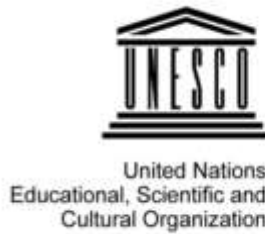


G E B C O

GENERAL BATHYMETRIC CHART OF THE OCEANS



Joint meeting of the
GEBCO Technical Sub-Committee for Ocean Mapping
GEBCO Sub-Committee for Regional Undersea Mapping
Google Headquarters
Mountain View, California, USA
December 11-13, 2014

V3.0, 03/01/15

Jenifer Austin, Google Ocean Manager, welcomed the participants to Google. She described the local Google campus which has six buildings. There are also locations in New York, Seattle, and Zurich.

Martin Jakobsson presented the meeting agenda, emphasizing that the status updates will lead into focusing the break-outs. He recommended break-outs include GEBCO Data Store, Regional compilations, and crowd-source bathymetry. He invited all to join and actively participate in SCRUM.

Karen Marks presented the activities and highlights of TSCOM over 2014. She invited all to join and actively participate in TSCOM.

http://www.gebco.net/about_us/meetings_and_minutes/documents/tscom_scrum_2014_marks.pdf

Martin Jakobsson presented activities and highlights of SCRUM

http://www.gebco.net/about_us/meetings_and_minutes/documents/tscom_scrum_2014_jakobsson.pdf

Status Reports:

Regional bathymetric compilations (Martin Jakobsson)

- SCRUM serves as liaison with regional mapping efforts
- Regional projects include IBCAO, IBSCO, JHOD, BSBD, EMODnet, IOBC, IBCs
- 19% of GEBCO_2014 grid consists of regional compilations, strong in shallow areas

- Goal for GEBCO_2016 is to have 40% of grid from regional compilations
- Potential new linkage with IICWG

Updating the GEBCO grid (Pauline Weatherall)

http://www.gebco.net/about_us/meetings_and_minutes/documents/tscom_scrum_2014_weatherall.pdf

- GEBCO_2014 released December 2014
- SID grid available
- Contains new regional compilations, grids, and ship track data
- New download webpage interface

GEBCO Data Store (Barry Eakins)

http://www.gebco.net/about_us/meetings_and_minutes/documents/tscom_scrum_2014_data_store.pdf

- Dan Price at NGDC is leading Data Store efforts
- Data Store seeks processed, metadata-documented data to improve GEBCO grid
- Metadata, data formats, and upload/download methods being determined
- Metadata/Upload Web Application Tool in testing

Global DEM project (Jenifer Austin):

- Virtual imaging in Google Earth/Google Ocean
- Earth Engine for visualizing and analyzing satellite imagery
- Google seeks to make all types of ocean data available

SRTM15_Plus (David Sandwell):

http://www.gebco.net/about_us/meetings_and_minutes/documents/tscom_scrum_2014_sandwell.pdf

- Scripps Institution of Oceanography seeks to contribute bathymetric data to GEBCO Data Store
- New SRTM15_Plus grid brings out new seafloor details and also bad data
- Bad data meticulously edited by hand
- Grid will improve by incorporating more data

GEBCO Hi-Res Product (Vicki Ferrini):

http://www.gebco.net/about_us/meetings_and_minutes/documents/tscom_scrum_2014_ferrini.pdf

- GMRT has been improved from new grids, new services, and new interface
- New attribution service includes zooming in on data and retrieving attributions

IBCAO (Martin Jakobsson):

http://www.gebco.net/about_us/meetings_and_minutes/documents/tscom_scrum_2014_ibcao.pdf

- Current version 3.0, 500 x 500 m grid
- Improved over older version by addition of new data
- High-resolution multibeam survey shows glacial scouring details which are not captured in 500 m IBCAO grid

Alaska Region DEM (Seth Danielson):

- Seeks to bring Alaskan multibeam data to GEBCO
- Soundings-only based model
- Compilation includes depths digitized from point soundings on Russian charts
- Coastal compilations not yet incorporated

IBCSO (Jan-Erik Arndt):

http://www.gebco.net/about_us/meetings_and_minutes/documents/tscom_scrum_2014_ibcao.pdf

- First version (1.0) available since 2013
- 500 m grid
- Extent: area south of 60°S
- Future improvements may include more data and greater extent

GEBCO 10 Year Goal (Shin Tani):

- Nippon Foundation has trained 60 students in ocean mapping
- Ten year celebration of GEBCO next year in Monaco
- GEBCO compiles bathymetry data, does not collect it
- GEBCO will now work from coastlines to deepest oceans

Outreach (Eunmi Chang):

http://www.gebco.net/about_us/meetings_and_minutes/documents/tscom_scrum_2014_outreach.pdf

- Outreach makes people aware of GEBCO work
- Vision and strategy includes moving from web to mobile
- Networks needed for large audience

Tasks – to do actions:

- Put a method of citing Cook Book up on web
- Post all TSCOM/SCRUM meeting presentations on GEBCO website
- List on GEBCO website all 38 members of TSCOM/SCRUM working group
- Thierry will provide link to publication for GEBCO website
- Ferrini, Schmitt, Chayes, Arndt volunteer to work on release paper.

