

TSCOM Activities and Preoccupations

Preliminary report

6-7 October 2015

Hosted by the Royal Malaysian Navy

Kuala Lumpur, Malaysia

TSCOM Updates

- TSCOM membership
- New GEBCO_2014 grid and release paper
- 2015 GEBCO Science Day
- EMODNet
- Working Groups
 - Crowd Sourced Bathymetry
 - Outreach Master Plan for Students
- GEBCO High-Resolution Product
- Cook Book, 2014 TSCOM/SCRUM Meeting, and GEBCO Science Day
- Break-out Topics and Related Activities

TSCOM Membership

Committee Members

Jenifer Austin – Google Earth, USA

Vicki Ferrini – LDEO, USA

John Hall – Geological Survey of Israel

Timothy Kearns – OneOcean Corporation, USA

Karen Marks – NOAA, USA

Marzia Rovere – Istituto di Scienze Marine, Consiglio Nazionale delle Ricerche, Italy

Thierry Schmitt – SHOM, France

Walter Smith – NOAA, USA

Shin Tani – Hydrographic and Oceanographic, Coast Guard, Japan

Pauline Weatherall – British Oceanographic Data Center, UK

Scientific Advisors

Paul Elmore, NRL, USA

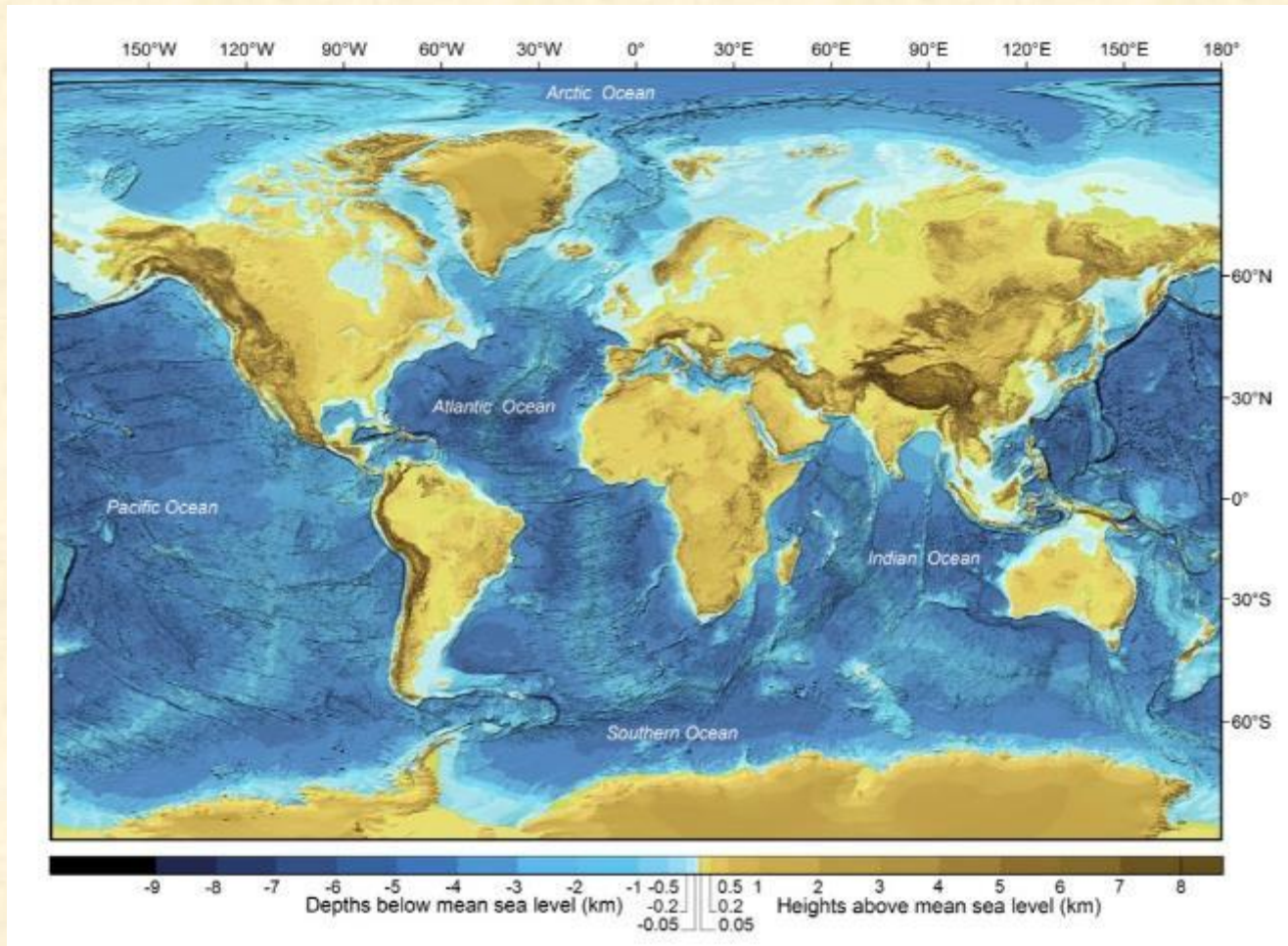
Tony Pharoah, IHO, Monaco

Martin Jakobsson, Stockholm University, Sweden

David Sandwell, Scripps Institution of Oceanography, USA

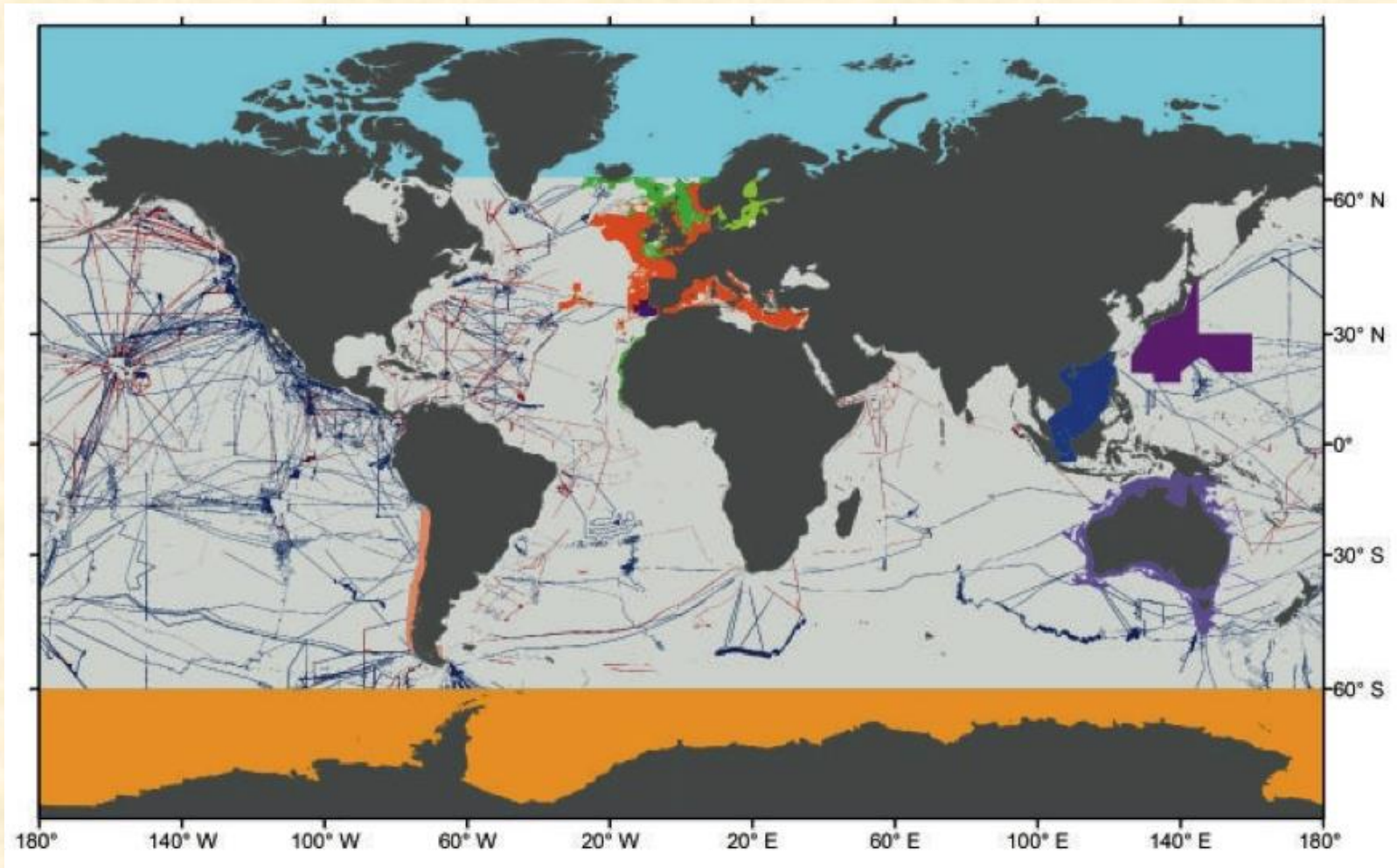
There are many more active in TSCOM work

GEBCO_2014



- New model released Dec. 2014
- Global bathymetry on 30 arc-sec grid
- Ocean floor depths merged with land topography

GEBCO_2014



- New data added since GEBCO_08 (2010 release)
- ~33% of ocean grid cells (not area) have been updated

GEBCO_2014 Release Paper Published

Weatherall, P., K. M. Marks, M. Jakobsson, T. Schmitt, S. Tani, J. E. Arndt, M. Rovere, D. Chayes, V. Ferrini, and R. Wigley (2015), A new digital bathymetric model of the world's oceans, *Earth and Space Science*, 2, 331–345, doi:[10.1002/2015EA000107](https://doi.org/10.1002/2015EA000107).

