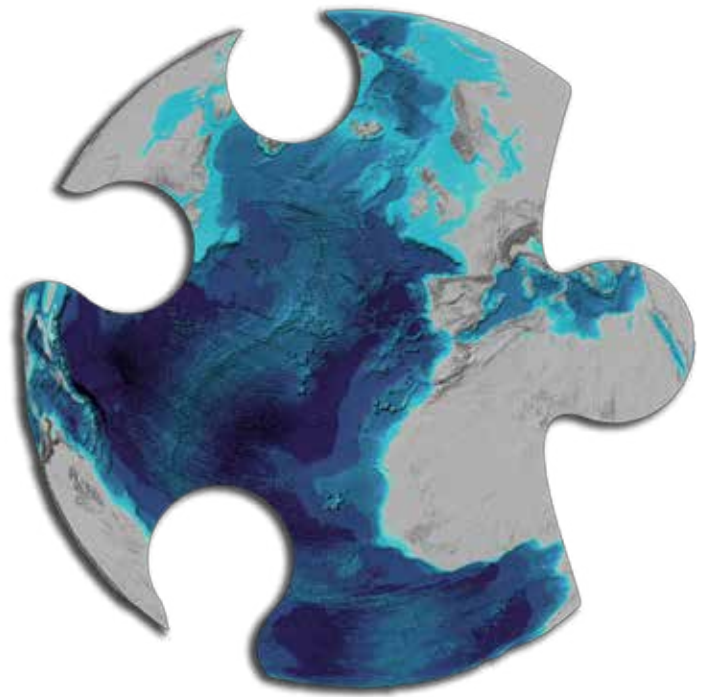


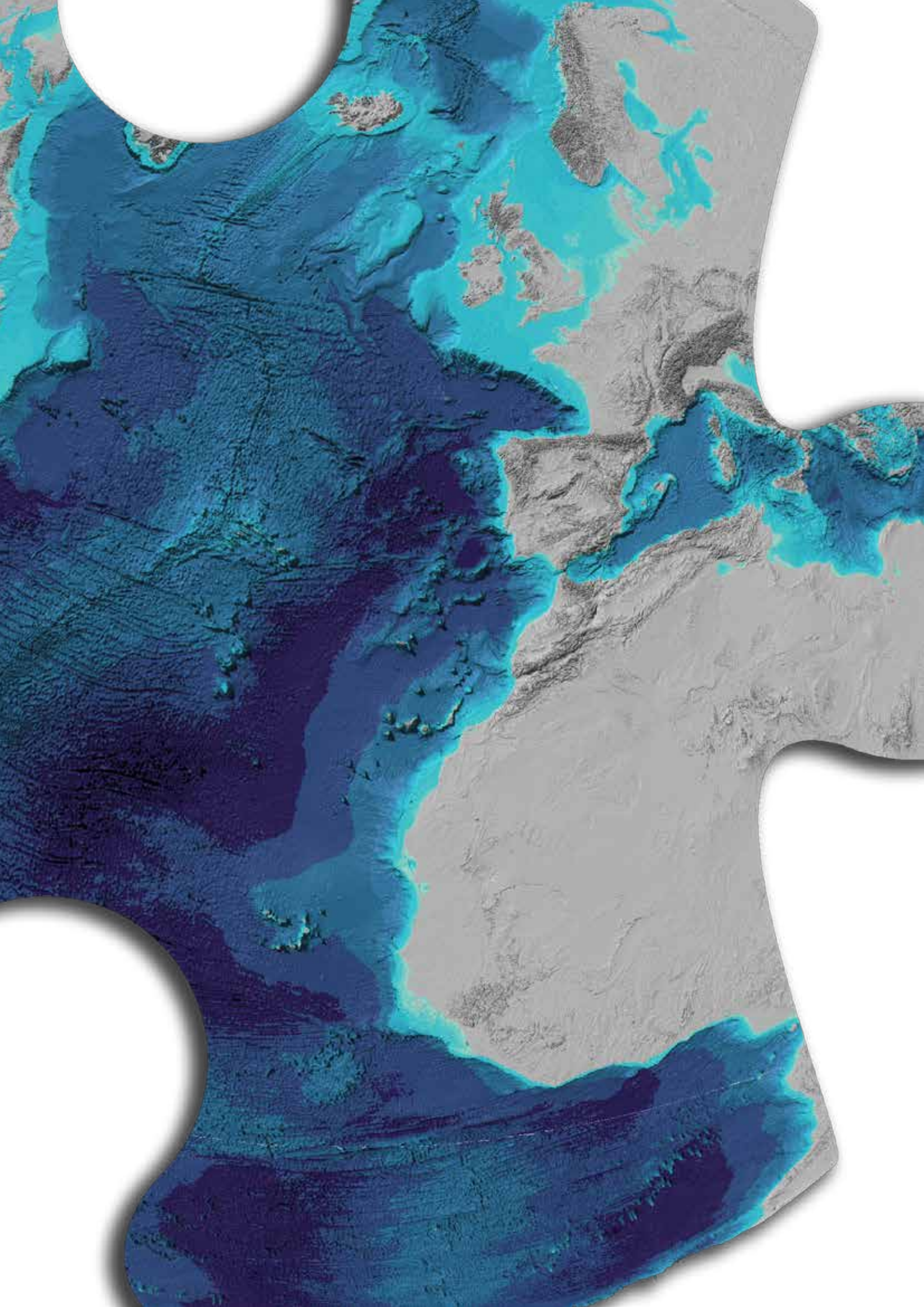
The Nippon Foundation-GEBCO

# Forum *for* Future Ocean Floor Mapping



Monaco  
15-17 June 2016





## Welcome

Dear Forum for Future Ocean Floor Mapping invitees,

Thank you for your interest in The Nippon Foundation-GEBCO's Forum for Future Ocean Floor Mapping (F-FOFM) in Monaco on 15-17 June 2016.

Defining the shape of the world's ocean floor underpins a broad range of human activity associated with the oceans of the world. As we know, bathymetry is the primary instrument for a better understanding of coastal erosion, storm surges, the threat of tsunamis, and ocean currents and tidal flows worldwide. It is the key for assessing the impact of sea-level rises, lies at the heart of safe navigation and is the basis of exploration for oil, gas and mineral resources.

GEBCO's team is working hard to prepare for the programme of the F-FOFM and I am pleased to bring you this preliminary programme.

In addition to this preliminary programme, provisional documents including an agenda, list of keynote speakers, and GEBCO's statement are now uploaded on the International Hydrographic Organization's website at [www.iho.int/mtg\\_docs/com\\_wg/GEBCO/FOFF/](http://www.iho.int/mtg_docs/com_wg/GEBCO/FOFF/)

I look forward to seeing you in Monaco.

Sincerely,



**Vice Admiral (ret) Shin Tani**  
Chairman of the GEBCO Guiding Committee



## Agenda

Tuesday, 14 June, 2016		Novotel Hotel