Tasks - in progress:

- John Hall is working on Cook Book chapter on how to make data available
- GEBCO_2014 release paper in preparation
- Arctic-Antarctic mapping meeting in 2015

Break-outs:

GEBCO Data Store

Barry Eakins led the break-out group.

Vision: Achieve 40% sounding coverage in GEBCO grid. Data store as repository of already- processed data, footprints (polygons), with links to original data source organizations, and information.

Data:

- Processed bathymetric track line and gridded data. Documented for public access, distribution.
- Proper source attribution.
- Necessary metadata provided (what processing has been done). Limited number of file formats.
- Flagged as GEBCO.
- Acceptable file formats- grids, netcdf, geotiff, Arc ASCII.
- Accommodate scanned images of data that have to be digitized into points (e.g. from John Hall)

What is the data store?

- 1) Definitive source for data.
- 2) Repository for cleaned and QC'd data for use in GEBCO grid.
- 3) Tool for increased collaboration.

What to consider:

- 1) How should data store function?
- 2) What does it need to do?
- 3) How to contribute and access the data store?
- 4) What is the format of contributed data?

Barry showed a slide of two unlabeled food cans to demonstrate the need for metadata. Without labels, one has no way to know what is in the cans. With labels (metadata) the contents can be identified and you know what you are getting.

David Sandwell suggested some high-level objectives:

- 1) If ~16% of seafloor in GEBCO grid is currently covered by soundings, we should set a goal of 40% being mapped by ships at some resolution in the future. GEBCO does not make data measurements, but instead compiles available data.
- 2) Regarding data in the GDS, it needs to be public data, not private data.
- 3) Why should there be only one data store? Should there be others, which are “mirrors” of each other?
- 4) Should a proposal to fund GDS be written up and submitted to government agencies or private industry?

Tools:

Low volume: CEdit Manual.

Enables contributors to easily create acceptable metadata and submit data through an HTML web form. Gathers info for data discovery, flags Source Identifiers (SID), and auto generates high quality, ISO compliant metadata.

High volume: automated. Common data formats, descriptions (relies upon precise metadata).

Discussion from the floor:

- The “comfort level” of contributors needs to be respected, while at the same time encouraging contributions. A proprietary or high-resolution data set may be decimated, enabling it to be a public contribution.
- The idea of not only data contributions, but “footprint” contributions came up. A source organization may not wish to contribute data, but may instead wish for the GDS to point to their website where data and metadata can be accessed directly. A “footprint” or “polygon” plotted on the global bathymetry map can indicate where data are available via link to source organization.
- The “volume” of contributions has two meanings- the number of contributors, or the amount of data files a single contributor may make.
- The GDS needs to be aware of source organization metrics (e.g., number of downloads, number of website visits, amount of data, etc.) and be designed in a way to increase metrics.
- The GEBCO community will likely be the biggest user of the GDS. So first the GDS should be built to serve the GEBCO community, then later for wider audience.
- Google could also be a user of GDS data. For example, Google could use the data in Google Engine and in outreach products. It could also be used for climate questions.
- Tony Pharaoh brings up the issue of licensing- should GDS data be licensed? What about a Creative Commons license?
- Attributions, DOI numbers, etc. are very important and may encourage contributions of data.
- Consider- instead of the GDS being a repository- should it be a registry of data, a kind of gate for data?
- The IHO DCDB and GDS webpages need to be “branded” for IHO, and not show host NOAA logos, etc.
- SID information may be leveraged to not only provide source attribution, but to show, graphically, how much of the ocean is not mapped. Possibly Google could use SID as a layer so users can visualize the % of ocean not covered by soundings.
- The GDS is part of the IHO DCDB. It can be displayed as a layer in the DCDB bathymetry map viewer. It should be designed so that it is possible to search on the date of a contribution, a time range (e.g., “new since mo-day-yr”). Searching on parameter such as depth range will be unlikely.
- Enable educational outreach opportunities

Summary

Main Purpose: Repository for data for GEBCO grid. Long term preservation plan for global ocean map data.