- Published in AGU's new *Earth and Space Science Journal*, Aug. 2015
- Obtained DOI
- Open Access – Creative Commons license permits free use and distribution
- Manuscript documents history, data sources, construction of grid, and scientific results
- We submitted images for journal cover, but not used

GEBCO_2014 Release Paper Published

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Research Article

A new digital bathymetric model of the world's oceans

Pauline Weatherall, K. M. Marks, Martin Jakobsson, Thierry Schmitt, Shin Tani, Jan Erik Arndt, Marzia Rovere, Dale Chayes, Vicki Ferrini, Rochelle Wigley

First published: 4 August 2015 Full publication history
DOI: 10.1002/2015EA000107 View/save citation
Cited by: 0 articles Check for new citations
Am score 52

Abstract

General Bathymetric Chart of the Oceans (GEBCO) has released the GEBCO_2014 digital bathymetric model of the world ocean floor merged with land topography available digital elevation models. GEBCO_2014 has a grid spacing of 30 arc sec and is a major update to the 2010 release (GEBCO_08) by incorporating new versions of regional bathymetric data from the International Bathymetric Chart of the Arctic Ocean, the International Bathymetric Chart of the Southern Ocean, the Baltic Sea Bathymetry Database, and data from the European Observation and Data network bathymetry portal, among other data sources. App

Early View

Online Version of Record published before inclusion in an issue

Abstract

- 1 Introduction
- 2 Methods and Data Sources
- 3 Results and Discussion
- 4 Summary and Outlook

Acknowledgments

References

Ocean Area	Regional and Global Bathymetric Grids
Gridded bathymetric data sets for all ocean regions	SRTM30_PLUS, version 5.0 [Becker et al., 2009]
Arctic Ocean (north of 64°N)	International Bathymetric Chart of the Arctic Ocean (IBCAO) v8 [Jakobsson et al., 2012] [www.ibcao.org]
Southern Ocean (south of 60°S)	International Bathymetric Chart of the Southern Ocean (IBCSO) v1 [Arndt et al., 2013] [www.ibcsos.org]
Caspian Sea	Gridded data set provided by John K. Hill [Hill, 2002]—also included in GEBCO_08
Black Sea	Gridded data set provided by John K. Hill [Hill, 2002]—also included in GEBCO_08
Weddell Sea	Bathymetric Chart of the Weddell Sea, grids provided by the Alfred Wegener Institute for Polar and Marine Research [Scheller et al., 1997]—also included in GEBCO_08
Waters around Europe	European Marine Observation and Data Network (EMODnet) 2013 dataset [http://www.emodnet.eu/bathymetry]

<http://onlinelibrary.wiley.com/doi/10.1002/2015EA000107/full>

Release Paper Metrics

A New Digital Bathymetric Model of the World's Oceans

Overview of attention for article published In Earth and Space Science, June 2015



About this score

In the top 5% of all articles scored by Altmetric

High score compared to articles of the same age (97th percentile)

LESS...

Mentioned by

1 blog
56 tweeters
8 Facebook pages

What is this page?

SUMMARY

Blogs

Twitter

Facebook

So far, Altmetric has seen 8 public wall posts from 8 users.



Pinoy Geologist, 04 Jul 2015

A New Digital Bathymetric Model of the World's Oceans! *General Bathymetric Chart of the Oceans (GEBCO) has released the...



INFOHAR, 02 Jul 2015

Find out all you need to know about the General Bathymetric Chart of the Oceans GEBCO_2014 grid, a new digital bathymetric...



ARC Earth Sciences, 01 Jul 2015

oooh!



Earth Science Portal, 01 Jul 2015

A New Digital Bathymetric Model of the World's Oceans <http://ow.ly/OZKz9> #AGUpubs



ASGA - Asociación Guatemalteca de Geociencias Ambientales, 30 Jun 2015

Nuevo mapa batimétrico digital mundial de los océanos.



Observatorio Sismológico - UNB, 30 Jun 2015

Novo mapa batimétrico!! Disponível!!!



Géologie de Pierre, 30 Jun 2015

Sera sans doute utile pour départager la souveraineté des fonds marins contestée par les pays riverain de l'Arctique. Une...



American Geophysical Union (AGU), 30 Jun 2015

A New Digital Bathymetric Model of the World's Oceans <http://ow.ly/OZKz9> #AGUpubs

Attention ranking

Top 5% of articles scored

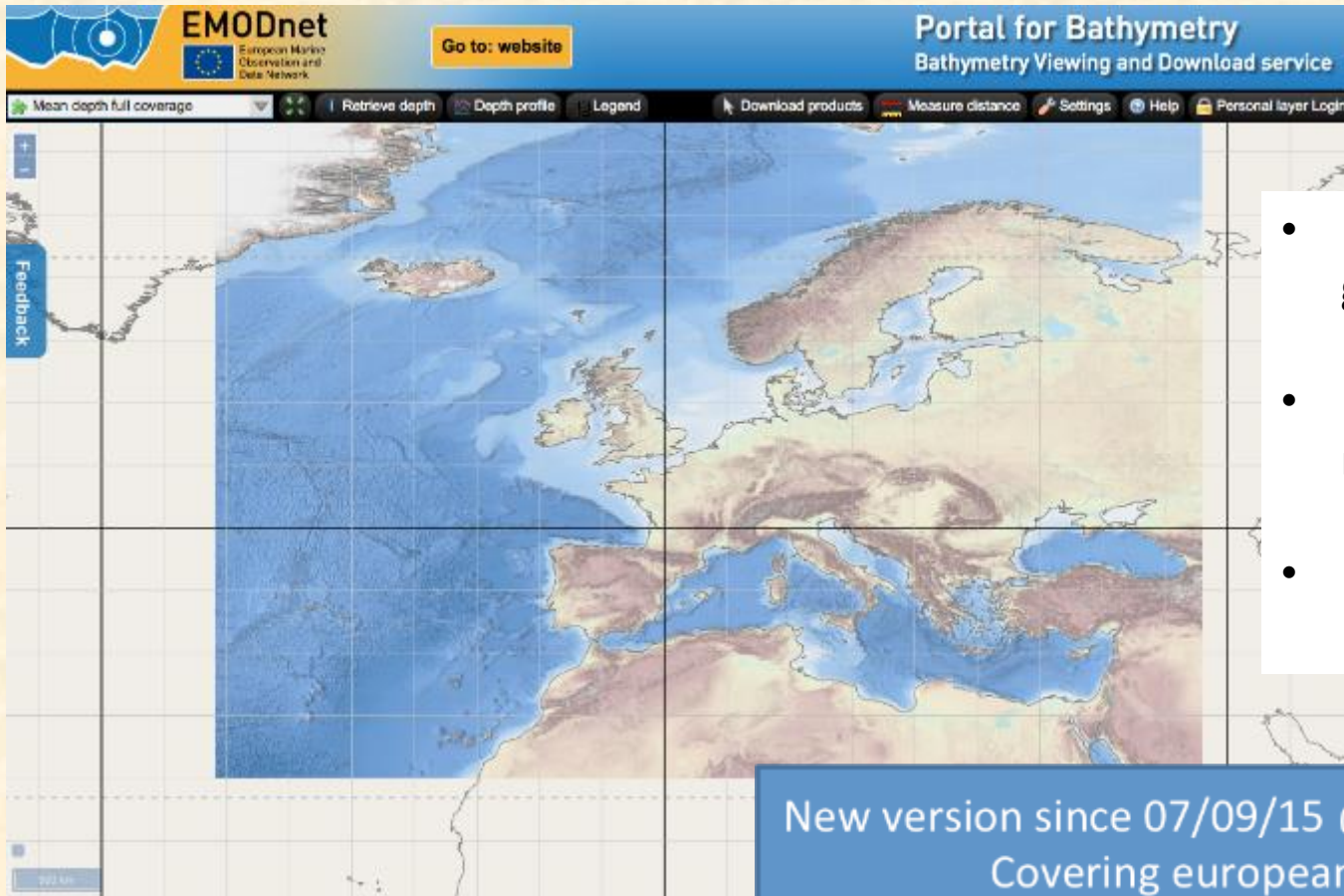
Mentioned by Facebook, Twitter, Blog

10th Annual GEBCO Science Day



- Kuala Lumpur Convention Center, Oct. 5, 2015
- Paul Elmore, Convener
- 13 Oral and 8 Poster Presentations
- 50+ attendees from all over the world

