

# TSCOM report to GC 2015

Preliminary report

8-9 October 2015

Hosted by the Royal Malaysian Navy

Kuala Lumpur, Malaysia



# Venue

TSCOM met jointly with SCRUM October 6-7, 2015, at the Royale Chulan Hotel.

We gratefully acknowledge the Royal Malaysian Navy for:

- excellent logistical support
- fine venue
- superb hospitality provided by our hosts



# Reports of Activities

- TSCOM tabled reports on:
  - GEBCO\_2014 grid
  - Crowd-Sourced Bathymetry
  - Outreach- Plan for Webpages for Students
  - High-Resolution Product
  - Science Day
- GEBCO\_2014 Release paper published in AGU's Earth and Space Science
- EMODNet presentation on new version of bathymetry database
- Reports of regional mapping activities were taken under SCRUM
- Much excellent work done- please see reports for the details



# 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 Pharosah, IHO, Monaco

Martin Jakobsson, Stockholm University, Sweden

David Sandwell, Scripps Institution of Oceanography, USA

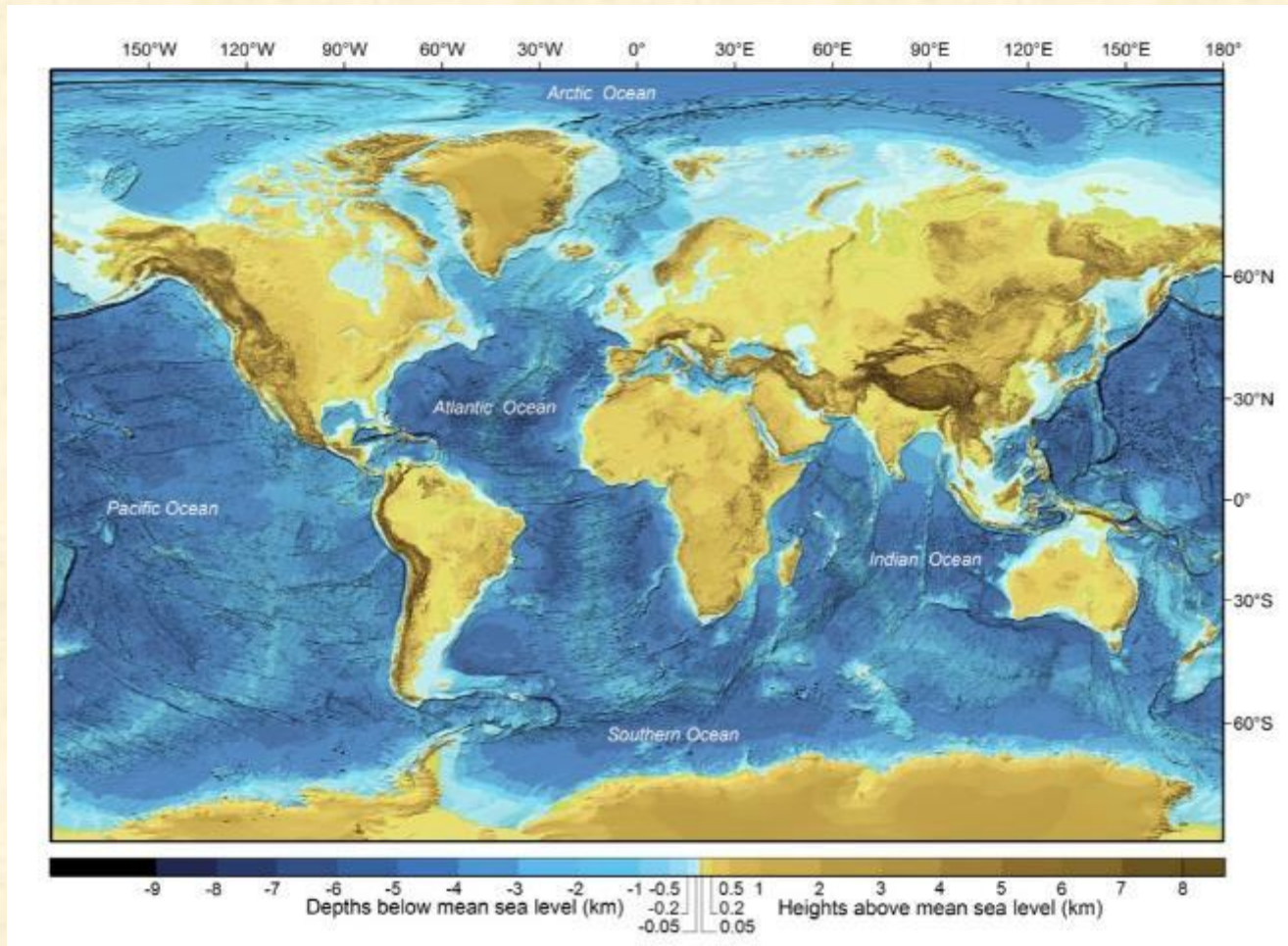


# TSCOM Leadership

- Karen Marks appointed Chair at 2013 GEBCO GC Meeting, currently no Vice-Chair
- 10 Members on TSCOM committee, but many more attend meetings and are active in TSCOM/SCRUM Working Group
- Should TSCOM/SCRUM Working Group be listed on GEBCO website?