0900 - 1700	Registration – Novotel lobby	
1800 - 2100	Icebreaker – Novotel Terrace, 8th floor	
Wednesday, 15 June		Monaco Oceanographic Museum
08:00	Depart Novotel by buses (every 15 minutes)	
09:00	All seated – await arrival of HSH Prince Albert II	
09:35	Address by the Chair of the GEBCO Guiding Committee – Vice Admiral (ret) Shin Tani	
09:45	Address by the Chair of the Nippon Foundation – Mr Yohei Sasakawa	
09:55	Address and Forum opening by HSH Prince Albert II	
<b>10:15 - 11:00</b>	<b>Tea/Coffee Break – Posters</b>	
11:00 - 11:10	IHO opening address	Robert Ward
11:10 - 11:20	IOC opening address	Vladimir Ryabinin
11:20 - 11:50	Keynote speaker 1	Robert Ballard, Center for Ocean Exploration, Graduate School of Oceanography/URI and Ocean Exploration Trust
11:50 - 12:20	Keynote speaker 2	Larry Mayer, Center for Coastal and Ocean Mapping/ Joint Hydrographic Center UNH
12:20 - 12:50	Keynote speaker 3	David Heydon, DeepSea Metals
<b>13:00 - 14:00</b>	<b>Lunch, provided by GEBCO – Posters</b>	
1400 - 1430	Keynote speaker 4	Kristina M. Gjerde, IUCN (International Union for Conservation of Nature)/Wycliffe Management
15:15 - 15:45	Keynote speaker 5	Jyotika Virmani, XPRIZE Foundation
<b>15:45 - 16:15</b>	<b>Tea/Coffee Break – Posters</b>	
16:15 - 16:45	Keynote speaker 6	Bjorn Jalving, Kongsberg Maritime, Subsea Division
16:45 - 17:15	Keynote speaker 7	Simon Winchester, author
17:30	Bus to Novotel	
18:30	Bus from Novotel to Monaco Yacht Club	
<b>19:00</b>	<b>Gala Function at Monaco Yacht Club</b>	