EMODNet Update



- Ingested into GEBCO grid
- New 250 m resolution version
- Portal demonstration

New version since 07/09/15 @ 250m resolution
Covering european waters
Over 7000 data sources from 31 data providers
Source data referencing system (CDI)
Strong linkage with GEBCO
Hi-res DTM prototypes

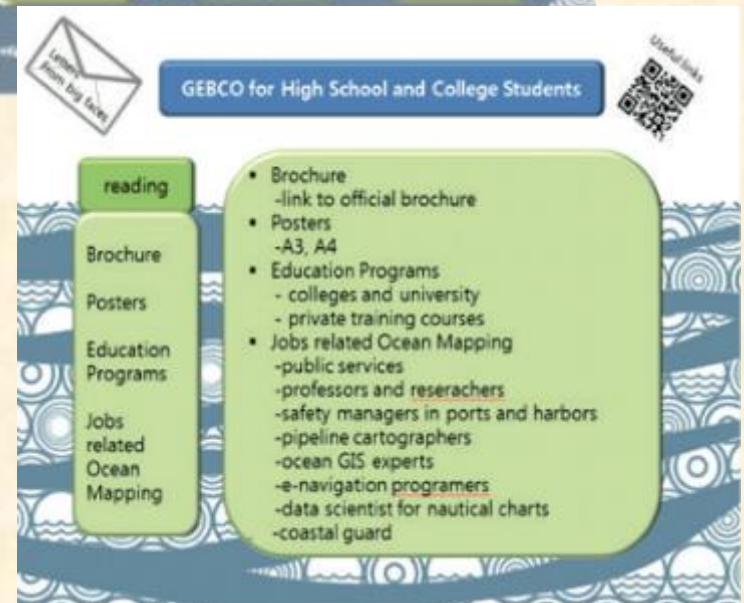
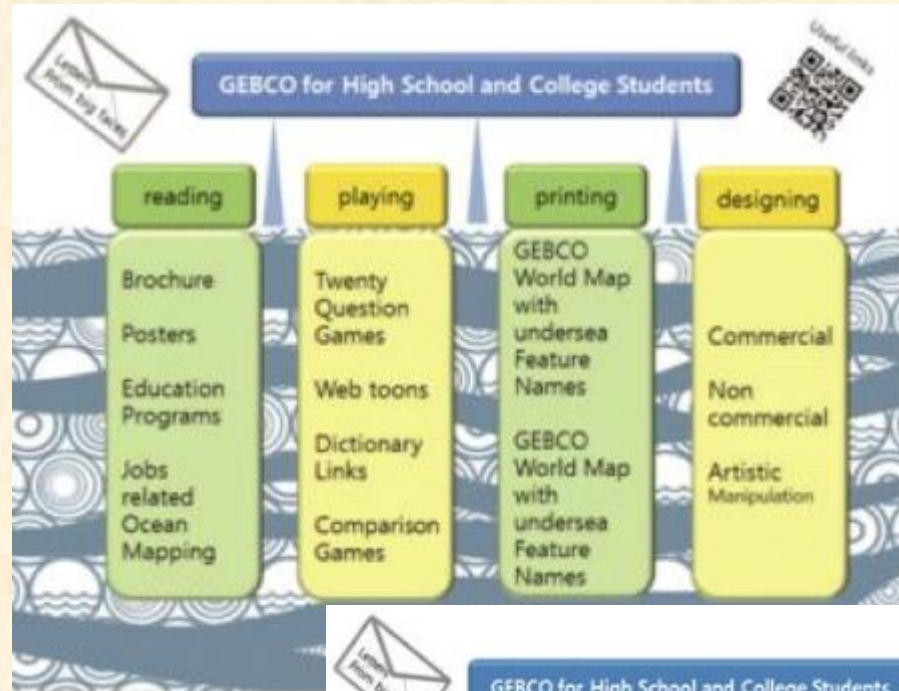
Thierry Schmitt, SHOM

Crowd-Sourced Bathymetry WG

- Crowd-Sourced Bathymetry Working Group (CSBWG) established by the IHO IRCC
- Lisa Taylor appointed Chair; members are from IHO Member States and invited Expert Contributors and Observers
- Examine how to best incorporate, manage, and use bathymetric data acquired while yachting or other ship activities
- Draft policy and guidelines on the collection and assessment of crowd-sourced bathymetry
- Enhance the IHO Data Center for Digital Bathymetry (DCDB) to serve as a data portal for Crowd-Sourced Bathymetry
- Break-out session scheduled

Outreach Working Group

- Outreach for High School and College Students
- Developed master plan for subpages on GEBCO website
- Break-out session scheduled



Eunmi Chang, Hyo Hyun Sung, Pauline Weatherall

GEBCO Hi-Res Product Update

- Technical Components from GMRT ✓
 - Integration with GEBCO 2014
 - Grid Composition
 - Image Creation
 - Attribution
 - Web Services
- Needs of Contributors
 - Attribution
 - Analytics
- Workflow
 - Extent of Coverage
 - Integration with Data Store
 - Editorial Process

The screenshot displays the GEBCO High-Res web interface. At the top, the GEBCO logo is prominently featured, along with the text 'General Bathymetric Chart of the Oceans'. To the right of the logo are several institutional logos, including the International Hydrographic Organization and the International Geographical Commission. Below the header, the page is divided into two main sections. On the left, a sidebar contains the text 'Regional mapping', 'ISCRUM', and 'Mapping projects'. The main content area on the right is titled 'GEBCO High-Res' and contains a descriptive paragraph: 'GEBCO High-Res is a prototype effort to create a new high-resolution GEBCO data product. Data currently displayed in the map include 100-m data from the LDEO GMRT synthesis as well as several contributed grids provided by international colleagues. Use the map to explore data sources and contributors. Please [contact us](#) with comments or suggestions.' Below this text is a map of the Atlantic Ocean region, showing bathymetry and various data overlays. A red pin is placed on the map, and a tooltip box displays 'EMODNET - Atlantic (EU)'. The map includes a scale bar for 1000 km and a 'Terms of Use' link. The bottom left corner of the map area shows coordinates: 'lon: 62.964829', 'lat: 30.851939', and the Google logo.

GEBCO Data Store

- **On hold until host funding can be allocated**
- A repository for already-processed bathymetric trackline and gridded data used to produce GEBCO grid
- To be part of IHO Data Center for Digital Bathymetry (IHO DCDB)
 - Prototype portal webpages under development
 - Data Store scope and services summary circulated Feb 2015

IHO Data Center for Digital Bathymetry (IHO DCDB)

The National Geophysical Data Center in Boulder, Colorado, USA, operates a worldwide digital data bank of oceanic soundings on behalf of the Member Countries of the International Hydrographic Organization (IHO). The IHO is based in Monaco and presently has approximately 95 Member Countries. An initial proposal was forwarded to the IHO jointly from the National Ocean Service, NOAA, and the US Defense Mapping Agency recommending formation of an International data center. On June 1, 1990, the IHO Data Center for Digital Bathymetry (DCDB) was officially established. Since that time, the IHO DCDB has made substantial progress toward establishing itself as the focal point for digital hydrographic data services for IHO Member Countries.

DATABASES

The worldwide digital data bank of oceanic soundings are maintained in several data bases, including the GEODAS global marine geophysical data base, and the Hydrographic Survey Data System. The NOGHDB (National Ocean Service Hydrographic Database) is a subset of the Hydrographic Survey Data System.