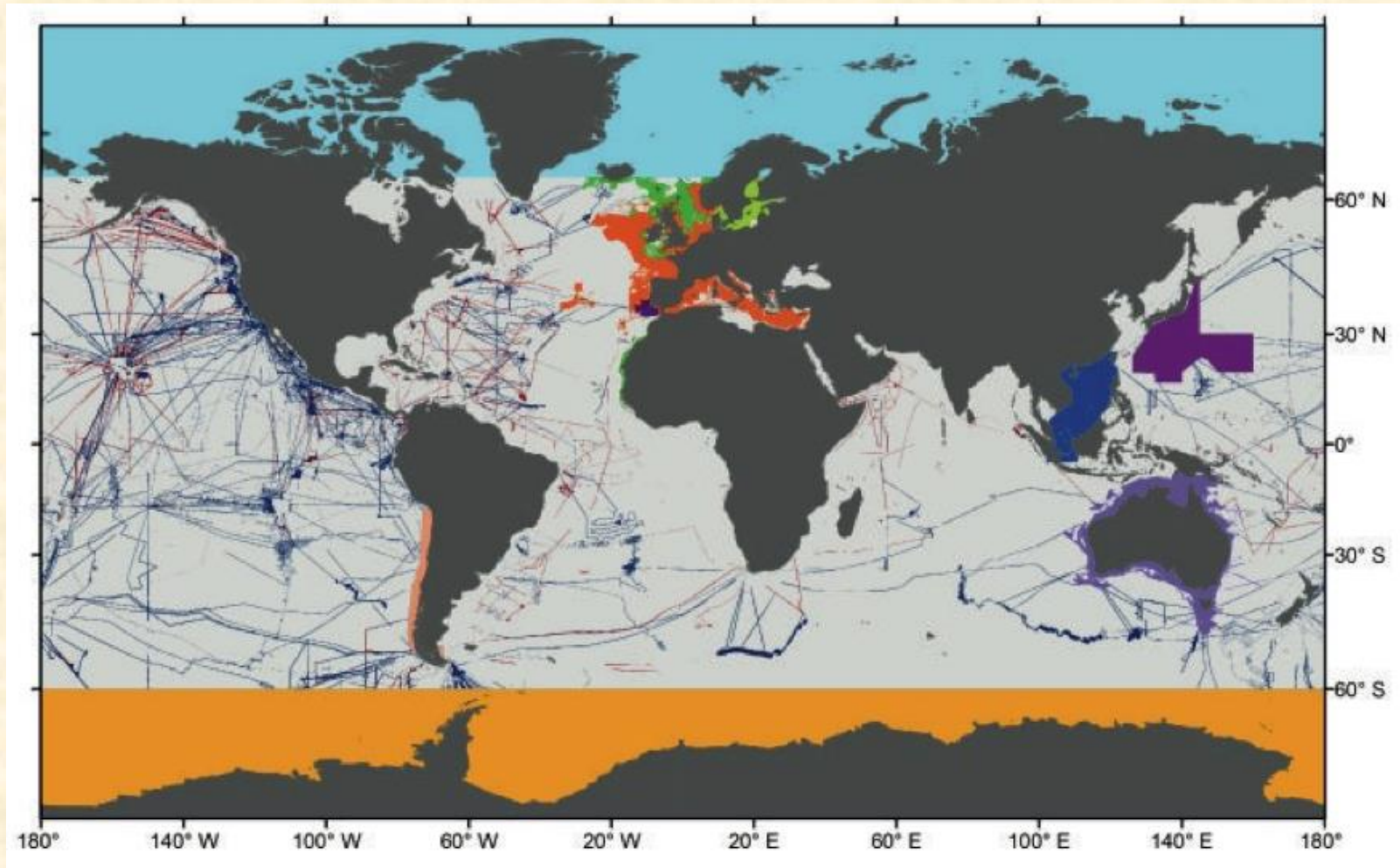
# GEBCO\_2014



- 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



# Future Grid Updates

- Updated regional compilations and new bathymetric data contributions continue to improve GEBCO grid
- GEBCO\_2014 estimated depths are based on SRTM30\_Plus V5 bathymetry model
- SRTM30\_Plus V11 assimilates new altimeter data and small-scale resolution is improved- but it is copyrighted, precluding its use in public GEBCO grid