## Agenda

Thursday, 16 June	Novotel Hotel
09:00 - 10:30	<b>Panel 1 – Use of bathymetry: The deep ocean perspective</b> <b>Moderators:</b> Asahiko Taira, JAMSTEC, Japan Vicky Ferrini, GEBCO, USA
10:30 - 11:00	Tea/Coffee Break – Posters
11:00 - 12:30	<b>Panel 2 – Use of bathymetry: The coastal perspective</b> <b>Moderators:</b> Larry Mayer, CCOM, USA Marzia Rovere, GEBCO, Italy
12:30 - 13:30	Lunch Provided by GEBCO at hotel. Posters
13:30 - 15:00	<b>Panel 3 – New tools and techniques in ocean mapping</b> <b>Moderators:</b> Dawn Wright, ESRI, USA Martin Jakobsson, GEBCO, Sweden
15:00 - 15:30	Tea/Coffee Break – Posters
15:30 - 17:00	<b>Panel 4 – Mapping the world ocean floor</b> <b>Moderators:</b> Craig McLean, NOAA, USA Lisa Taylor, GEBCO, USA
19:00	Forum Dinner at Hotel Novotel, provided by GEBCO
Friday, 17 June	Novotel Hotel
09:00 - 10:00	<b>Concurrent Workshop Sessions.</b> Breakout into focus groups with pre-identified leaders from industry and academia. Scholars and participants assigned to specific focus groups.
10:00 - 10:30	Tea/Coffee Break – Posters
10:30 - 11:30	<b>Concurrent break-out Sessions.</b> All participants will rotate to next concurrent Workshop session.
11:30 - 12:30	<b>Concurrent break-out Sessions.</b> All participants will rotate to next concurrent Workshop session
12:30 - 14:00	Lunch, provided by GEBCO at Novotel – Posters
14:00 - 15:00	<b>Concurrent break-out Sessions.</b> All participants will rotate to next concurrent Workshop session.
15:00 - 15:45	Tea/Coffee Break – Posters
15:45 - 17:00	Way-forward session, draft Forum communiqué. Closing of the Forum
19:00	Informal Dinner at Novotel Hotel, provided by GEBCO

## Programme

### DAY ONE

Wednesday, 15 June, 2016

#### Opening speakers

HSH Prince Albert II

Vice Admiral (ret) Shin Tani, Chair of the GEBCO Guiding Committee

Mr Yohei Sasakawa, Chair of the Nippon Foundation

Robert Ward, President of the IHO

Vladimir Ryabinin, Executive Secretary of the IOC

#### Keynote speakers

Robert Ballard, Center for Ocean Exploration, Graduate School of Oceanography/URI and Ocean Exploration Trust

Larry Mayer, Center for Coastal and Ocean Mapping/Joint Hydrographic Center UNH

David Heydon, DeepSea Metals

Kristina M. Gjerde, IUCN (International Union for Conservation of Nature)/Wycliffe Management

Jyotika Virmani, XPRIZE Foundation

Bjorn Jalving, Kongsberg Maritime, Subsea Division

Simon Winchester, author

## Programme

### DAY TWO

Thursday, 16 June, 2016

#### Panel Discussions

The main objective of the panel discussions is to explore each topic starting with a set of defined questions. Additional questions may be addressed as a result of panel discussions.

Each panel will have a limited number of panelists, each with broadly different experience or work areas. Each panelist will briefly address one or more of the questions from their perspective. Open discussion will follow.

The panel sessions will not be concurrent. They are intended to complement each other.

The outcome from each panel will feed into the development of a “*Road map for future ocean floor mapping*”, one of the Forum’s main objectives. The roadmap will be worked on Day 3.

### Panel 1 – Use of bathymetry: The deep ocean perspective

#### Moderators:

- Taira Asahiko, JAMSTEC, Japan
- Vicky Ferrini, GEBCO, Lamont Doherty, USA

#### Questions:

- *Who are the users of deep ocean bathymetry?*
- *What bathymetric products do users want?*
- *At what resolution does the deep ocean need to be mapped?*
- *How much bathymetry is still perceived as necessary in the discovery, study and protection of deep sea extreme ecosystems?*
- *How much bathymetry is essential to environmental management plans that have to be established in areas beyond national jurisdiction?*
- *How can bathymetry be effectively used to identify Marine Protected Areas in areas beyond national jurisdiction?*