SERVICES PROVIDED BY THE IHO DCDB

The following services are provided by the NGDC on behalf of the IHO:

1. Operation of the data center with a focus of activity on oceanic regions with depths greater than 100 meters.
2. Provision, free of charge to the IHO for use by its Member Countries, of the data needed for their national or international projects. IHO Member Countries' Hydrographic Offices are requested to provide the IHO DCDB with digital bathymetric data collected by their nation's institutions in oceanic regions.
3. Maintenance of 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) and completeness of metadata for contributed cruises.
4. Maintenance of inventories in digital form of all digital bathymetric data held in the data center.
5. Collaboration with various international organizations in the developments of exchange formats and standards to expedite bathymetric data exchange.

Related External Links:

- International Hydrographic Organization (IHO)
- GEBCO
- International Ocean Mapping

Search GEODAS

Databases:
GEODAS
Hydrographic Surveys

Data Submission

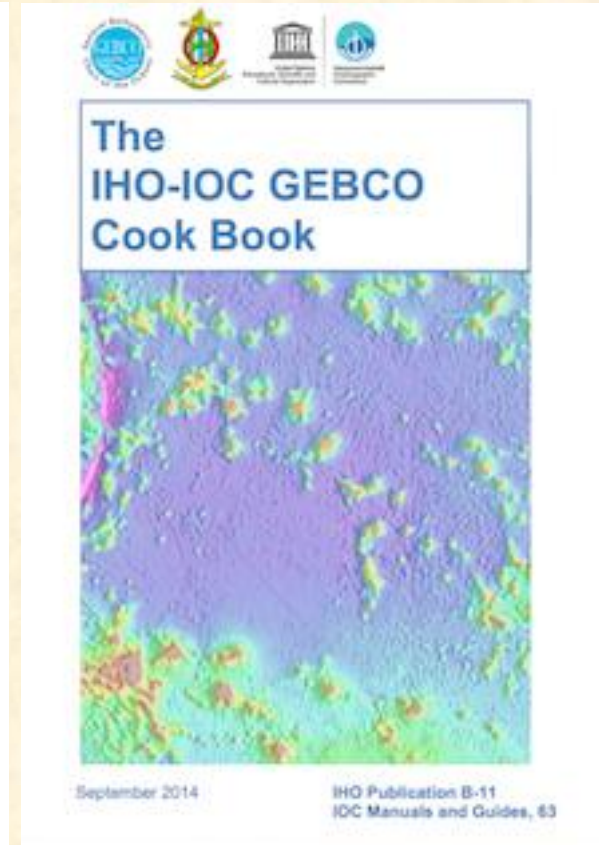
The IHO DCDB can accept data via File Transfer Protocol (FTP), e-mail, CD and DVD as well as other mutually agreed upon digital media. Data are preferable in the MGDT77 exchange format, but any well documented format is acceptable.

Mailing Address:
NOAA-NGDC
75155 15th Broadway
Boulder, CO USA 80509-3028

IHO-IOC GEBCO Cook Book

At the 2009 GEBCO 25th Meeting of TSCOM, the “Cook Book Working Group” was formed to “create a manual that enables users to prepare and grid data for inclusion in GEBCO products,” resulting in:

- IHO-IOC GEBCO Cook Book:
 - IHO Publication B-11 (April, 2012)
 - IOC Manuals and Guides, 63 (Oct. 2012)
 - EOS “News Brief” announcing Cook Book was published in EOS Trans. AGU, Feb. 2013
 - Article in Hydro Int’l (April, 2014) highlighted Cook Book
- Used as educational resource, including:
 - UNH CCOM/JHC Ocean Mapping classes
 - Texas A&M University
 - Workshops
 - Used internationally
- Available for Download: <http://www.gebco.net>
- Citation format is published on GEBCO website
- **Last update September 2014, seeking new materials**



Nautical Chart Adequacy Workshop

- Workshop developed and hosted by NOAA Coast Survey and UNH/CCOM
- Trained hydrographers on procedures to assess adequacy of nautical charts using public information
- Used Chapter “LANDSAT 8-Satellite-Derived Bathymetry” of Cook Book
- Included visit to NOAA Laboratory for Satellite Altimetry



Workshop- July 2015

Shachak Pe'eri and Rochelle Wigley, UNH/CCOM

2014 TSCOM/SCRUM Meeting

- TSCOM/SCRUM meeting held Dec. 11-12, 2014 at Google Headquarters, Mountain View, CA
- Host was Jenifer Austin, Manager of Google Ocean Program
- 38 Participants



GEBCO Bathymetric Science Day at Fall 2014 AGU Meeting Special Session

AGU FALL MEETING

San Francisco | 15–19 December 2014

New Perspectives on Seafloor Morphology from High-Resolution Ocean Mapping

Session ID#: 1702
Session Description:

Morphologic details of the ocean floor are revealed in high-resolution bathymetric maps derived from data collected by a variety of sensors: from echosounders, lasers, and multi-beam sonars, to satellite altimetry. As the resolution of those systems increases, the details of seafloor structure that they reveal provide new insights into a range of seafloor, oceanographic, and tectonic processes. New advances in mapping and data processing may further enhance these interpretations. This session invites contributions from studies using high-resolution seafloor mapping, including regional and global data, as well as innovations in methods of compilation, gridding, uncertainty evaluation, and display techniques that lead to an enhanced interpretation. We seek contributions dealing with a wide range of applications including, but not limited to, high-resolution seafloor imagery revealing new perspectives on glacial landforms, tectonic processes, bottom currents, sediment dynamics, and bottom habitats.

Index Terms:

1006 Oceanic [PH-DPM4132]
3045 Seafloor morphology, geology, and geophysics [MARINE GEOLOGY AND GEOPHYSICS]
4562 Topographic/bathymetric interactions [OCEANOGRAPHY: PHYSICAL]

Primary Convener:

Paul A. Elmore
paelmore@earthsci.ucsb.edu

Workshop Lead:

Martin Jacobsson
Martin.Jacobsson@svet.stfc.gov.uk
Stennis Space Center MS (United States)

New Perspectives on Seafloor Morphology from High-Resolution Ocean Mapping

- Wednesday, Dec. 17, 2014
- Ocean Sciences sessions OS31A, OS31B, OS33A, OS34D
- 16 oral and 29 poster presentations
- Conveners
 - Paul Elmore- Primary Convener
 - Jenifer Austin
 - Martin Jakobsson

AGU FALL MEETING

San Francisco | 15–19 December 2014

My Schedule

WEDNESDAY, DECEMBER 17, 2014

08:00 AM - 12:00 PM



OS31A New Perspectives on Seafloor Morphology from High-Resolution Ocean Mapping / Posters

Museum Meet
Poster / Hall



OS31B New Perspectives on Seafloor Morphology from High-Resolution Ocean Mapping / Posters

Museum Meet
Poster / Hall

01:40 PM - 03:40 PM



OS32D New Perspectives on Seafloor Morphology from High-Resolution Ocean Mapping / V

Museum Meet
2000

04:00 PM - 06:00 PM



OS34A New Perspectives on Seafloor Morphology from High-Resolution Ocean Mapping / V