# 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

Altmetric score 22

### 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 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

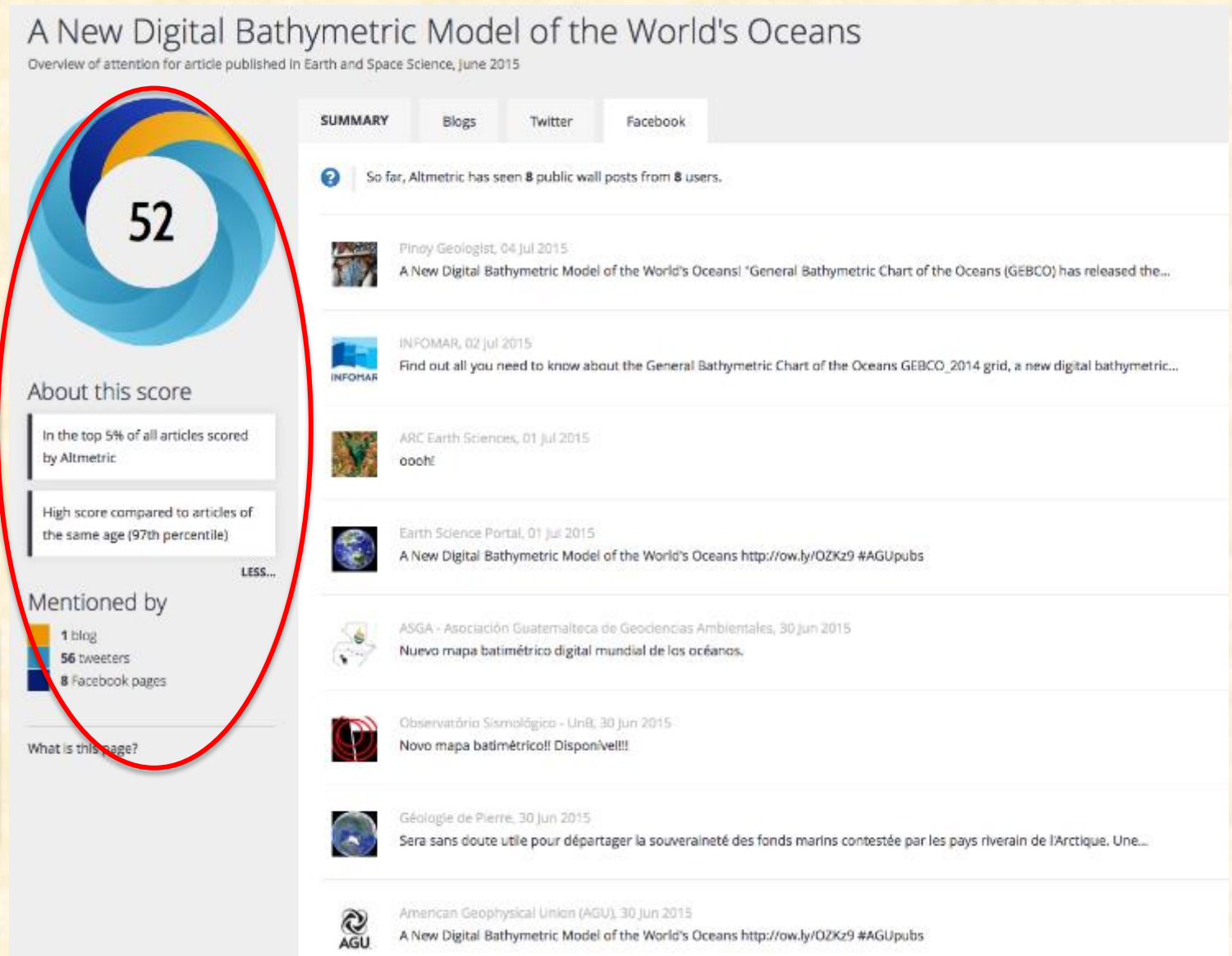
References

Ocean Area	Regional and Global Bathymetric Grids
Gridded bathymetric data sets for all ocean regions	SBTMD32_PLUS, version S02 (December of ... 2009 )
Arctic Ocean (north of 64°N)	International Bathymetric Chart of the Arctic Ocean (IBCAO) v3 (Jakobsson et al., 2012 ) ( <a href="http://www.ibcao.org">www.ibcao.org</a> )
Southern Ocean (south of 60°S)	International Bathymetric Chart of the Southern Ocean (IBCSO) v1 (Arndt et al., 2013 ) ( <a href="http://www.ibso.org">www.ibso.org</a> )
Caspian Sea	Gridded data set provided by John K. Hill (1987 )—also included in GEBCO_08
Black Sea	Gridded data set provided by John K. Hill (1987 )—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 (Schweizer et al., 1997 )—also included in GEBCO_08
Waters around Europe	European Marine Observation and Data Network (EMODnet), 2013 data set ( <a href="http://www.emodnet.eu/bathymetry">http://www.emodnet.eu/bathymetry</a> )

