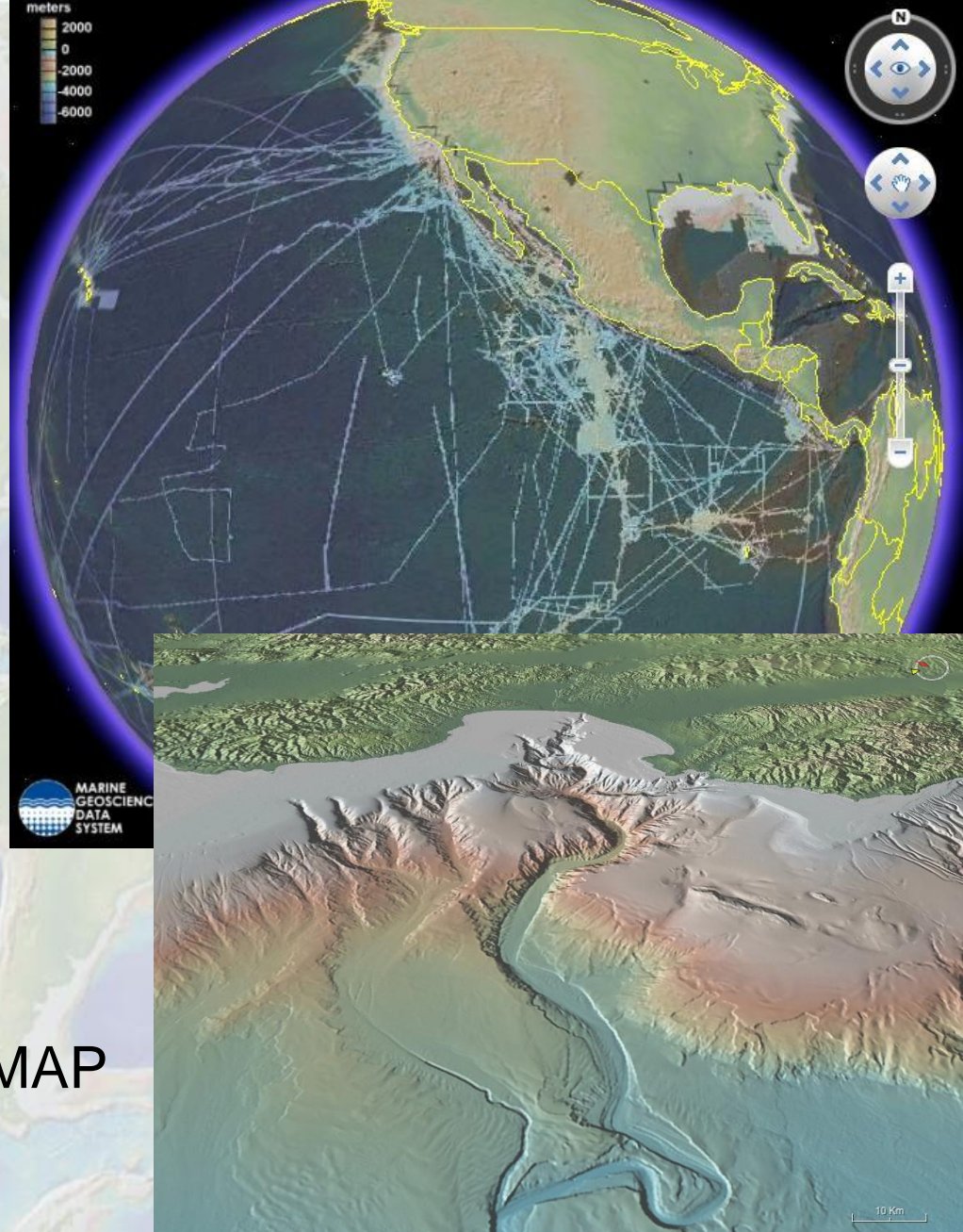


Attribution and Provenance Tracking for the GMRT Synthesis

Vicki Ferrini & Suzanne Carbotte
Lamont-Doherty Earth Observatory
Columbia University