Museum Meet
2000

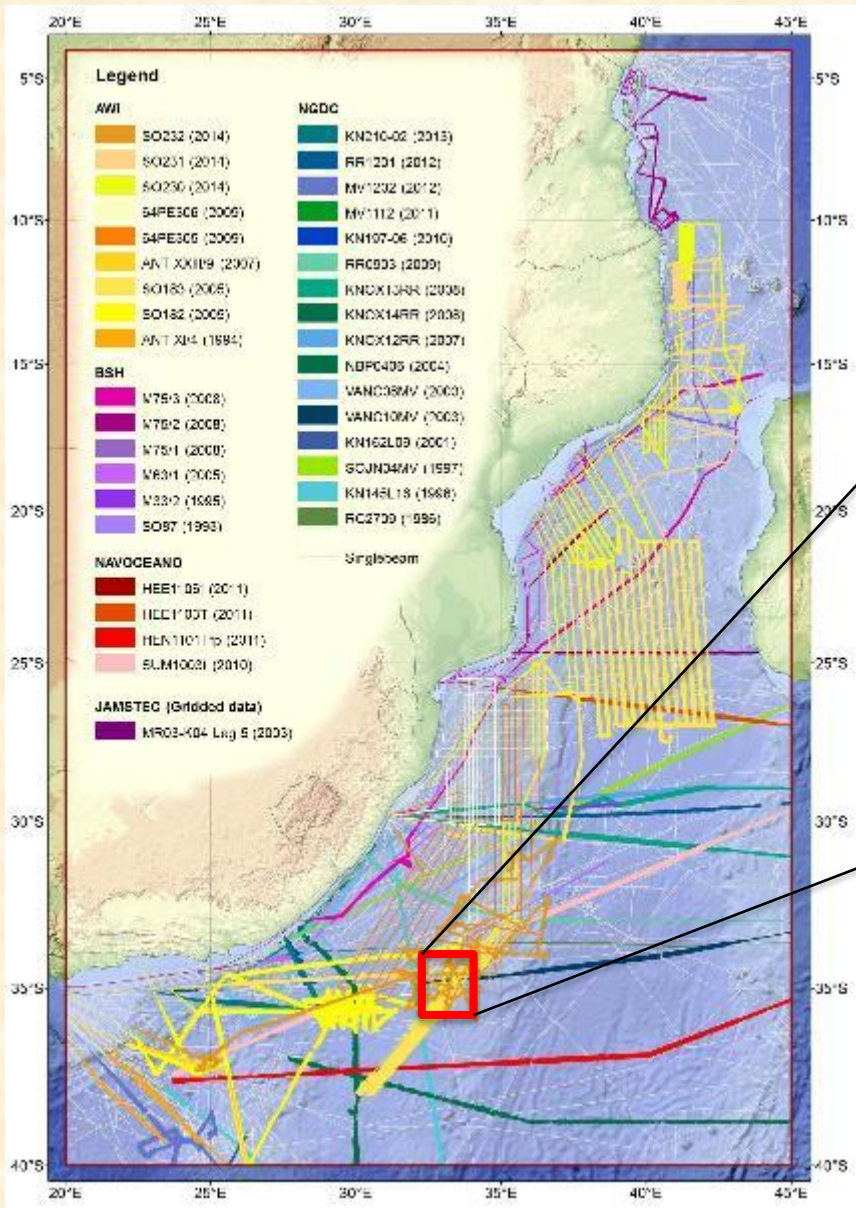
Break-out Sessions

- Crowd-Sourced Bathymetry Working Group (Taylor)
- Outreach Working Group- Webpages for Students (Sung/Chang/Weatherall)
- Update the GEBCO grid: Regional compilations and base grid (Jakobsson/Marks)

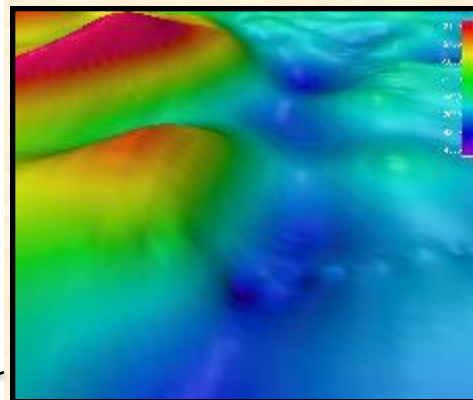
Related Activities

- IBCSO gridding algorithm used in swIOBC (Arndt)
- FRAM- 2014/15 Drift of R/H SABVABAA (Hall)
- New Bathymetric Map of Israeli EEZ (Hall)
- R/V Bet Galim to survey EEZ (Hall)

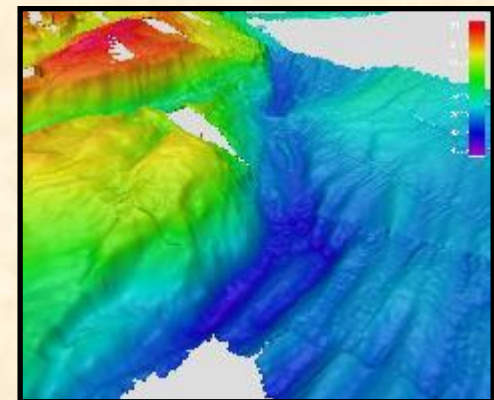
swIOBC using IBCSO gridding



- Database: About 21% high resolution data and 79% GEBCO
- Data from 10 different institutes
- swIOBC is derived at AWI by Laura Jensen, with support by Jan Erik Arndt
- V1.0 is expected to be published in 2016 ► will become part of the IOBC



Existing GEBCO data, ~ 1000 m Resolution



Bathymetry data of SO232 (2014), ~ 250 m resolution as the swIOBC will provide.

Jan Erik Arndt, AWI

Fram 2014/15 Ice Drift



Ice drift station FRAM-2014/15 summary

Why ice drift stations?

An ice drift station is a logistic alternative to:

- explore areas of the Arctic Ocean not accessible to icebreakers,
- carry out scientific field experiments which cover the full annual cycle and requires physical presence.

FRAM-2014/15 was an ice drift station using a medium-sized hovercraft as logistic and scientific platform operated by a crew of two persons. The hovercraft was equipped as a scaled-down modern research vessel. Work space for geologic and oceanographic work was set up on the ice separately. The station was deployed on first year ice from icebreaker *Polarstern* on 30 Aug. 2014 in the Makarov Basin, upstream of the target, the Lomonosov Ridge (Fig. 1). The drift during the next 12 months covered over 1,900 km with scientific data acquisition and includes an unprecedented five complete crossings of Lomonosov Ridge. The drift during November through April were in a part of the Arctic Ocean not accessed by diesel driven icebreakers unless assisted by a nuclear icebreaking vessel. The expedition was recovered by the sealing vessel *Havsel* at 81° N on 18 Aug. 2015.

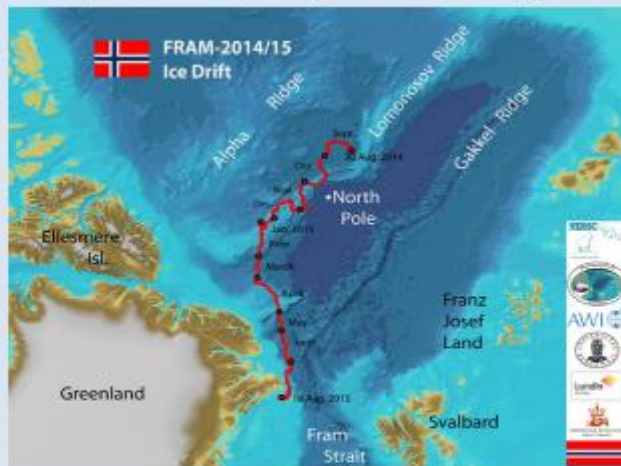


Fig. 1 - The drift track of FRAM-2014/15 (red line)

FRAM-2014/15 drift of R/H Sabvabaa in the Arctic Ocean is completed

- Successful mission
- Scientific data were collected:
 - Bathymetry
 - Seismic reflection
 - Current profiles
 - Ocean temperature
 - Weather
 - Atmospheric data



New Bathymetric Map of Israeli EEZ



A regional bathymetric map of the Eastern Mediterranean seas was previously published in 1994, compiled from all the depth maps, remnants available at the time. In recent years a large amount of new gridded bathymetric data was collected offshore Israel within the framework of research and hydrocarbon exploration activities.

The continuing interest in the Israeli EEZ (Exclusive Economic Zone) by oil and gas companies, academia and governmental agencies requires an up-to-date high-resolution bathymetric grid of the EEZ. In this work we present a detailed bathymetric grid of the Israeli EEZ that was compiled from all available data sets.

Data sets used to create the map (see details in images 9 & 10)

- Multi beam bathymetry acquired by IOLR between 2001-2010
- 3D Seismic Surveys
 - o Southern Israel
 - o Erez 2009-2010 Merge
 - o Sara Myra
 - o Afe
 - o Polgic
 - o Nava Horzee
 - o Ruff C
- 2D Seismic Surveys
 - o Horizon 1993
 - o bezmarz 1995
 - o Isramco 1991
 - o Petro Med
 - o Spectrum 2001
 - o TGS 2000
 - o TGS 2008
- Legacy data sets
 - o Northern Area
 - o French (Esmer) 'Eshalim' EM302 survey by RV Simul in 2004 for the Lebanese government.
- GSI-MGD seismic survey of Ras al Beyate during 'Operation Uzanit' in 1978
- Lebanese coastal and fishing charts
- North-Israeli Area
- Medimp Group Mediterranean multibeam sonar compilation available to contributing members as a 500m grid
- Eastern Area
- GSI-HLR-SOI Israel NBS EM1002 multibeam sonar survey 2001-2013.
- Crown's coastal pipeline survey done for the Ministry of National Infrastructure in 1986
- GSI-MGD reconnaissance seismic surveys 1971-80.
- The land data is from NASA METI ASTER 30m GDEM global topographic dataset.

In the shallow areas (10 to 1000 m below MSL) mapping is primarily based on multibeam. In the deeper part of the EEZ mapping is based on 2D and 3D seismic surfaces and well control. The 3D seismic sets used in this work consist of seven adjacent and overlapping seismic cubes (Fig. 4). In areas with no multibeam or 3D seismic coverage, data from 2D seismic profiles was used (Fig. 5). The depth to the sea-floor in the seismic data is calculated as the 'peak' of the first seismic reflection across the 3D cube or 2D profile. When the seismic data was available only in two-way travel time it was converted to depth using speed of sound in the water column (1520 m/s).