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



# Release Paper Metrics



Attention ranking

Top 5% of articles scored

Mentioned by  
Facebook,  
Twitter, Blog



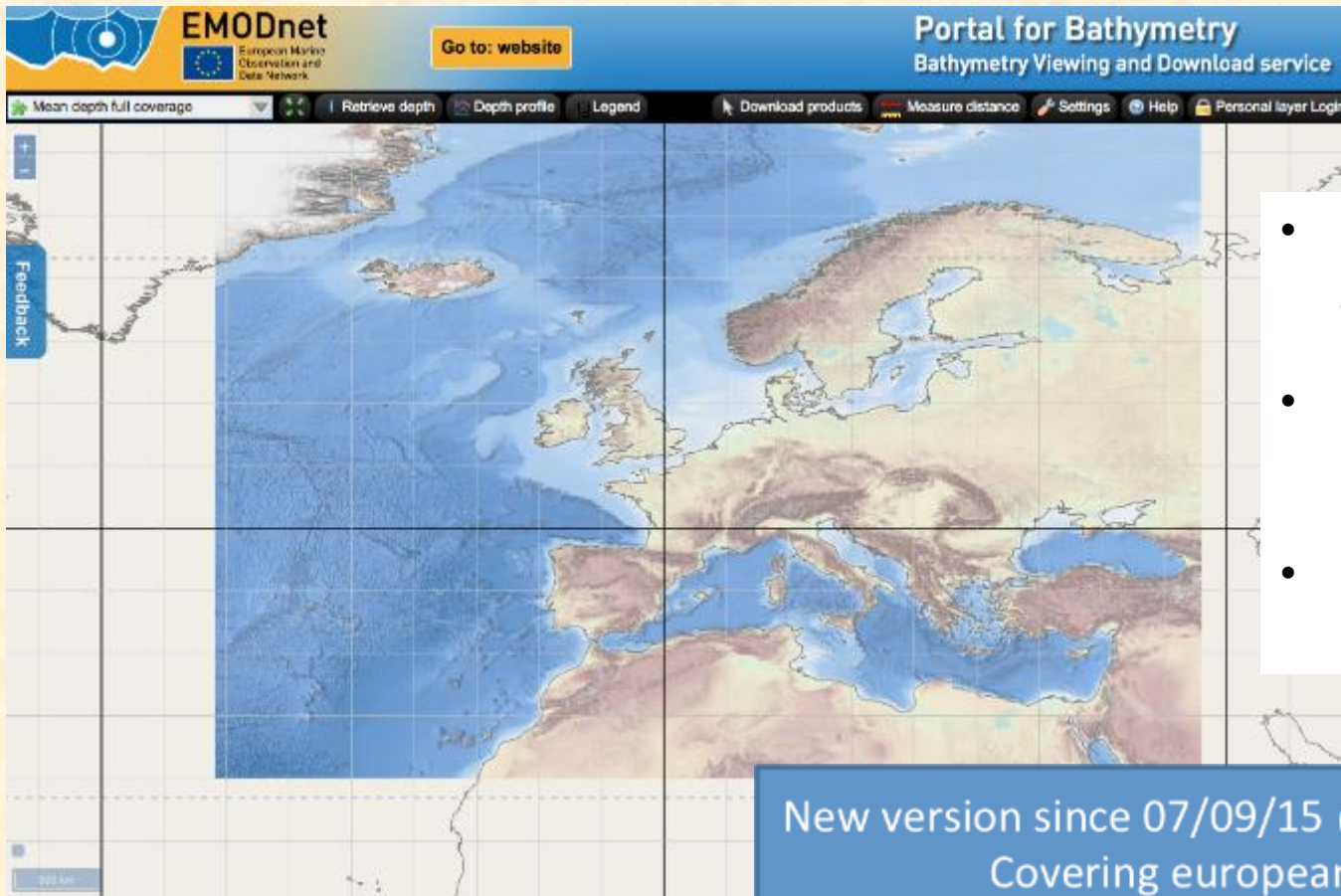
# 2015 Science Day

- 10<sup>th</sup> Annual GEBCO Bathymetric Science Day was held at the Kuala Lumpur Convention Center
- 13 oral and 8 poster presentations
- 50 + attendees at Science Day
- We were honored by Dato' Seri Hishamuddin Tun Hussein, Minister of Defence Malaysia, speaking at the Opening Ceremony