Vision:

- 1) Achieve 40% sounding coverage in GEBCO grid
- 2) Data store is a repository of already-processed data, footprints (polygons) with links to original data source organizations, and information about other data
- 3) Data store is designed initially for GEBCO community use

Goals:

- 1) Enable and encourage open contributions
- 2) Serve needs of GEBCO community
- 3) Establish where data exist (geospatially & internationally) Definitive inventory for reconstructing altimetry grid.
- 4) Repository to improve altimetry grid. Access data for regional mapping efforts. Collaboration.
- 5) Central repository for open data for the world. Establish where data exists.
- 6) Curating the best map of the ocean. Enable Ocean education and outreach.

Tasks:

- 1) Demonstrate FTP upload and download of data contributions from GEBCO community
- 2) Define minimum metadata requirements
- 3) Refine and make functional web application tool for metadata/data upload/download
- 4) Branding of websites to IHO DCDB

Metrics of success?

Metrics: press, website usage. YouTube video views.

Amount of paper reference, DOI number. SID accompanying a grid, attribution.

Ferrini: Contributor can say, we've contributed x amount of data to "GEBCO data store."

Schwehr: If you require website usage, download stats as requirement, then can create a straw limitation. Attribution and press part. Referenced in papers.

Sandwell/JJ: take data machine to machine, not using Map Viewer. Need to consider data file has date, so computer can tell what's new automatically.

Future considerations:

- 1) Policy discussions
- 2) Graphical search criteria
- 3) Create FTP site. Scope out metadata template? Data catalog entry labels?
- 4) Policy discussion. Graphical search criteria

Separate target:

- 1) GEBCO should write a proposal for funding to create Data Store

Attendees:

Jamie Adams
Jenifer Austin
J.J. Becker
Eunmi Chang
Barry Eakins
Li Sihai

Vicki Ferrini
Karen Marks
Rezwann Mohammad
Chris Olson
Tony Pharaoh

David Sandwell
Thierry Schmitt
Kurt Schwehr
Beata Van Esch
Tsuyoshi Yoshida

Gridding Workshop Breakout Group

Martin Jakobsson led this break-out group.

Purpose of Gridding Workshop:

Technical workshop for experiments with different types of gridding techniques.

Considerations:

- 1) Types of attendees- people looking for a lecture, or people showing up with computers and hands-on learning to grid (Dale Chayes)
- 2) IHO may have 9000 euros for teaching gridding (Jan Erik Arndt, Martin Jakobsson)
- 3) Possible venue for workshop is with 2015 Fall AGU meeting in San Francisco
- 4) Potential gridding course- teaching how to grid. Can course be made available on YouTube or iTunes University (Paul Elmore)?
- 5) Potential for gridding course in conjunction with RHCs. Mapping program in underdeveloped regions, can be classified as capacity building (training IBCs) (Tony Pharaoh).
- 6) Volunteers would be needed to go teach the course. Tony, Thierry, Martin may explore finding volunteers.
- 7) Gridding workshop results may be compared to controls, such as multibeam surveys or even satellite-estimated depths.

Tasks:

By end of Jan. 2015, prepare data sets to use with different gridding algorithms. Data sets may represent different tectonic regimes: EPR (Paul), Trench, Svalbard (Martin), MAR, IBCSO (Jan-Erik). Sample should be heterogeneous, including single- and multi-beam data.

Goals:

Workshop to result in a published review paper on different gridding methods and gridding pitfalls.

Scientific Gridding Workshop sign-up sheet:

Thierry Schmitt
Paul Elmore

Thierry.schmitt@shom.fr
paul.elmore@nrlssc.navy.mil

Karen Marks Karen.Marks@noaa.gov
Rezwan Mohammad Rezze@geo.su.se
MB System (Dave Caress & Dale Chayes) caress@mbari.org, dale@ldeo.columbia.edu
Chamic Minchol chamic@korea.kr
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JJ Becker joseph.jeffrey.becker@gmail.com
Marzia Rovere m.rovere@ismar.cnr.it
Jan Erik Arndt Jan.Erik.Arndt@awi.de

Crowd-source Bathymetry Breakout

Easy to add a data logger to boats of opportunity.

Olex- makes contributing low threshold, and returns a product.

IHO- interested in what areas need to be surveyed?

Encourage best practices. Cook book goal.