Working Steps

1. Manual picking of WB seismic reflection on 3D data (Fig. 6)
2. Auto picking of entire 3D cubes (Fig. 7)
3. Surface creation (spatial resolution as seismic data)
4. Depth conversion (where needed)
5. Surface adjustment to WB from well control (Fig. 8)
6. Merge 3D surfaces (Fig. 9)
7. Manual picking of WB seismic reflector on 2D lines
8. Create surface of 2D picking
9. Depth Conversion of surface
10. Merge 3D & 2D water bottom surfaces
11. Merge seismic water bottom surface with legacy & land data (Fig. 11)

Hall J.K. (1), Uppman B. (2), Gardosh M. (2), Tiber G. (3), Sado A.R. (3), Sado H. (3), Golan A. (3), Amit G. (3), Gur-Ari L. (4), Meisim I. (2)

1. Geological Survey of Israel, 30 Malkha Street, Jerusalem 95501, Israel
2. Ministry of Energy and Water Resources Administration, 216 Jaffa, Jerusalem, 94383, Israel
3. Israel Oceanographic & Limnological Research Ltd., Tel-Shikmona, P.O. Box 8090, Haifa 31090, Israel
4. Survey of Israel, 1 L. Lincoln, Tel-Aviv 14171, Israel

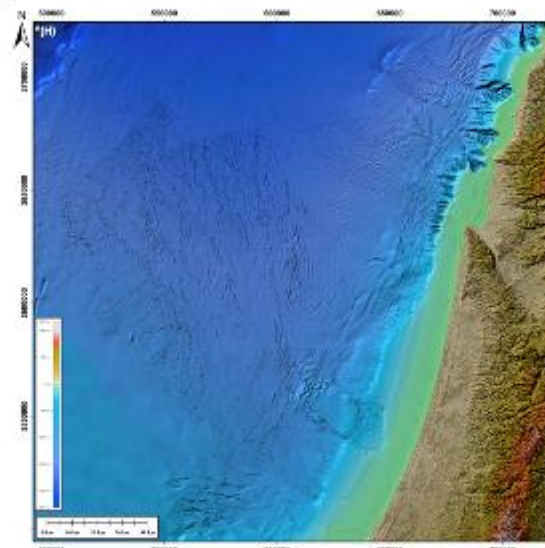
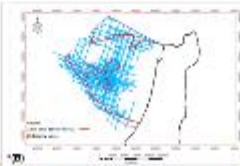


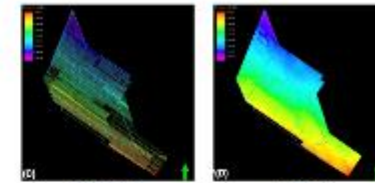
Fig. 10. 300, 100m resolution (WB) data cubes - Zone 5A



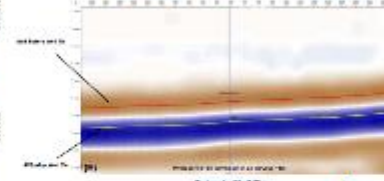
Spatial Resolution of Seismic 3D Surveys & Locations of Multibeam Data



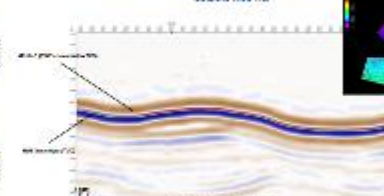
Areas of 3D Seismic Lines Filling



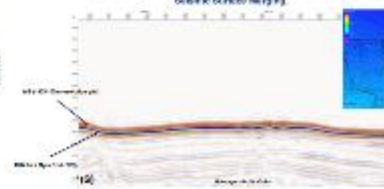
Manual Picking Auto Picking



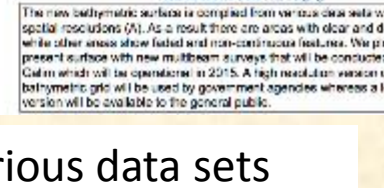
Seismic Water Top



Seismic Water Bottom



Merge 3D Surfaces



Final Bathymetric Surface

The new bathymetric surface is compiled from various data sets with different spatial resolutions (A). As a result there are areas with clear and distinct features while other areas show faded and non-continuous features. We plan to update the present surface with new multibeam surveys that will be conducted by the RV 'Shalim' Galim and will be operational in 2015. A high resolution version of the bathymetric grid will be used by government agencies whereas a lower resolution version will be available to the general public.

- New bathymetric map is compiled from various data sets
- Plan is to update with multibeam surveys

R/V Bat Galim




The New Israeli Research Vessel for the Exclusive Economic Zone

Gideon Tibor - Israel Oceanographic & Limnological Research, Haifa, Israel

1. Abstract

The extensive exploration and production activities in the Israeli Exclusive Economic Zone (EEZ) in recent years, the need to monitor it and to collect systematic environmental and marine data have lead the Israeli Government to purchase a new research vessel for the deep water. In June 2014 the Bat Galim, a Klein Klasse German support vessel, was purchased from the Israeli Navy who owned it since 2006. The refitting of the Bat Galim into a modern research vessel with capabilities to map, sample and analyze the seafloor, sub-bottom and water column from WD of 10-3,000m was based on the guidelines set in the Science Mission Requirements (SMR) for Regional Class oceanographic vessels. The R/V Bat Galim will serve the needs of the different governmental agencies and academic for marine data and will be fitted to conduct oil spills and assist in search and rescue missions.

2. Background

In 1932 David Ben-Gurion, the primary founder and first Prime Minister of Israel, said that "Both seas of Israel - The Mediterranean Sea and the Red Sea are the prolongation of Israel's economy and contain enormous hidden possibilities". Sixty eight years later this vision came true as large-scale natural gas deposits have been discovered within the EEZ of Israel (Fig. 1). The 1st offshore discovery was the Noa gas field in 1999 than exploration activity increased drastically after the discovery of the giant Tamar and Leviathan fields in 2009-2010. The Leviathan gas field (1.28 Tcf) is one of the world's largest offshore gas finds of the past decade.



Figure 1: Israel EEZ

3. R/V Bat Galim missions & capabilities

The R/V Bat Galim will be a general-purpose research vessel serving the needs of the different governmental agencies and academia. It will have the capabilities to map, sample and analyze the seafloor, sub-bottom and water column from WD of 10-3,000 m. The R/V Bat Galim will also be fitted to conduct oil spills, operate RCV and other autonomous vessels that will assist in search and rescue missions.

4. The Klein Klasse Vessel

The Bat Galim, a Klein Klasse support vessel, was built in 1990 by Larsen Shipyards in Germany. General features:

Leaf number	Item	Spec. data	Unit	Comments
01	Length	38.00	m	Overall length
02	Breadth	7.80	m	Maximum
03	Max. draught	11.70	m	At max. draft
04	Max. speed	14.7	knots	Maximum
05	Max. displacement	1150	tonnes	Maximum
06	Max. fuel capacity	18000	litres	Maximum
07	Max. deck area	1000	m ²	Maximum

5. Acoustic testing

The acoustic testing was conducted by Gates Acoustic Services. The Bat Galim appears to be a relatively quiet platform for a future multibeam sonar installation. Propeller cavitation characteristics are good and no machinery noise was noted that will impact future sonar data. It is predicted that in the absence of bubbles, the acoustic levels expected during normal ship operations will be similar to other vessels equipped with mid-depth multi beam sonar systems (Fig. 3). These expected levels should not cause acoustic degradations to sonar operations.



Figure 3: Acoustic level at future multibeam sonar test site. The test site is the 25 May 10-m depth. General specifications of each of these frequencies. Note that typically lower levels are 15 to 20 dB higher than recommended by guideline 532.

6. Refitting to modern R/V

The refitting of the Bat Galim into a modern research vessel follows most of the guidelines set in the Science Mission Requirements (SMR) for Regional Class oceanographic vessels that were developed as part of the Academic research efforts by the University-National Oceanographic Laboratory System (UNOLS). The Bat Galim will be equipped with a 3.5 10-ton dry lab, 36 m³ of Dry & Wet labs built in 20-21' portable containers (Fig. 4) 4 tan, 4 m width and 5.7m high telescopic A-Frame (Fig. 5).