# 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



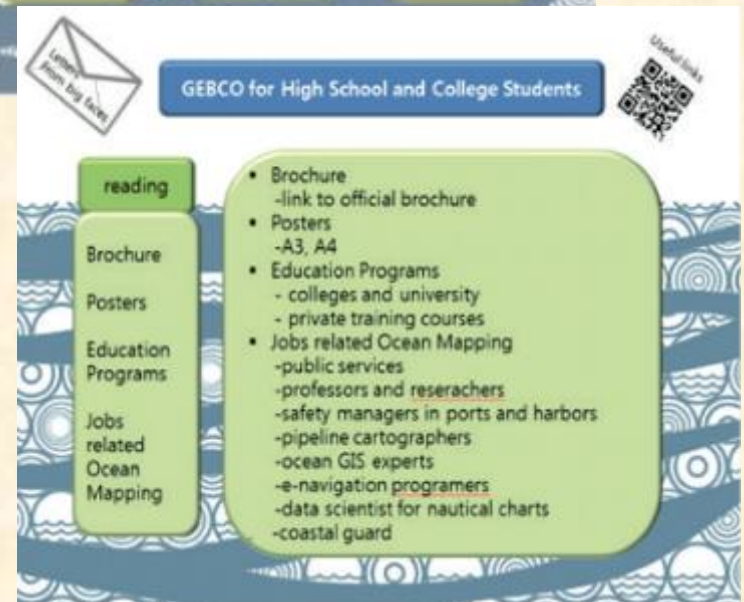
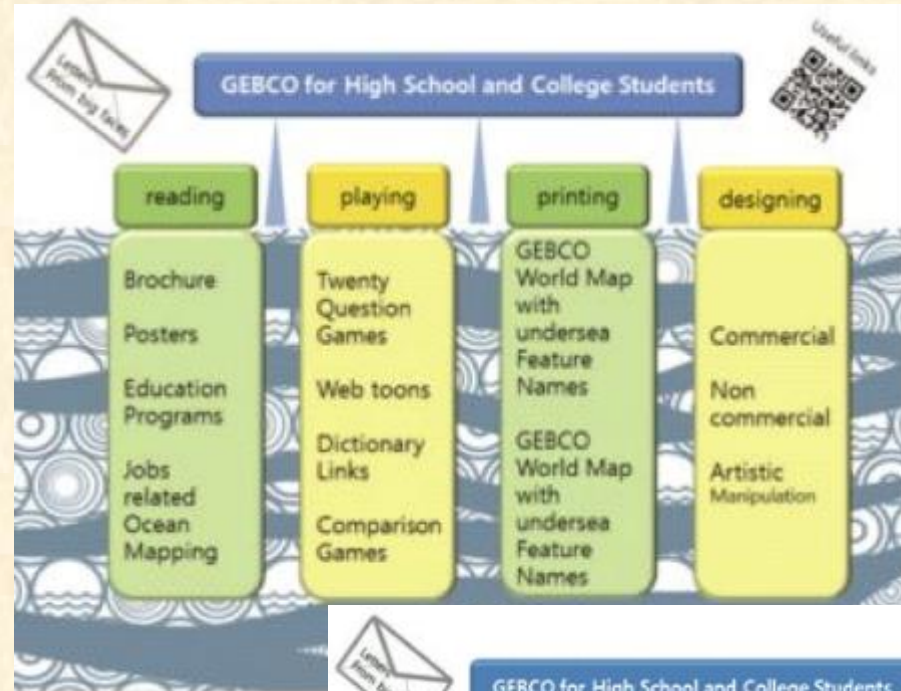
# Crowd-Sourced Bathymetry WG

- 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





# 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

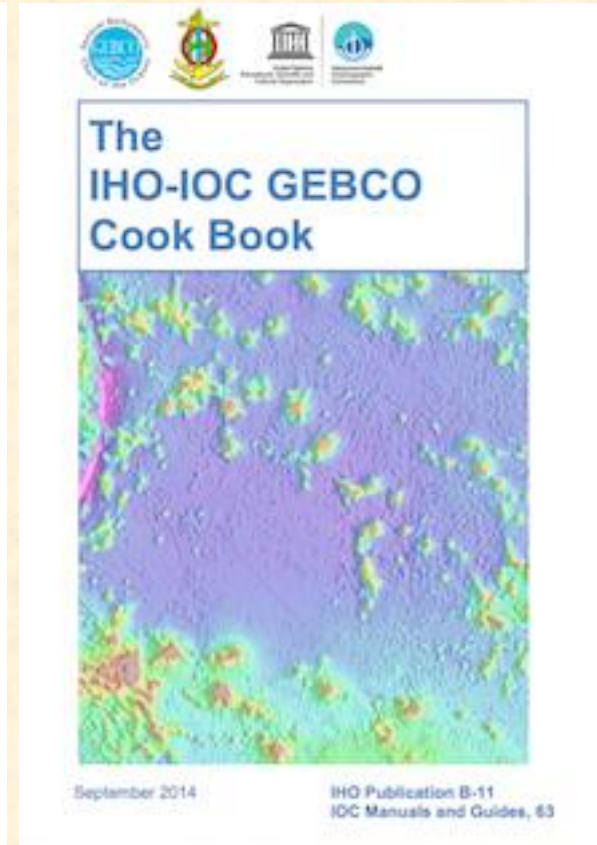
All Bathymetry	Coastal	DEM Portal	Fishing	Global	Lakes	Multibeam	NOB
							
<b>IHO Data Center for Digital Bathymetry (IHO DCDB)</b>							
<p>The National Geophysical Data Center in Boulder, Colorado, USA, operates a worldwide digital data bank of oceanic soundings on behalf of the Member Countries of the International Hydrographic Organization (IHO). The IHO is based in Monaco and presently has approximately 65 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.</p>							
<b>DATABASES</b>							
<p>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 NOSHDB (National Ocean Service Hydrographic Database) is a subset of the Hydrographic Survey Data System.</p>							
<b>SERVICES PROVIDED BY THE IHO DCDB</b>							
<p>The following services are provided by the NGDC on behalf of the IHO:</p> <ol style="list-style-type: none"><li>1. Operation of the data center with a focus of activity on oceanic regions with depths greater than 100 meters.</li><li>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.</li><li>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 continued cruises.</li><li>4. Maintenance of inventories in digital form of all digital bathymetric data held in the data center.</li><li>5. Collaboration with various international organizations in the development of exchange formats and standards to expedite bathymetric data exchange.</li></ol>							
<b>Related External Links:</b> <ul style="list-style-type: none"><li>International Hydrographic Organization (IHO)</li><li>GEBCO</li><li>International Ocean Mapping</li></ul>							
<b>Search GEODAS</b> <b>Databases:</b> GEODAS Hydrographic Surveys							
<b>Data Submission</b> 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 preferably in the MGD77 exchange format, but any well documented format is acceptable. <b>Mail Address:</b> NOAA/NGDC 50503 285 Broadway Boulder, CO USA 80508-3008							