### Panel 2 – Use of bathymetry: The coastal perspective

#### Moderators:

- Larry Mayer, CCOM, USA
- Marzia Rovere, GEBCO, ISMAR, Italy

#### Questions:

- *Who are the users of shallow water bathymetry?*
- *What bathymetric products do users want?*

## Programme

### *DAY TWO Panel 2 questions continued*

- *At what resolution do the coastal areas need to be mapped?*
- *What are the emerging conflicting uses of the coastal areas and how can a better knowledge of bathymetry mitigate these conflicts?*
- *What data resolution is needed for effective hazard and tsunami mitigation programs?*
- *What data resolution is needed for effective oceanographic modelling?*
- *How far are we from an adequate seafloor morphology mapping of the world continental margins?*

## Panel 3 – New tools and techniques in ocean mapping

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### **Moderators:**

- Dawn Wright, ESRI, USA
- Martin Jakobsson, GEBCO, Univ Stockholm, Sweden

### **Questions:**

- *Who are the users of commercial and open source software?*
- *How strong is the demand for innovative software tools in response to the new technology of multibeam systems?*
- *Interferometry vs multibeam?*
- *How can we leverage cloud computing and Big Data?*
- *What are the key developing survey technologies?*
- *How can satellite-derived bathymetry be integrated in the bigger picture?*

## Panel 4 – Mapping the world ocean floor

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### **Moderators:**

- Lisa Taylor, GEBCO, NOAA, USA
- Craig McLean, NOAA, USA

### **Questions:**

- *How can we map the gaps in bathymetric coverage?*
- *How can we engage more mariners to contribute crowd sourced bathymetry?*
- *How can we overcome the barriers to sharing bathymetric data?*
- *How is industry tackling this challenge?*
- *What processes and practices are working well and how can we build upon them?*
- *How can we leverage satellite-derived bathymetry for mapping sensitive coastal areas?*
- *What partnerships can we foster to get this done?*



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## Programme

### DAY THREE      Friday, 17 June, 2016

#### Roadmap Workshop

The primary goal of the Workshop day is development of a *“Roadmap for Future Ocean Floor Mapping”*.

The workshop will initially be organized into breakout sessions; each corresponding to one of the four panel subjects of Day Two. Participants will draw on the Day Two panel discussions and their own experience. Each breakout will be tasked with developing a preliminary Roadmap for their subject area.

Each workshop session will be led by a facilitator, assisted by a rapporteur, from the GEBCO community.

The second part of the day will be devoted to presenting each of the subject Roadmaps to all participants, and then drawing them together into one draft Roadmap.

It is expected that the draft roadmap resulting from Day three will be further developed after the Forum.

## GEBCO – inspiring and coordinating the global effort to map the ocean floor

Scientists' vision of portraying the World Ocean floor on a series of maps inspired the initiation of the General Bathymetric Chart of the Oceans (GEBCO) in 1903. The birth of GEBCO followed from efforts by Prince Albert I of Monaco and Professor Julien Thoulet, University of Nancy, who both shared a strong passion for the ocean. This vision of portraying the depth and shape of the World ocean floor remains at the heart of GEBCO. Over the last 100 years, the ambition has evolved from developing a general bathymetric chart of the deep ocean to producing:

*... a high-resolution digital map, from the coast to the deepest trench of the ocean that enables scientists to explore and understand how the ocean works, informs maritime policy and supports the management of natural marine resources for a sustainable Blue Economy.*

GEBCO's ideas and vision follow from societal needs, scientific curiosity and technological developments. Knowing the bathymetry, i.e. depth of the ocean floor, is today recognized to be of vital importance not only for navigation and coastal management but also a growing variety of inter-related uses. Bathymetry is a fundamental parameter for studies of deep water circulation, tides, tsunami forecasting, upwelling, fishing resources, wave action, sediment transport, environmental change, slope stability, paleoceanography, site selection for platforms, cables, pipelines and renewables, waste disposal and mineral extraction and much more.

The satellite era has brought the capability to capture a general view of the shape of deep ocean floor. Beyond this general view are the high-resolution bathymetric details required to understand critical ocean processes and to manage our ocean resources. These details must be revealed using modern acoustic mapping technologies requiring coordination beyond individual national boundaries. As a project of both the International Hydrographic Organization (IHO) and Intergovernmental Oceanographic Commission (IOC) of UNESCO, GEBCO is in the best position to undertake a global coordinated effort to map the ocean floor, identify the areas of greatest need so that efforts can be prioritized and to increase the recognition of the importance of bathymetry in intergovernmental forums.

