Accessing the Global Multi-Resolution Topography (GMRT) Synthesis through GMRT MapTool

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Abstract

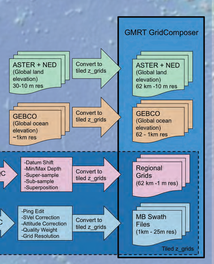
The Global Multi-Resolution Topography (GMRT) Synthesis (http://gmrt.marine-geo.org) is a dynamically maintained global multi-resolution synthesis of terrestrial and seafloor elevation data maintained as both images and gridded data values as part of the IEDA Marine Geoscience Data System. GMRT seamlessly brings together a variety of elevation sources, and includes ship-based multibeam sonar collected throughout the global oceans that is processed by the GMRT Team and is gridded to 100-m resolution. New versions of GMRT are released twice each year, typically adding processed multibeam data from ~80 cruises per year. GMRT grids and images can be accessed through a variety of tools and interfaces including GeoMapApp (http://www.geomapapp.org) the GMRT MapTool (http://www.marine-geo.org/tools/maps_grids.php), and images can be accessed through a Web Map Service.

We have recently launched a new version of our web-based GMRT MapTool interface, which provides custom access to the gridded data values in standard formats including GeoTIFF, ArcASCII and GMT NetCDF. Several resolution options are provided for these gridded data, and corresponding images can also be generated. Coupled with this new interface is an XML metadata service that provides attribution information and detailed metadata about source data components (cruise metadata, sensor metadata, and full list of source data files) for any region of interest. Metadata from the attribution service is returned to the user along with the requested data, and is also combined with the data itself in new Bathymetry Attributed Grid (BAG) formatted files.

About GMRT

GMRT brings together a variety of elevation sources which are delivered as multi-resolutional images and grids of land and ocean elevations. A mask layer is available that highlights the high-resolution data. Source data include:

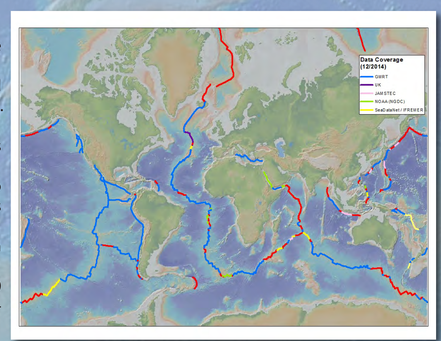
- Ship-based multibeam swath bathymetry data (100-m resolution) from research cruises assessed, cleaned, processed and curated by the MGDS. The current version (GMRT v2.7) includes data from 808 cruises.
- Terrestrial elevation data (10-m resolution) for portions of the US from the USGS National Elevation Dataset (NED)
- Terrestrial elevation data (30-m resolution) from NASA's Advanced Spaceborne Thermal Emission and Reflection Radiometer global DEM (ASTER)
- Gridded seafloor depth data (variety of scales) contributed by the international science community
- Gridded seafloor depth data (30 arc-second resolution) from the General Bathymetric Chart of the Oceans (GEBCO_08)
- Gridded seafloor depth data (2-km resolution) from the International Bathymetric Chart of the Arctic Ocean (IBCAO) version 2.23
- The SCAR Subglacial Topographic Model of the Antarctic (5-km resolution) from the (BEDMAP)



GMRT Version Number	Release Date	Track Length (miles)	Cumulative Track Length (miles)	Number of Swath Files Processed	Number of Cruises	Cumulative Number of Cruises
1	*before* 09/2009	1,370,354	1,370,354	51,248	365	365
2	01/2011	389,819	1,760,173	24,490	129	494
2.1	05/2011	206,256	1,966,429	9,307	77	571
2.2	04/2012	125,917	2,092,346	12,306	41	612
2.3	10/2012	81,463	2,173,809	5,437	37	649
2.4	04/2013	67,401	2,241,210	11,882	40	689
2.5	10/2013	132,142	2,373,352	18,595	42	731
2.6	05/2014	148,501	2,521,853	15,200	48	779
2.7	11/2014	105,765	2,627,618	9,830	29	808