# IHO-IOC GEBCO Cook Book

At the 2009 GEBCO 25<sup>th</sup> 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 contributed 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



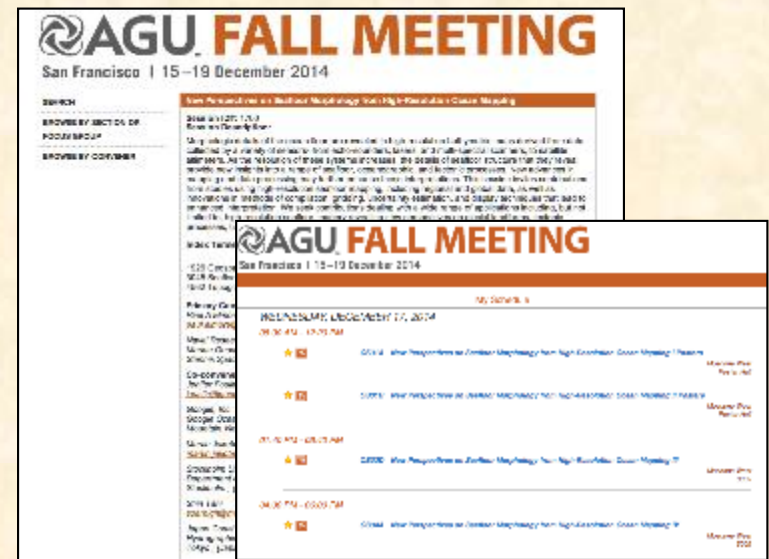
Workshop- July 2015

Shachak Pe'eri and Rochelle Wigley, UNH/CCOM



# 2014 TSCOM/SCRUM Meeting and GEBCO Science Day

- TSCOM/SCRUM meeting held Dec. 11-13, 2014 at Google Headquarters, Mountain View, CA
- Host was Jenifer Austin, Manager of Google Ocean Program
- GEBCO Science Day was at a Fall 2014 AGU Meeting Special Session
- 4 Ocean Sciences sessions
- 16 oral and 29 poster presentations





# Break-out on Crowd-Sourced Bathymetry

- Led by Taylor
- Discussions on how to incorporate, manage, and use crowd-sourced bathymetric data
- List attendees
- Notes to be submitted to Permanent Secretary
- Activity is on-going



# Break-out on Outreach- Webpages for Students

- Led by Sung, Chang, and Weatherall
- Discussions on adding subpages to GEBCO website
- List attendees
- Notes to be submitted to Permanent Secretary
- Activity is on-going



# Break-out on Updating the GEBCO Grid

- Led by Jakobsson and Marks
- Discussion on adding regional compilations to grid
- Discussion on updating base grid to SRTM30\_Plus V11
- List attendees
- Notes to be submitted to Permanent Secretary
- Activity is on-going