GMRT Overview

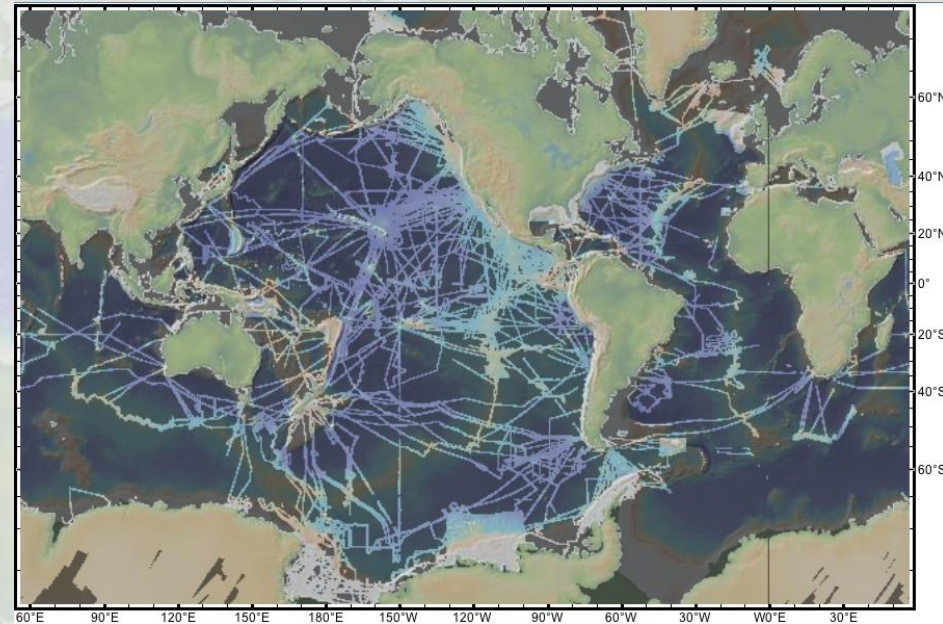
- Multi-resolution synthesis to ~100m resolution
- Dynamically maintained
- Access provided to images & gridded compilation
- Mask highlights hi-res data
- Attribution to data sources & contributing scientists
- Source Data Includes:
 - SRTM, ASTER, NED, GEBCO_08, IBCAO, BEDMAP
 - Contributed grids
 - Processed swath data from > 700 cruises (*public domain*)



GMRT Evolution

- **1992** – Ridge Multibeam Synthesis Project
- **2003** – Expanded to include US-funded MB data from Southern Ocean
- **2004 – present** – Expanded to include public domain MB data from throughout global oceans
- **2011 – present** – Two releases per year with ongoing growth of ~80 cruises/yr

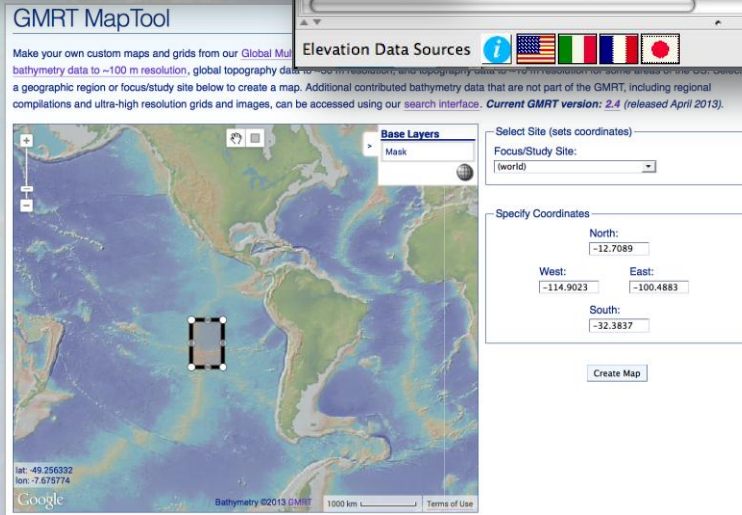
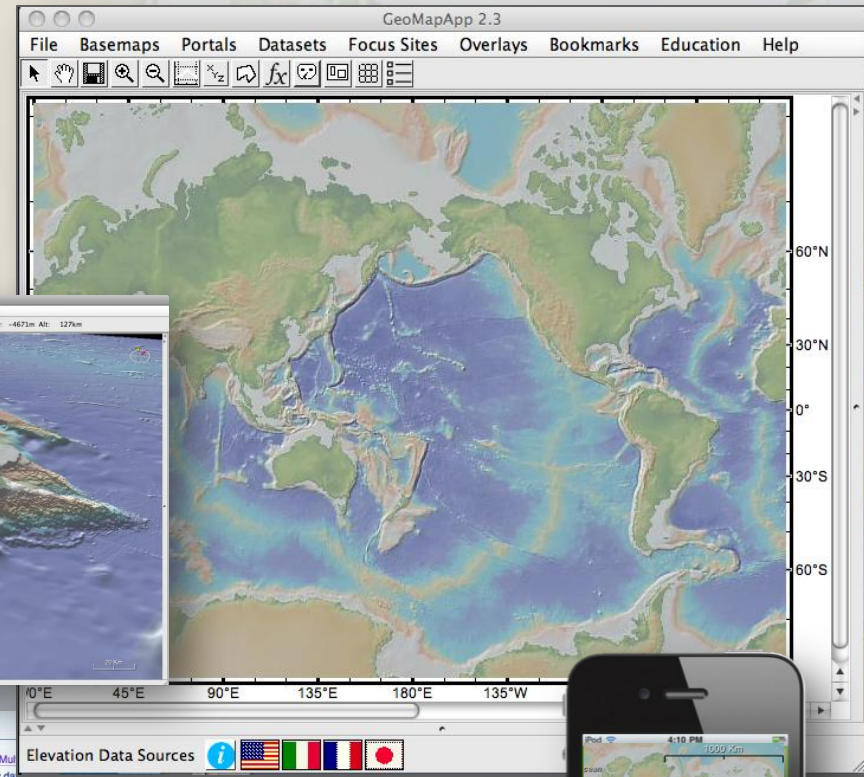
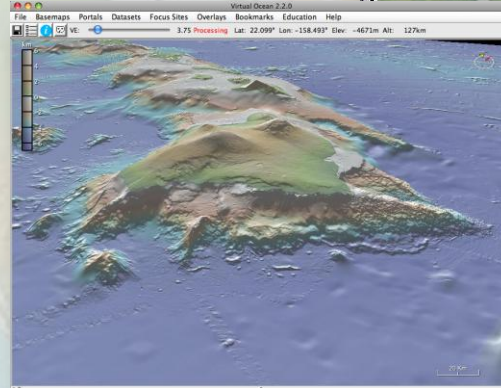
<http://gmrt.marine-geo.org>