GEBCO recognizes that vast areas of the World ocean floor, especially those at great distances from coastal and national areas of jurisdiction, are far from adequately mapped. Mapping from the coasts to the deepest trench involves reaching beneath the virtually unknown realms of Polar ice shelves and pack ice covered oceans. These environments are less known today than the deep ocean was for Prince Albert I and Professor Julien Thoulet more than 100 years ago.

*The journey towards GEBCO realizing our ambition of a global high-resolution digital map involves and requires that:*

- *GEBCO, as an IHO and IOC project, being recognized as THE place to go for a wide range of global ocean mapping related information, data, products and expertise.*
- *GEBCO being the home of IHO and IOC ocean mapping expertise with a pool of people who are leaders in all aspects of this field. They include technology experts in industry as well as research organizations who work to develop leading edge technology, practical at-sea surveying experts, data processing experts, database managers, software developers, geologists and geophysicists and other relevant ocean scientists. These experts share a passion for GEBCO's vision, work with ocean mapping projects and advise groups and individuals involved with ocean mapping.*
- *GEBCO being universally respected as an IHO and IOC project, free of any political bias or constraints, enabling it to gather bathymetric data and resources from any nation, industry or governmental, research, academic organization. In return, GEBCO provides information back to all the communities and the public.*

GEBCO is committed to achieving this ambition through building the necessary technical, scientific and management capacity and by engaging with groups involved in the same pursuit. By managing training initiatives such as the Nippon Foundation/GEBCO Training Program at University of New Hampshire and bringing like-minded people together, GEBCO will continue to link individuals and organizations worldwide and enhance existing global networks to drive ocean mapping and a deeper understanding of the current and ancient processes shaping the ocean floor.

## Profiles

### The Principality of Monaco and GEBCO

The GEBCO chart series was initiated in 1903 by Prince Albert I of Monaco. The 7th International Geographic Congress (Berlin, 1899) had in fact nominated a Commission on sub-oceanic nomenclature, which 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, and adopted the characteristics defined in a memorandum by J. Thoulet.

The 24 sheets of Carte générale bathymétrique des océans printed in Paris in 1905, hastily prepared, were harshly criticised by E. de Margerie. Immediately Prince Albert decided that a new edition should be made for which a second commission convened in Monaco (1910). The second edition was printed from 1912 to 1931 with contour lines representing the terrestrial relief and a revised nomenclature. The use of sonic and ultrasonic devices increased the amount of data tremendously. The responsibility of the Chart was then transferred to an international organisation: the International Hydrographic Bureau.

For the third and fourth editions there was a major change in organization. Following the death of Prince Albert, his scientific team was disbanded and the International Hydrographic Bureau was invited to take over the project. Again delays were caused by war and by 1972 only certain sheets of these editions had been published.

Following recommendations by the Scientific Committee on Oceanic Research (SCOR), it was then decided to modernize the whole series and bring in the expertise of the scientific community to meet the needs of present day users. The Intergovernmental Oceanographic Commission (IOC) of UNESCO was invited to cosponsor a 5th Edition, and strong support was provided by the Canadian government. With this structure in hand, the joint IHO-IOC GEBCO Guiding Committee was in a position to offer marine geoscientists in many countries of the world the possibility of publishing their work in a prestigious chart series of high quality. World coverage on the original scale of 1:10 million was completed and published by 1982, followed by a small scale world sheet in 1984.

Since the publication of the 5th Edition GEBCO chart series, and largely because of its success, considerable support has been forthcoming for GEBCO's work, and in 1994 the GEBCO Digital Atlas (GDA) on CD-ROM was published. The first release of the GDA was produced by digitising the bathymetric contours, coastline and shiptracks from the printed sheets of the 5th Edition.

It represented the first seamless, high-quality, digital bathymetric contour chart of the world's oceans and now provides the base for the regular updating of GEBCO. A second release was published in 1997.

The latest release of the GDA, the Centenary Edition of the GEBCO Digital Atlas was published in 2003 and last updated in 2015. It is available from the British Oceanographic Data Centre (BODC). It includes a global set of digital bathymetric contours and coastlines, the latest GEBCO 30 arc-second grid, GEBCO One Minute Grid and the GEBCO gazetteer of geographic names of undersea features. It is accompanied by software for viewing and accessing the data sets.