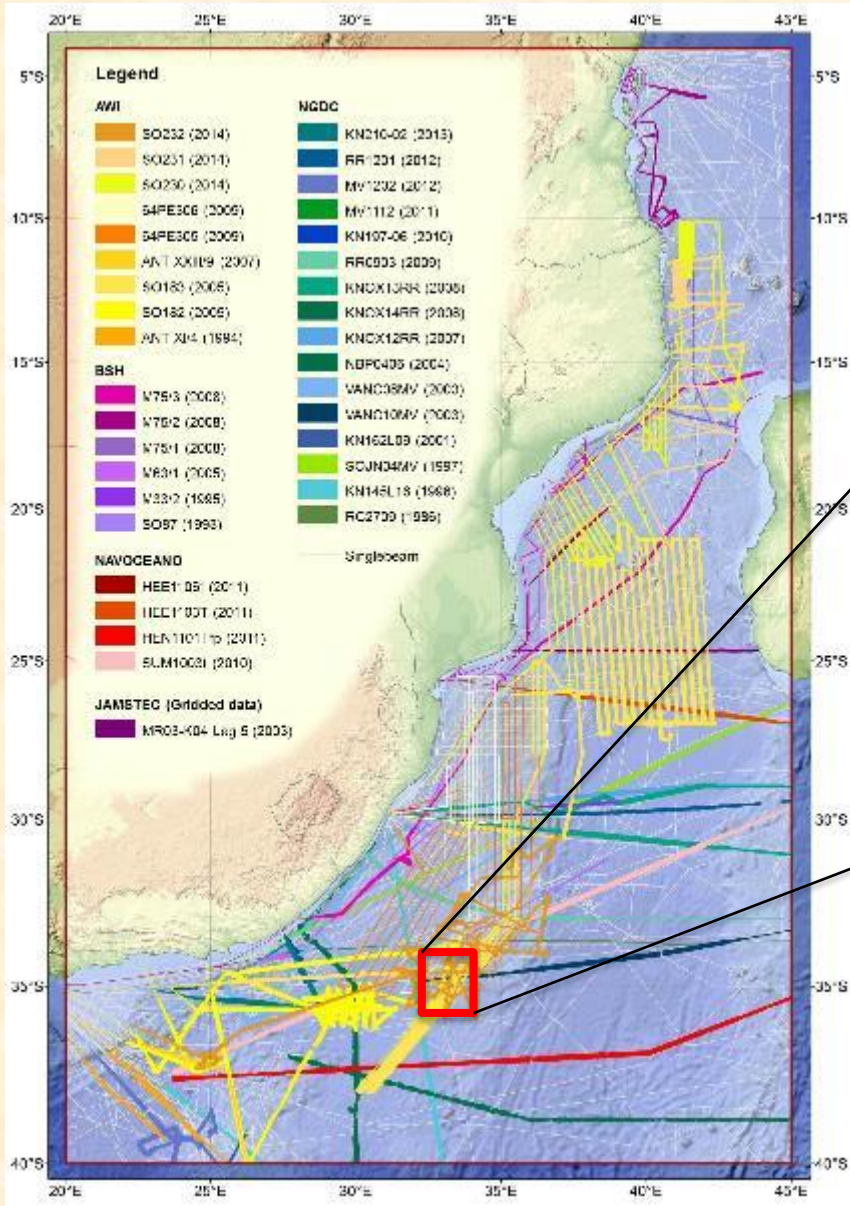


# Related Activities

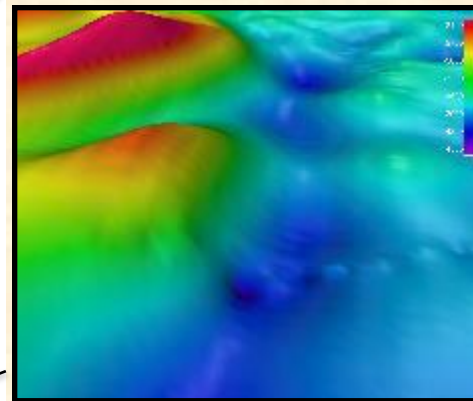
- IBCSO gridding algorithm used in swIOBC (Arndt)
- FRAM- 2014/15 Drift of R/H SABVABAA (Hall)
- New Bathymetric Map of Israeli EEZ (Hall)
- R/V Bet Galim to survey EEZ (Hall)



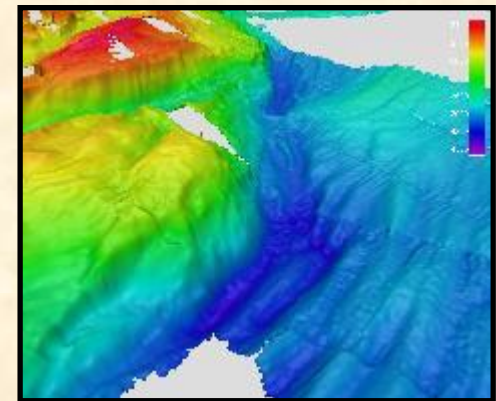
# swIOBC using IBCSO gridding



- 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 area was previously published in 1994, compiled from all the depth maps, remotes 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
  - Southern Israel
  - Emerald 2009-2010 Merge
  - Bora Myra
  - Arie
  - Polagic
  - Nave Hovvei
  - Rudi C
- 2D Seismic Surveys
  - Horizon 1993
  - Seismic 1995
  - Isomac 1991
  - Palto Med
  - Spectrum 2001
  - TGS 2000
  - TGS 2008
- Legacy data sets
  - Northern Area
  - French Marine's 'Bhalimar' EM1002 survey by RVN Summit in 2004 for the Lebanese government.
- GSI-MGD seismic survey of Ras al Bayana during 'Operation Uran' in 1979
- Lebanese coastal and fishing charts
- Northwestern Area
- Medmap Group Mediterranean multibeam sonar compilation available to contributing members as a 500m grid.
- Eastern Area
- GSI-HOLR-SOI Israel NBS EM1002 multibeam sonar survey 2001-2013.
- Crossed coastal pipeline survey done for the Ministry of National Infrastructures in 1998
- 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 1800 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. 6). The depth to the sea-floor in the seismic data is correlated to 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 (1500 m/s).

### Working Steps

1. Manual picking of WB seismic reflection on 3D data (Fig. 4)
2. Auto-picking of entire 3D cube (Fig. 4)
3. Surface creation (spatial resolution as seismic data)
4. Depth conversion (where needed)
5. Surface adjustment to WB from well control (Fig. 6)
6. Merge 3D surfaces (Fig. 7)
7. Manual picking of WB seismic reflection 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 surfaces with legacy & land data (Fig. 9-11)

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

1. Geological Survey of Israel, 30 Malkia Street, Jerusalem 95501, Israel
2. Ministry of Energy and Water Resources Administration, 216 Jaffa, Jerusalem, 64388, Israel
3. Israel Oceanographic and Limnological Research Ltd., Tel-Shikmona, P.O.Box 8090, Haifa 31080, Israel
4. Survey of Israel, 11 Lincoln, Tel-Aviv 14171, Israel