GMRTv2.5 - 731 cruises (Oct 2013)

GMRT: Access

- Images & gridded data
- Desktop Apps
 - GeoMapApp
 - Virtual Ocean
- Web App
 - GMRT MapTool
- iPad/iPhone App
 - Earth Observer
- Web Map Services
 - Images & Mask



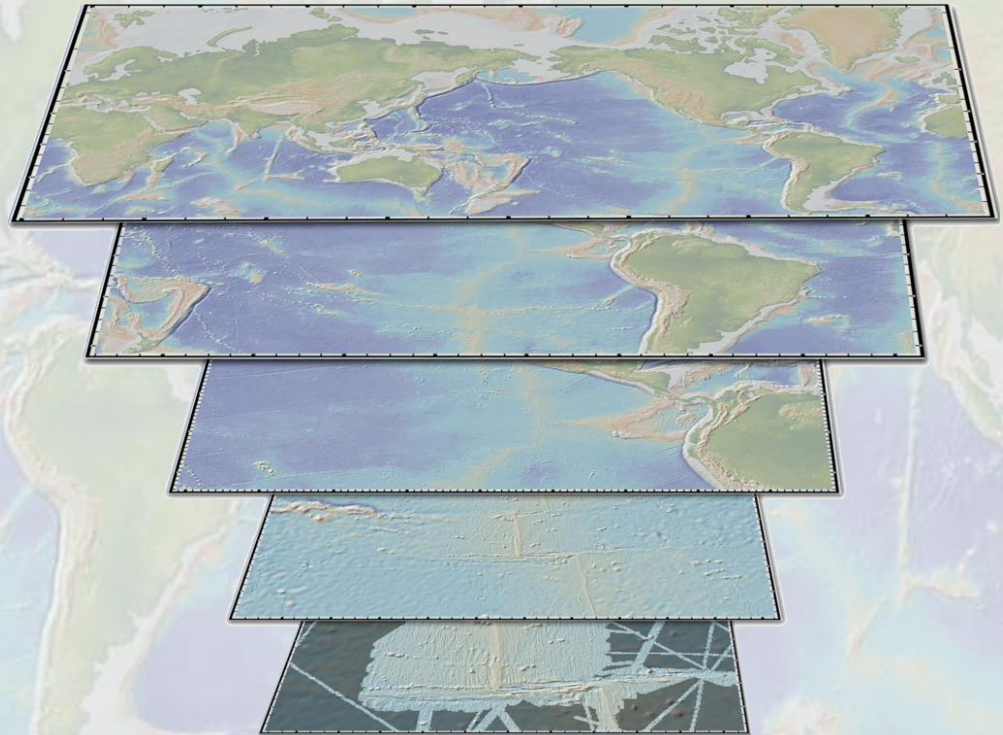
Export as: NetCDF, Arc ASCII, Binary, Fledermaus, KMZ, PNG, Geotiff...