1. Planning. ID interesting area for csb work; what kind of sounder to put you your boat?

2. How to collect Guidelines.

- Hardware best practices- max automation, opto isolation, power (leaving port), ability to turn off (legal/limitations)
- Metadata (provide ways to describe data post collection. Accuracy attribution: sounder make and model, gps make and model, GPS and sounder offsets (wizard), how did you get these numbers (calculate frame, pace it, measure tape, guess)
- Free-form text paragraph describing the installation (could indicate wrong side of sounder, verify the metadata numbers).
- Fuzzy numbers accuracy algorithm/field guide to uncertainty; dempster-Shafer (Paul Elmore working).
- Asynchronous input matching on the fly vs. pure raw data and post process (time stamping)
- Patch test sites.
- Time synchronizing (GLA/GSM)

CSB Data Collection not on typical vessels, buoys.

Some fleets don't want to contribute during the same season, i.e. fishing. Role for trusted node. Major next sources of crowd-sourcing. Make possible for oil, cable industry. Think about what data will be used for? What if someone contributes false data on purpose?

Attendees: Kenneth Himschoot, Shin Tani, Paul Elmore,+?

Regional Products Breakout

Conclusions

1. Make chapter in GEBCO Cook Book on SID (Pauline/Marzia)
Develop a SID scheme that all can use for the next releases with type of data as one digit number.
This will be a recommendation paper that all regional compilations can use.
2. Next Arctic and Antarctic mapping meetings
 - CCOM, organize next Arctic Antarctic mapping, volunteer, Fall 2015 Late Oct.
 - AWI, check for fall 2015.
3. Updates: IBCSO, v 2 (2017), IBCAO, v3.1, spring 2016, including rdem, Greenland.
IOBC, ver 1 spring 2016. RedSea spring 2016
EMODnet, new 250m version by spring 2015.
4. Working group to explore use of variable grids.

Jakobsson: Where are we going? How to we show multi resolution?

Van Esch: puts multi resolution data, combined into one sequel service.

Sandwell- re-gridding in real time. Goes back to original data source.

Eakins: followed Lamont's tiles at multi resolution.

Attendees: Martin Jakobsson. Pauline Weatherall, Marzia Rovere, Jan Erik Arndt, Boris Dorschel; Laura Jensen and Seth Danielson

Outreach

Conclusions

Pauline is in charge of GEBCO website and will cooperate to add outreach webpage for the next generations.

GEBCO world map will be translated in other language rather than English and will be able to download from the outreach site.

Outreach activities should be tightly connected to GEBCO webpage and more diverse contents should be organized

Action items will be added by attendants after meetings

Attendees:

Eunmi Chang, emchang21@gmail.com

Kenneth Himschoot, kenneth.himschoot+gebco@sea-id.org

Vicki Ferrini, ferrini@Ideo.columbia.edu

John Hall, jkh1@012.net.il
 Pauline Weatherall, paw@bodc.ac.uk
 Rochelle Wigley, rochelle@com.unh.edu

Action Items for GEBCO Outreach Activities

The 1st stage to do list

#	Items	Contributors	By when
1	Gazetteers upgrade	NGDC NOAA	
2	GEBCO world map Translator In other languages	Nippon Foundation Colleagues, Tani	?
3	GEBCO world map: derived maps	Korea, Hyo and Eunmi	October, 2015
4	GEBCO Lenticular map & Balloons	England, Pauline	
5	GEBCO Webpage contents (Enriched pages with materials)	Korea, Hyo and Eunmi	Korean Government to develop section for High School students (edu) Kenneth Himschoot to develop a section on crowd sourcing Sections to be linked from main site (Pauline)
6	Cartoons in English	Korea, Hyo and Eunmi	October, 2015
7	Other material for outreach activities	?	October, 2015
8	Ask webpage links to IOC and other committees	Eunmi Chang	June, 2015
9	ICAO cooperation	Eunmi Chang	May, 2015
10	Museum contact	Eunmi Chang	August, 2015
11	Social Media content	?	GEBCO scholars to make YouTube videos
12	Newsletter articles		Identify people to interview (Rochelle & Vicky). Make list of interviewers.