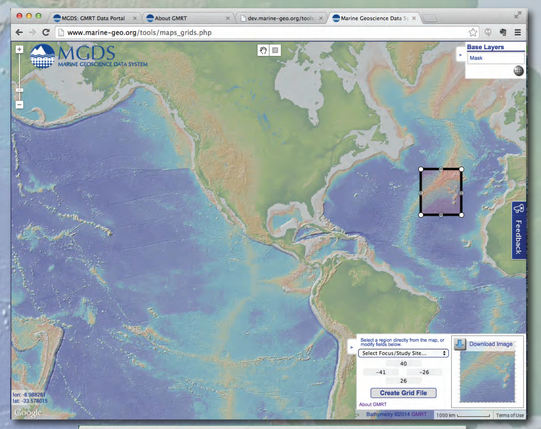
History

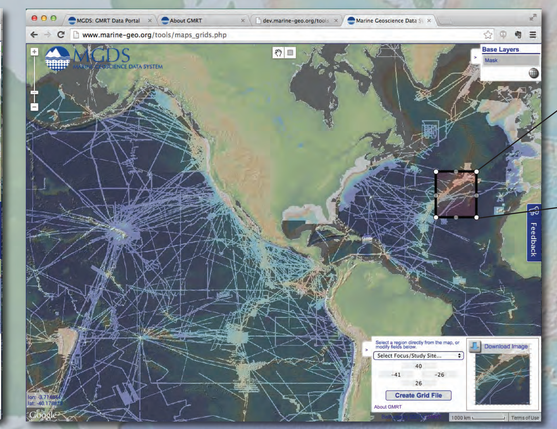
-1992- Synthesis began as the Ridge Multibeam Synthesis.
-2003- Compilation expanded to include the Southern Ocean.
-2004- GeoMapApp version 1.1 was launched providing access to GMRT compilation
-2005- Synthesis expanded to global oceans; Web Services Established
-2009- Ryan et al. published in G-cubed
-2010 & beyond- GMRT v.2.0 launched with semi-annual releases each year since.

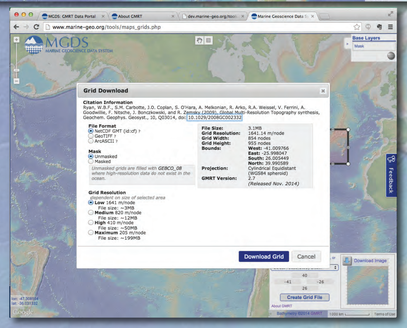


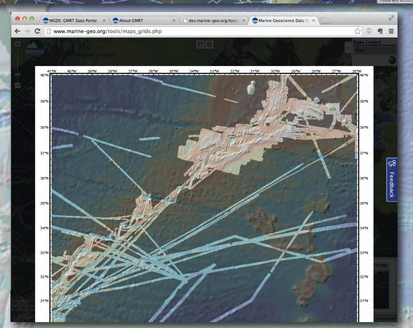
GMRT MapTool

GMRT MapTool presents the GMRT synthesis in a Google Maps interface and provides the user with simple tools for selecting an area of interest using either a graphical interface or by inputting W, E, S, N boundaries. The user is presented with several options for grid resolution and file format, as well as the option to download a high resolution image.