Figure 6: The gondola



- 5 Hr - 120 lb Hydrostat
- 12 Hr - 120 lb Hydrostat
- 10 Hr - 120 lb Hydrostat
- 15 Hr - 120 lb Hydrostat
- 20 Hr - 120 lb Hydrostat
- 25 Hr - 120 lb Hydrostat
- 30 Hr - 120 lb Hydrostat
- 35 Hr - 120 lb Hydrostat
- 40 Hr - 120 lb Hydrostat
- 45 Hr - 120 lb Hydrostat
- 50 Hr - 120 lb Hydrostat
- 55 Hr - 120 lb Hydrostat
- 60 Hr - 120 lb Hydrostat
- 65 Hr - 120 lb Hydrostat
- 70 Hr - 120 lb Hydrostat
- 75 Hr - 120 lb Hydrostat
- 80 Hr - 120 lb Hydrostat
- 85 Hr - 120 lb Hydrostat
- 90 Hr - 120 lb Hydrostat
- 95 Hr - 120 lb Hydrostat
- 100 Hr - 120 lb Hydrostat

Figure 4: Wet/Dry Labs



Figure 5: Telescopic A-Frame



The acoustic equipment will be installed in a 3.5 m x 2.6 m gondola (Fig. 6). It will include: **Kongsberg EM 302** (1x2 deg.) and **EM-2040** multibeam systems; **Knudsen Chirp 1200** sub-bottom profiler and **12 kHz single beam** echo sounder; **Tekofyne RDI Ocean Surveyor** 75 kHz ADCP; **SiikQuest TC5000ns USBL**; **Talodyne Reson** 516-120kHz hydrophones and **Valport** mini sound velocity sensor. Other sampling and mapping equipment will include: **660 Marine Survey Systems** high resolution seismic imaging with **Geo-Spark 2500K** and multi-channel streamer; **SBF 1E** Carusol water sampler with CTD; box and 9 m piston cores (built similar to USGS design).

contact info: [Dr. Gideon Tibor \(tiborg@ocean.org.il\)](mailto:Dr. Gideon Tibor (tiborg@ocean.org.il))

- Acquired by Israeli Government for marine data collection
- R/V Bat Galim to conduct multibeam surveys of EEZ

John Hall, Geological Survey of Israel (ret.)

END OF PRESENTATION

GEBCO_2014 Download Webpage

GEBCO_2014 Grid (30 arc-second interval)

The GEBCO_2014 Grid is a continuous terrain model for ocean and land with a spatial resolution of 30 arc-seconds. It was generated by combining quality-controlled ship depth soundings with interpolation between sounding points guided by satellite-derived gravity data. Where they improve on the existing grid, data sets developed by other methods are included. Further information can be found in the data set documentation. The complete global grid file in compressed form is 1.1 Gbytes. [More information](#).

Available data options	Available formats	Select
User-defined area* or global grid	2D netCDF	<input type="checkbox"/>
Global grid	1D netCDF	<input type="checkbox"/>
User-defined area*	INT16 GeoTIFF (data)	<input type="checkbox"/>
User-defined area*	ESRI ASCII	<input type="checkbox"/>

New GeoTIFF and
ESRI ASCII format
options

*maximum area allowed is 10800 grid cells by 10800 grid cells, this is equal to an area of 90 degrees by 90 degrees

GEBCO_2014 Source Identifier (SID) Grid (30 arc-second interval)

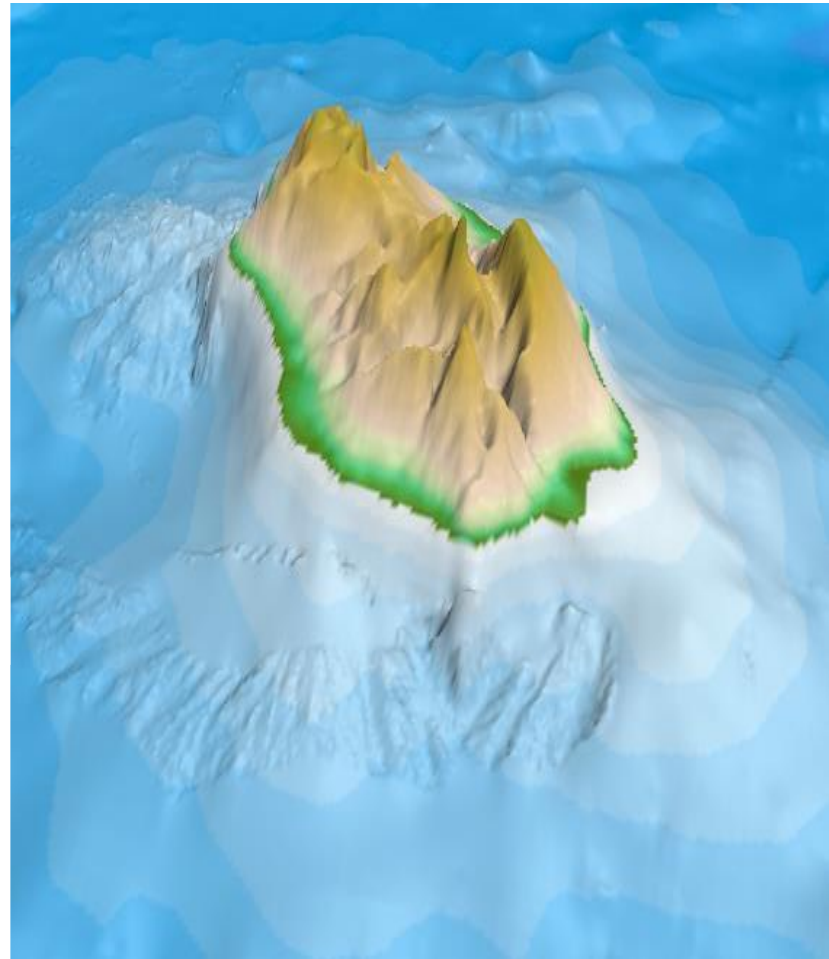
The GEBCO_2014 Source Identifier (SID) grid accompanies the GEBCO_2014 bathymetric grid. This data set identifies which grid cells in the GEBCO_2014 grid are based on bathymetric soundings or bathymetric depth values from grids, and which cells contain predicted depth values. The SID grid is a global grid file at 30 arc-second intervals. Further information can be found in the data set documentation. The complete global grid file in compressed form is 32 Mbytes. [More information](#).

Available data options	Available formats	Select
User-defined area* or global grid	2D netCDF	<input type="checkbox"/>
Global grid	1D netCDF	<input type="checkbox"/>
User-defined area*	INT16 GeoTIFF (data)	<input type="checkbox"/>
User-defined area*	ESRI ASCII	<input type="checkbox"/>

*maximum area allowed is 10800 grid cells by 10800 grid cells, this is equal to an area of 90 degrees by 90 degrees

New bathymetry and SID download options

Capacity-building workshop – Introducing the IBCSO gridding algorithm to IOBC working group