GMRT Components

Global & Regional
Grids (≥ 500 m res.)
e.g. *GEBCO_08*, *IBCAO*

Contributed
Grids (< 500 m res.)

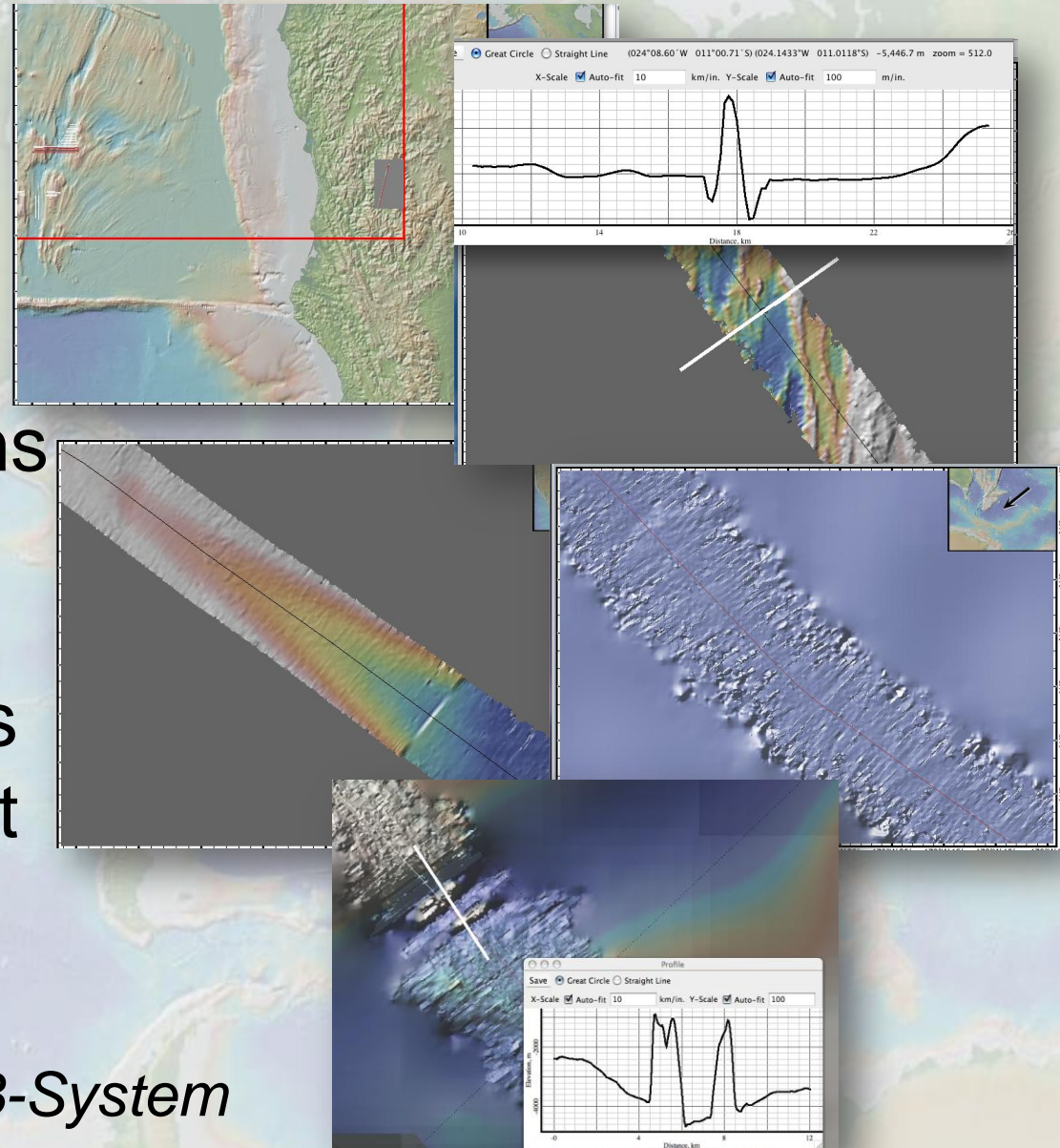
LDEO 100-m
compilation* (ping
files in public domain)



**LDEO team performs QC of ping files*

GMRT: MB Data Preparation

- Bad navigation
- Noisy outer beams
- Attitude problems
- Bad soundings
- Instrument problems
- Bad weather
- Sound velocity
- Slow speed in turns
- Quality assessment for grid weighting and resolution