In 2009, GEBCO released the GEBCO\_08 Grid a global grid at 30 arc-second intervals. The grid was generated by combining quality-controlled ship depth soundings with interpolation between sounding points guided by satellite derived gravity data. An updated version of the grid was released in 2010. GEBCO's latest global bathymetric grid at 30 arc-second intervals is the GEBCO\_2014 Grid, released in December 2014. It is based on the GEBCO\_08 Grid but includes a number of new data sets and regional bathymetric compilations.

In order to widen the GEBCO community and to encourage more younger scientists and hydrographers to become involved in mapping the ocean floor, the Nippon Foundation is sponsoring the training of a new generation of ocean bathymetrists through the Postgraduate Certificate in Ocean Bathymetry (PCOB) at the University of New Hampshire (UNH), USA.

## Profiles

### The Nippon Foundation

The Nippon Foundation, a private, non-profit foundation was established in 1962 for the purpose of carrying out philanthropic activities, using revenue from motorboat racing. The Foundation's overall objectives include social innovation, assistance for humanitarian activities and global ocean management. Its philanthropic ideals embrace social development and self-sufficiency, and it pursues these principles by working to improve public health and education, alleviate poverty, eliminate hunger and help the disabled.

Since its formation, the Foundation has put a considerable amount of effort in marine capacity building. However, with ocean issues becoming increasingly complex and serious, The Foundation is increasingly becoming concerned that we will be unable to pass on sustainable and healthy oceans to future generations. The Nippon Foundation believes that effective solutions cannot be developed without interdisciplinary and international collaborative efforts, extending beyond the traditional maritime community. Thus, The Foundation aims at building human capacities and creating bonds that transcend national and organizational boundaries. In addition, The Foundation promotes dialogue on global ocean issues and the search for viable solutions.

Such efforts cannot come into effect if the people who can put them into practice are not available around the world. Therefore, one of The Foundation's major commitment is on global capacity building for the world's oceans for nearly 30 years; more specifically, fellowship programmes with various institutes around the world. These programmes cover various fields related to the oceans including global ocean governance, ocean floor mapping, global ocean observation, wellbeing of seafarers, future state of the world's oceans, overfishing and environmental degradation. More than 1,100 fellows and alumni from 132 countries make up the Nippon Foundation fellow network today.

One example of these fellowship programmes that has so far has been very successful is the NF-GEBCO Training Programme. Around six students are selected every year to participate in a one-year postgraduate course at the University of New Hampshire on seafloor mapping. The first fellows started the course in 2004 and currently the 12th year group is receiving training.

The Nippon Foundation is currently establishing new platforms that allow fellows/alumni of our fellowship programmes including the NF-GEBCO Programme, to not only collaborate within each programme's fellow network but also to collaborate between each programme's

network. The Foundation believes that such platforms are important to enable collaborative efforts with long-term perspectives for the world's oceans.

For further information on each of our ocean-related fellowship programmes, please go to

<http://www.nippon-foundation.or.jp/en/what/grant/maritime/>

### Yohei Sasakawa

Yohei Sasakawa is Chairman of The Nippon Foundation, which has been committed to ocean-related issues for over half a century. He was awarded the prestigious International Maritime Prize for 2014 by the International Maritime Organization (IMO) for his contribution to supporting the development of future maritime leaders and to enhancing of safety and security in vital shipping lanes.

Mr Sasakawa has long been dedicated to ocean-related human resource development. Through the initiatives of The Nippon Foundation, together with the World Maritime University (WMU), based in Malmo, Sweden, the IMO International Maritime Law Institute (IMLI) in Malta and other organizations, a new generation of ocean professionals has been nurtured.

He has also been instrumental in supporting the establishment of the Cooperative Mechanism in the Straits of Malacca and Singapore, a fund that enables coastal state governments and industry to work together to protect the environment and enhance navigational safety. The Nippon Foundation's support for research and technological projects on maritime safety and marine environment protection have been led by Mr Sasakawa.

Since 2003, he has served as WHO Goodwill Ambassador for Leprosy Elimination. His decades-long commitment to fighting leprosy and the social discrimination it causes is one of his most enduring initiatives. He is also Special Envoy of the Government of Japan for National Reconciliation in Myanmar.

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### The International Hydrographic Organization (IHO)

The International Hydrographic Organization (IHO) was established in 1921 as the International Hydrographic Bureau (IHB). The present name was adopted in 1970 as part of a new international Convention on the IHO adopted by the then member nations. The former name International Hydrographic Bureau was retained to describe the IHO Secretariat, which coordinates and promotes the IHO's programmes and provides advice and assistance to Member States. The Secretariat comprises three elected Directors and a small staff at the Organization's headquarters in the Principality of Monaco, the official seat of the organization as a result of the offer of Albert I, Prince of Monaco, to provide suitable accommodations for the bureau. The IHO began its activities with 18 Member States and has now 85 members with 8 others in various stages of applying to join.