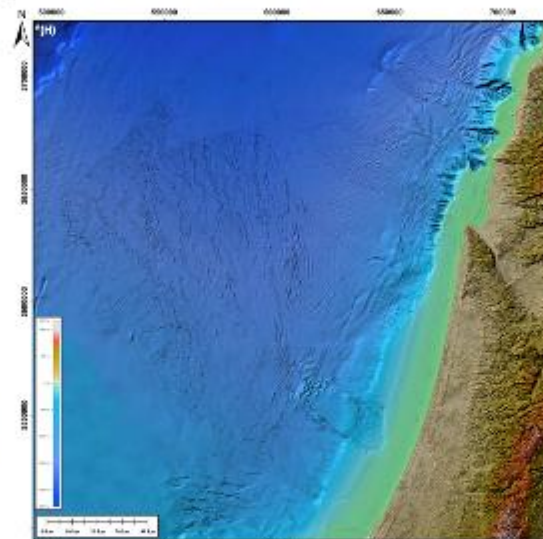


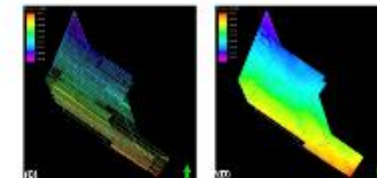
Fig. 1: 3D, 10m resolution (WB) data sets - Zone 5A



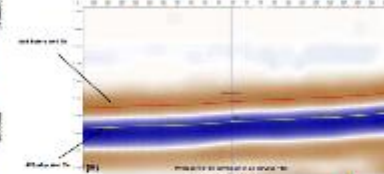
Spatial Resolution of Various 3D Surveys & Location of Multibeam Data



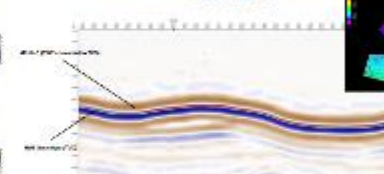
Areas of 3D Seismic Line Picking



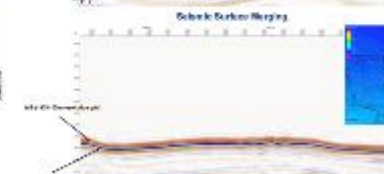
Manual Picking Auto Picking



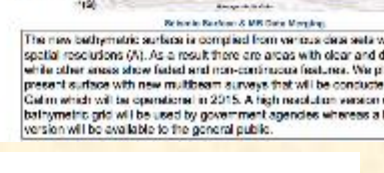
Seismic Well Tie



Seismic Well Tie



Seismic Well Tie



Seismic Well Tie

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 'Shikmona' which 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 combat 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: Nof gas field in 1999 then exploration activity increased drastically after the discovery of the giant Tamar and Leviathan fields in 2006-2010. The Leviathan gas field (~38 Tcf) is one of the world's largest offshore gas finds of the past decade.

### 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 combat oil spills, operate RCN and other autonomous vessels that will also assist in search and rescue missions.

### 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.

### 4. The Klein Klasse Vessel

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

Length overall	36m	Beam	10.5m	Depth of hull	14.5m
LD	10	Max. draft	10.5m	Displacement	1,300 tons
LD	10	Max. speed	14 knots	Endurance	14 days at sea & 10 days in port
Max. displacement	1,300 tons	LD	10	Max. draft	10.5m
Endurance	14 days at sea & 10 days in port	LD	10	Max. draft	10.5m

Figure 3: Acoustic level at future production location. The plot shows the acoustic level (dB) versus frequency (Hz) for the Bat Galim. The level is relatively low across the frequency range, indicating good acoustic characteristics for sonar operations.

Figure 4: Wet/Dry Lab

Figure 5: Telescopic A-Frame

### 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 (UNOL). The Bat Galim will be equipped with a 3.5 m x 2.5 m x 2.5 m wet/dry lab, 36 m<sup>3</sup> of Dry & Wet lab built in 20-20' portable containers (Fig. 4) 4 tan, 4 m width and 5.7m high telescopic A-Frame (Fig. 5).

The acoustic equipment will be installed in a 3.5 m x 2.5 m gondola (Fig. 6). It will include: Kongsberg EM 302 (132 deg.) and EM 2040 multibeam systems; Knudsen Chirp 1200 sub-bottom profiler and 12 kHz single beam echo sounder; Tekodyne RDI Ocean Surveyor 75 kHz ADCP; EikonQuest TC5000s USBL; Teledyne Reson 510-120kHz hydrophones and Valeport mini sound velocity sensor. Other sampling and mapping equipment will include: 660 Marine Survey Systems high resolution seismic imaging with Geo-Spark 2500K and multibeam streamer; SBE 12 Carousel water sampler with CTD; box and 9 m piston cores (built similar to USGS design).

contact info: Dr. Gideon Tibor (tiborg@unol.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.)



# Summary

- GEBCO\_2014 grid released Dec. 2014
- GEBCO\_2014 release paper published in AGU's Earth and Space Science
- Progress made on:
  - Crowd-Sourced Bathymetry Working Group
  - Outreach Master Plan for Students
  - Updating the GEBCO grid
- Joint TSCOM/SCRUM Meeting at Kuala Lumpur had 48 attendees and 3 Break-out sessions
- GEBCO Science Day was successful- 13 oral presentations and 8 posters
- Related Activities



**END OF PRESENTATION**