The 2nd stage to do list

#	Items	Contributors	By when
1	Gazetteers Upgrade	NGDC NOAA	
2	GEBCO world map Digital globes	Google	
3	App application	Korea, Hyo and Eunmi	
4	Smart globes	England, Pauline	
5	Augmented Reality with GEBCO world map		
6	Derived digital map	Korea, Hyo and Eunmi	
7	Application of 3D printing (Abyssals and Fracture zones)		
8	A Study of Social Benefit of Bathymetry data: presentation materials and Brochure		

9	ICAO cooperation at second stage		
10	Museum contact at second stage		

TSCOM-SCRUM Meeting Attendees

Jamie Adams	Google
Robert Anderson	Science Applications International Corporation
Jan Erik Arndt	Alfred Wegener Institute for Polar and Marine Research
Jenifer Austin	Google
J.J. Becker	US Naval Research Laboratory
Eunmi Chang	Ziinconsulting INC.
Dale Chayes	Lamont Doherty Earth Observatory
Seth Danielson	University of Alaska Fairbanks
Boris Dorschel	Alfred Wegener Institute for Polar and Marine Research
Barry Eakins	National Geophysical Data Center/NOAA
Paul Elmore	US Naval Research Laboratory
Vicki Ferrini	Lamont Doherty Earth Observatory
John Hall	Geological Survey of Israel
Norhizam Hassan	National Hydrographic Centre
Kenneth Himschoot	Sea ID Ltd.
Martin Jakobsson	Stockholm University
Laura Jensen	Alfred Wegener Institute for Polar and Marine Research
Serge Lévesque	Canadian Hydrographic Service
Karen Marks	NOAA Laboratory for Satellite Altimetry
Rezwann Mohammad	Stockholm University
Son V Nghiem	Jet Propulsion Laboratory/NASA
Chris Olson	Scripps Institution of Oceanography
Tony Pharaoh	International Hydrographic Bureau
Marzia Rovere	Marine Sciences Research Institute
David Sandwell	Scripps Institution of Oceanography
Thierry Schmitt	Service Hydrographique et Océanographique de la Marine
Kurt Schwehr	Google
Li Sihai	National Marine Data & Information Service
Shin Tani	Hydrographic and Oceanographic Department Japan Coast Guard
Beata Van Esch	ESRI
Pauline Weatherall	British Oceanographic Data Centre
Rochelle Wigley	Center for Coastal and Ocean Mapping/UNH
Tsuyoshi Yoshida	Hydrographic and Oceanographic Department Japan Coast Guard

TSCOM-SCRUM Meeting Agenda

Thursday Dec. 11 (SCRUM and TSCOM)

8:00 Continental Breakfast

Welcome to Google (Jenifer Austin)

09:00 TSCOM activities and preoccupations (Karen Marks)

09:15 SCRUM activities and preoccupations (Martin Jakobsson)

09.30-10:30

Status Reports from regional bathymetric compilations

Status Reports from technical work on processing and gridding bathymetric

Status Reports

- Regional Bathymetric Compilations
- Updating the GEBCO grid (Weatherall)
- Global DEM Project/Sharing data with Google (Austin, Erickson, Schwehr, Adams, Sullivan)
- GEBCO Data Store (and brief look at NGDC's crowd-sourcing efforts) (Eakins)
- Demonstration of the GEBCO Data Store (Sandwell, Olson, Becker)
- GEBCO High-Resolution Product (Ferrini)
- GEBCO Science Day (Elmore)
- IBCAO (Jakobsson)
- IBCSO (Arndt)
- GEBCO Ten Year Goal (Tani)
- Master plan for an Outreach Program for GEBCO (Chang)

10.00-10:30 Refreshment Break

11:00 -12:00 Continue Status Reports

Meeting Address:

Google Headquarters

GWC3 building, Sesame Street Conference Room, 2nd floor

1505 Salado Dr

Mountain View, California 94043

12.00-13.30 Lunch

15:00 Adjourn

Friday Dec. 12 (SCRUM and TSCOM)

Meeting Address:

Google Headquarters

GWC3 building, Sesame Street Conference Room, 2nd floor

1505 Salado Dr

Mountain View, California 94043

8:00 Continental Breakfast

09:00 Tour of Google (Jenifer Austin)

09:00-14:30 Break-out sessions

Potential topics:

1. Regional compilations (route to GEBCO grid, copyright issues, new projects, data sharing)
2. Updating the GEBCO grid (Weatherall)
3. SRTM15_Plus 15 arc-second global grid (Sandwell, Olson, Becker)
4. Metadata, attribution, multi-scale resolution
5. "Bathymetric Gridding Course" (Jakobsson)
6. Crowd-sourcing (Himschoot)

7. GEBCO Data Store - portal, metadata, logistics, data sharing (Eakins)
8. Global DEM Project (Austin)
9. Documenting GEBCO grid in journal article (if article is already submitted, we won't need this) (Marks, Jakobsson)

10:00-10:30 Refreshment Break

10:30 – 12:00 Continue Break-out sessions

12.00-13.30 Lunch

14.30 Break-out sessions report results, recommendations, and action plans

15.00 Adjourn

Saturday Dec. 13 (SCRUM and TSCOM)

Half day (if needed)