The IHO is the inter-governmental organization representing hydrography and its principal role is to ensure that the world's seas, oceans and navigable waters are properly surveyed and charted. The IHO develops hydrographic and nautical charting standards to be adopted and used by the Member States. The IHO coordinates the provision of hydrographic and nautical charting services across the world as well as operating a capacity building programme, aimed primarily at developing countries. The IHO publishes the international standards related to nautical charting and hydrography, including S-57, IHO Transfer Standard for Digital Hydrographic Data, the encoding standard that is used primarily for electronic navigational charts. In 2010 the IHO introduced a new hydrographic geospatial standard for modelling marine data and information, known as S-100. It is based on ISO geographic standard 19100.

The IHO enjoys observer status at the United Nations where it sits as the recognised competent authority on hydrographic surveying and nautical charting.

The IHO has encouraged the formation of 15 Regional Hydrographic Commissions (RHCs) and the IHO Hydrographic Commission on Antarctica (HCA). Each RHC coordinates the national surveying and charting activities of countries within each region and acts as a forum to address other matters of common hydrographic interest.

Most IHO publications, including the standards, guidelines and associated documents such as the *International Hydrographic Review*, *International Hydrographic Bulletin*, the *Hydrographic Dictionary* and the *Year Book* are available from the IHO website free of charge.

In 2005, the IHO adopted the concept of a World Hydrography Day, which was welcomed by the United Nations General Assembly in resolution A/RES/60/30 Oceans and the Law of the Sea. The date chosen for World Hydrography Day is June 21, the anniversary of the founding of the International Hydrographic Organization. A theme for each World Hydrography Day is chosen by the Member States and is intended to promote the importance of hydrography internationally. The theme for 2016 is "Hydrography - the key to well-managed seas and waterways".

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### Robert Ward

Robert Ward was elected as the President of the secretariat of the IHO. He assumed the office in September 2012, after serving the previous five years as the secretariat Director responsible for the IHO technical programme.

Ward was born in England and joined the Royal Australian Navy after 13 years service in the British Royal Navy. He retired from the navy in 2007 in the rank of Captain.

During a naval career of 37 years, more than 20 of which were spent in ships, including in command, he developed a wide experience of hydrographic and oceanographic surveying around the world. He also served for a short time as a deck officer in the British Merchant Navy. Ashore, his experience has included the training of hydrographers both in the UK and as the Head of the Royal Australian Navy Hydrographic School. His last position in the Navy was as Deputy Hydrographer of Australia. Robert Ward has a long history of involvement in the implementation and development of the standards and regulations associated with electronic chart navigation and digital hydrographic data both in the IHO and in the IMO.

### Shin Tani

Vice Admiral (ret) Shin Tani is the current Chairman of the joint IHO-IOC GEBCO Guiding Committee since October 2013. Before that, he has made a major contribution to GEBCO's work and activities for more than 24 years.

He holds a Master of Science (MSc) in Geophysics from the Post Graduate School of Kyoto University, obtained in 1978 and served the Japan Coast Guard as Vice Admiral. He is the 44th Chief Hydrographer of Japan since 1871.

He is a Member of IHO-IAG ABLOS (Advisory Board on the Law Of the Sea) and served as a member of the UJNR Sea Bottom Surveys Panel from 1979 to 2014. He has been Cabinet Counsellor for the Cabinet Secretariat of the Government of Japan in charge of ocean policy, renewable energy, ocean survey and monitoring, data management, marine cadastre, and UNCLOS Extended Continental Shelf. He was visiting Professor at the Kanazawa University in 2005-2010. He worked at the Japan Oceanographic Data Center (JODC) and the National Geophysical Data Center (NGDC).

### Intergovernmental Oceanographic Commission of UNESCO

The UNESCO's Intergovernmental Oceanographic Commission (IOC) was established by resolution 2.31 adopted by the General Conference of UNESCO in 1960. It first met in Paris at UNESCO Headquarters from 19 to 27 October 1961. Initially, 40 States became members of the Commission and currently there are 148 Member States.

The IOC promotes international cooperation and coordinates programmes in marine research, services, observation systems, hazard mitigation and capacity development in order to understand and effectively manage the resources of the ocean and coastal areas. The IOC assists governments to address their individual and collective ocean and coastal management needs, through the sharing of knowledge, technology and decision-making processes with respect to marine resources, climate variability and sustainable development of the marine environment, in particular in developing countries.