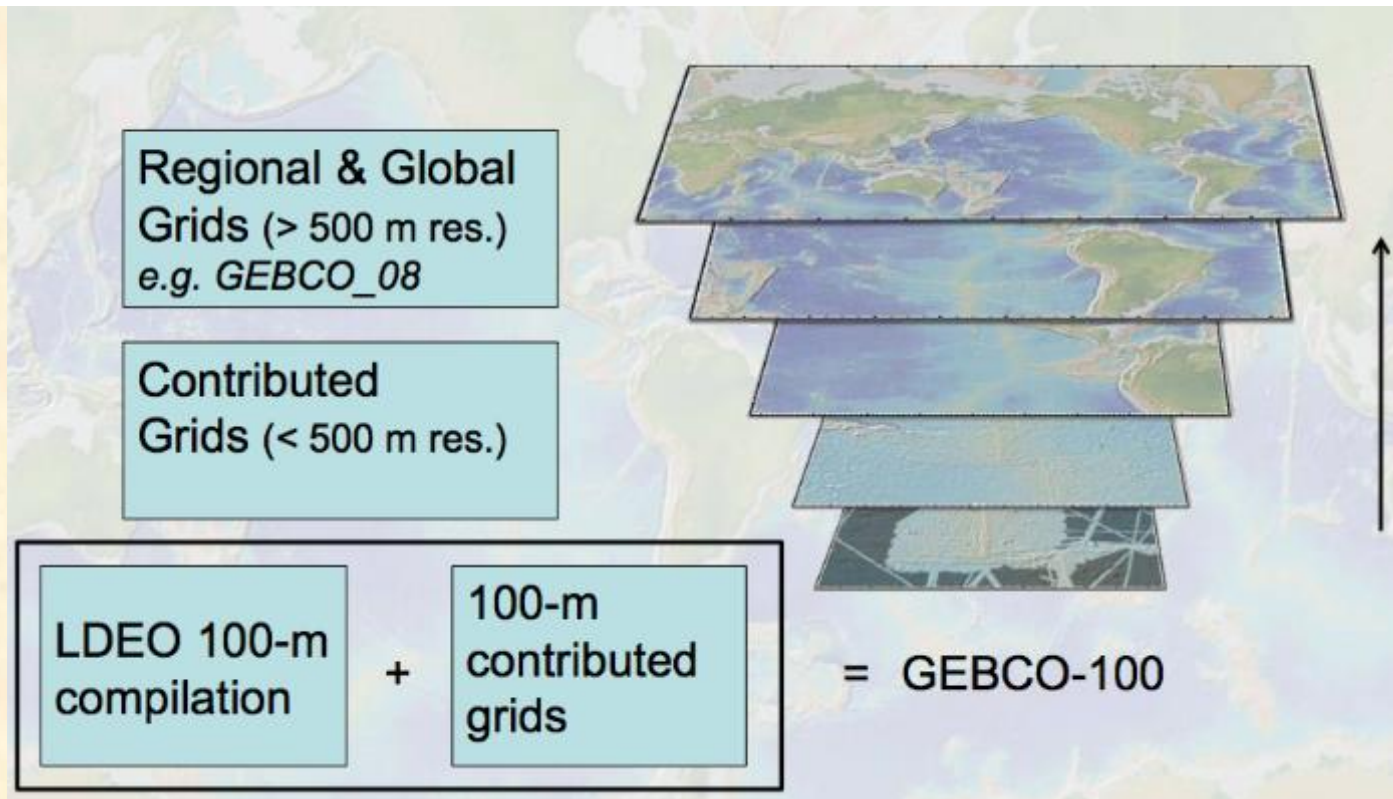


Jan Erik Arndt, AWI

Workshop- May 2014

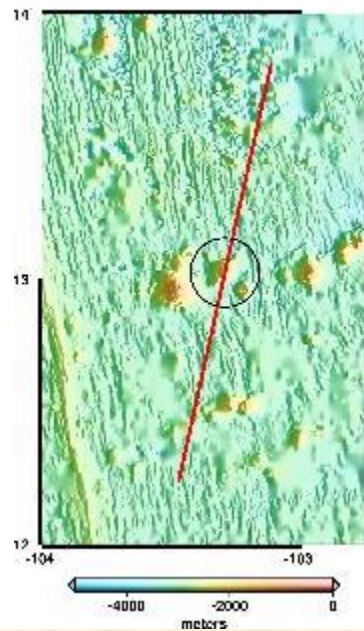
GEBCO Hi-Res Product

- **GEBCO Hi-Res** is a prototype effort to create a new high resolution GEBCO product
- **Global Multi-Scale Resolution Topography (GMRT)** is a synthesis of terrestrial and seafloor elevation data in image and grid form that can be viewed in various resolutions
- GEBCO_2014 grid is combined with LDEO compilations and contributed grids
- Users can zoom-in, view data attributes, and access data

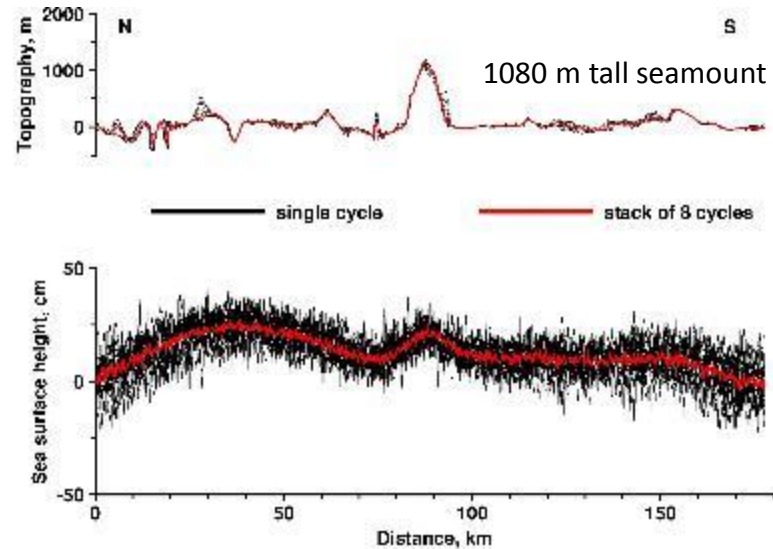


Detecting Very Small Seamounts

East Pacific Rise



Stacked AltiKa repeat cycles



- Seamounts taller than ~ 2 km are easy to find in marine gravity fields derived from satellite altimetry
- Smaller seamounts are hard to find because the amplitude of their geoid anomaly is small
- Stacking AltiKa repeat cycles reduces noise and improves resolution of small seamounts

Eos Feature Article

EOS

EOS, TRANSACTIONS, AMERICAN GEOPHYSICAL UNION

VOLUME 95 NUMBER 21 27 MAY 2014

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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.

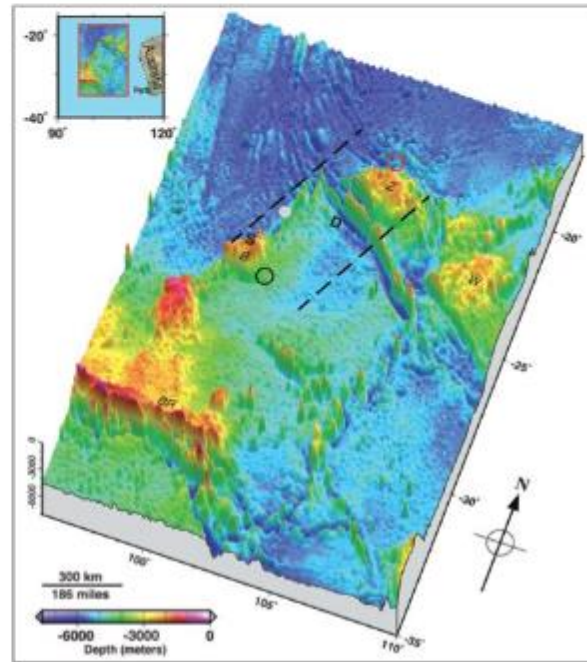
Little is known about the seafloor from skip-borne echo sounder measurements in the region where flight MH370 is believed to have crashed. Available depth measurements cover only 5% of the 2000 by 1400 kilometer area in Figure 1 (a high-resolution copy of this figure may be found in the additional supporting 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 30 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 *MaXun 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)
- Science Magazine News article figure ("Lost at Sea," Science, 30 May 2014)

GEBCO data displayed in news articles

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27 May 2014 Last updated at 10:10 ET

Jonathan Amos

Science correspondent

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MH370 spur to 'better ocean mapping'

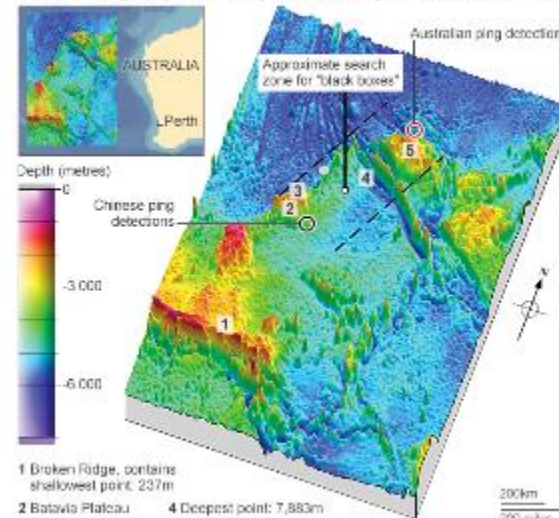
COMMENTS (5)

Scientists have welcomed the decision to make all ocean depth data (bathymetry) gathered in the search for missing Malaysia

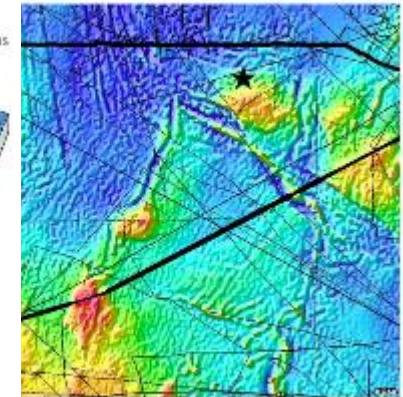


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Seafloor topography in the Malaysia Airlines flight MH370 search area



Malaysia Airlines MH370: Searching in an ocean of uncertainty



Down Sharda detections have been made at about 23 degrees South. It has illustrated once again just how poor our 4 floor. What they are we know better the areas of Meta Deep sea challenge

MH370 mystery

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