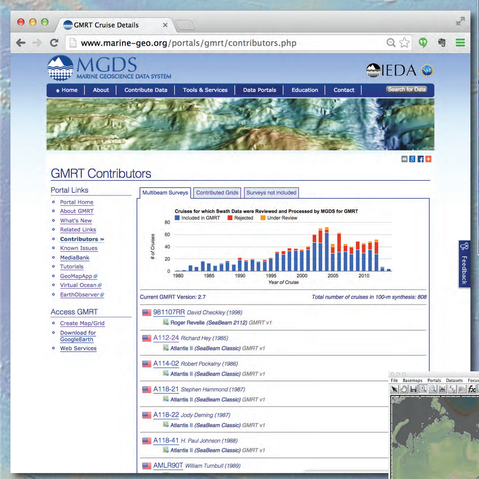


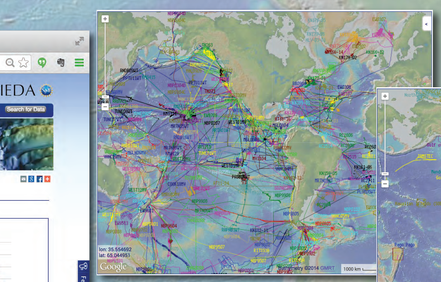


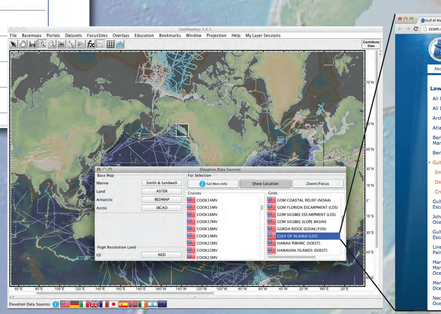


http://www.marine-geo.org/tools/maps_grids.php

Attribution & Access to Source Data



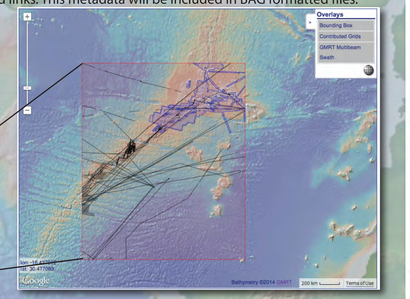




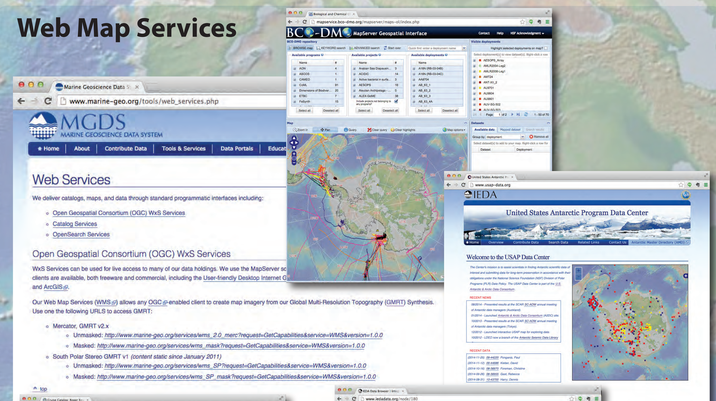
Full attribution to data sources is provided with metadata describing the source content, links to related websites, and access to source data files.

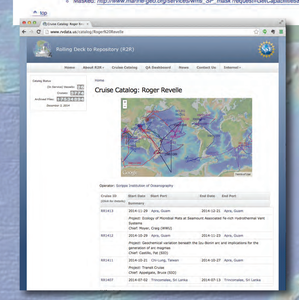
Attribution Service

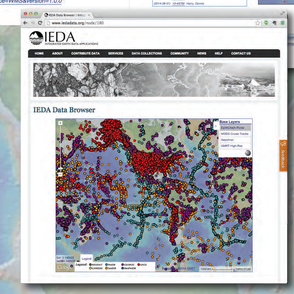
Returns metadata about source data included in GMRT synthesis in selected area. Metadata includes Scientist, Year, Cruise, file names, related links. This metadata will be included in BAG formatted files.



Web Map Services

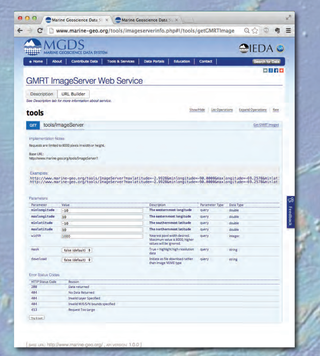




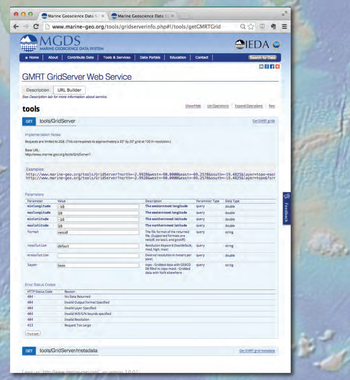


http://www.marine-geo.org/tools/web_services.php

New REST-like Services



GMRT ImageServer provides access to images from the GMRT Synthesis. Requested images may be up to 8000 pixels in either dimension and are returned as jpegs.



GMRT GridServer is a REST-like service for direct access to gridded data from the GMRT Synthesis. Requested data may be up to 2GB, or approximately 20 by 20 degrees at 100 meters per node (maximum available resolution). A variety of output formats are supported.

Acknowledgements

The curation of the GMRT Synthesis is supported as part of the IEDA Data Facility by the National Science Foundation with contributions from the Tides Foundation.