The IOC coordinates ocean observation and monitoring through the Global Ocean Observing System (GOOS), which aims to develop a unified network providing information and data exchange on the physical, chemical, and biological aspects of the ocean. GOOS serves as the ocean component of the Global Climate Observing System (GCOS). IOC sponsors the World Climate Research Programme (WCRP). IOC own work in ocean observation and science and the work of GOOS and WCRP contribute to building the scientific knowledge of climate and its change. UNESCO-IOC is co-convenor with the World Meteorological Organization of the World Climate Change Conference.

The IOC also coordinates and fosters the establishment of regional intergovernmental coordinating tsunami warning and mitigation systems in the Pacific and Indian Oceans, in the North East Atlantic, Mediterranean and Caribbean seas. The IOC is in close cooperation also with a number of Member States to strengthen their national Early Warning Services and Preparedness for Coastal Hazards.

The IOC is composed of its Member States, an Assembly, an Executive Council and a Secretariat. The Secretariat is based in Paris. Additionally the IOC has three regional Sub-Commissions: IOC Sub-Commission for Africa and the Adjacent Island States (IOCAFRICA), IOC Sub-Commission for the Caribbean and Adjacent Regions (IOCARIBE), and IOC Sub-Commission for the Western Pacific (WESTPAC). Other outstanding regional body is the Regional

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Committee for the Central Indian Ocean (IOCINDIO). These regional subsidiary bodies are respectively supported by regional secretariats located in Nairobi, Kenya, Cartagena, Colombia, and Bangkok, Thailand.

There are a number of programme/project offices that complement and reinforce the IOC's field presence: The Perth Regional Programme Office in Australia; Data Buoy Cooperation Panel (DBCP) Argo Project Office (JCOMMOPS) in Brest, France; The IOC Science and Communication Centres on Harmful Algae in Copenhagen, Denmark; the International Oceanographic Data and Information Exchange (IODE) and the Secretariat for the Ocean Biogeographic Information System (OBIS) in Oostende, Belgium.

The IOC has defined its vision and 4 High Level Objectives in the context of its Medium Term Strategy for 2014-2021:

### Vision:

*“Strong scientific understanding and systematic observations of the changing world ocean climate and ecosystems shall underpin sustainable development and global governance for a healthy ocean, and global, regional and national management of risks and opportunities from the ocean.”*

### High Level Objectives:

1. Healthy ocean ecosystems and sustained ecosystem services.
2. Effective early warning systems and preparedness for tsunamis and other ocean-related hazards.
3. Increased resiliency to climate change and variability and enhanced safety, efficiency and effectiveness of ocean-based activities through scientifically-founded services, adaptation and mitigation strategies.
4. Enhanced knowledge of emerging ocean science issues.

## Dr. Vladimir Ryabinin

**Vladimir Ryabinin has been appointed to the post of Executive Secretary of the IOC, at the level of Assistant Director-General of UNESCO, in 2015.**

He began his professional career by conducting theoretical studies of the ocean circulation and variability and the role of the ocean in climate. Dr. Ryabinin was one of the creators of the first Soviet technology for numerical weather prediction for medium ranges (up to a week) implemented in the mid-1980s. From 1989-1993, he developed a spectral model for the prediction of wind waves on the ocean surface. During that period he lectured at the Moscow State University and participated in a number of offshore engineering projects. Dr. Ryabinin obtained the academic degree of a Senior Doctorate in Oceanography and Geophysics in Moscow, in 1995. In 1996-1998, Ryabinin was the Head of the Laboratory for Marine Forecasting Research and Coordinator of national research on marine forecasting. In 1998 he was appointed Principal Scientist at the Euro-Mediterranean Centre on Insular Coastal Dynamics based in Malta. In 2001 Ryabinin joined the International Ocean Institute in Malta, initially as a consultant, and later as its Executive Director. From 2001 to 2015, Ryabinin was a Senior Scientific Officer of the World Climate Research Programme and a staff member of the World Meteorological Organization.

Ryabinin contributed to the design and setup of several important international and national programmes and initiatives, such as GOOS, JCOMM, Global Cryosphere Watch, International Polar Year 2007-2008, Federal Programme “World Ocean” of the Russian Federation, etc. He has authored and/or co-authored a monograph and approximately a hundred of articles and publications, mostly in the domains of oceanography, meteorology and climate.

## Contact and organiser details

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