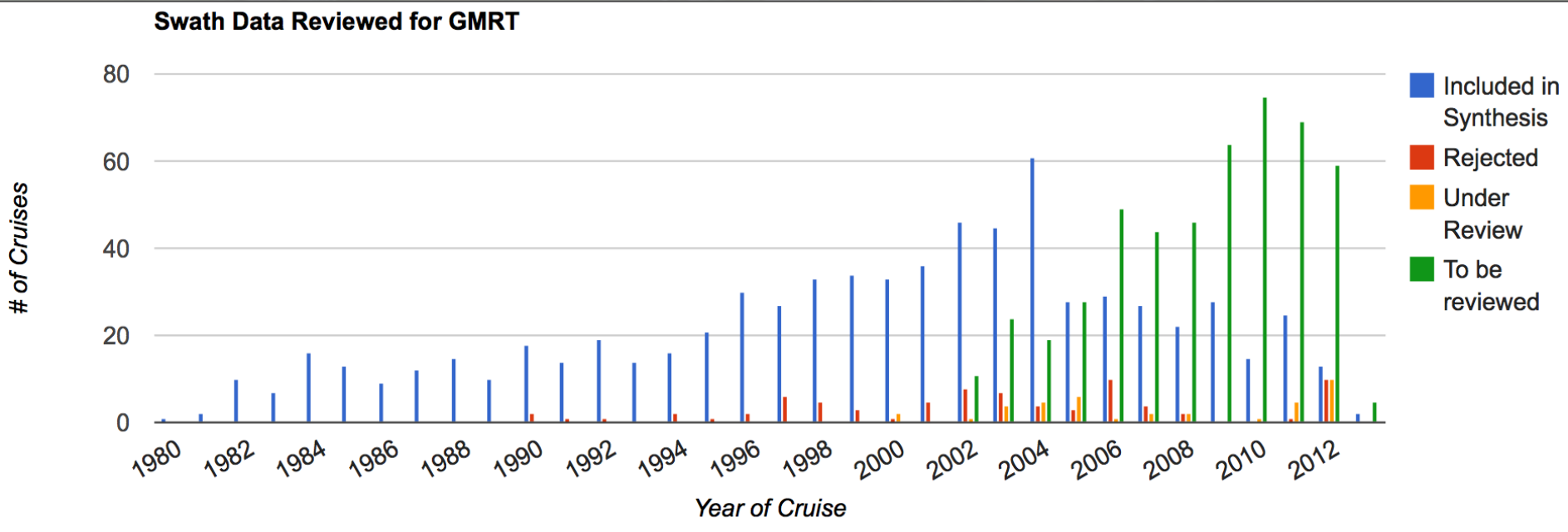


Processing done with MB-System

GMRT 100-m Compilation

GMRT Version	Release Date	# Additional Cruises	Total Cruises
1.x	Oct. 2009		377
2.0	Jan. 2011	115	492
2.1	Sep. 2011	77	569
2.2	April 2012	41	610
2.3	Oct. 2012	37	647
2.4	April 2013	40	687
2.5	Oct. 2013	42	731

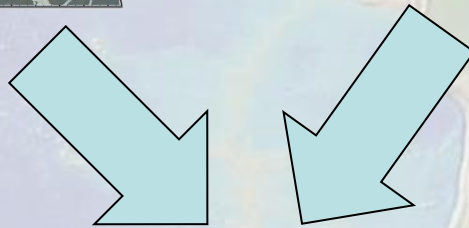
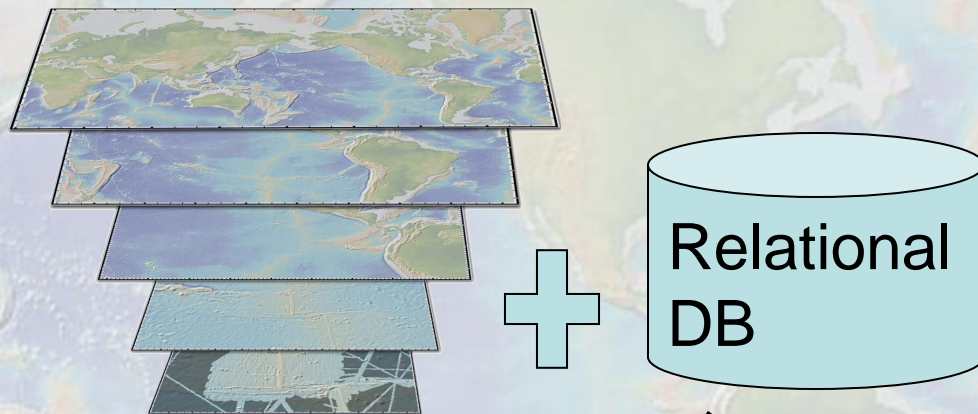
GMRT 100-m Compilation Content



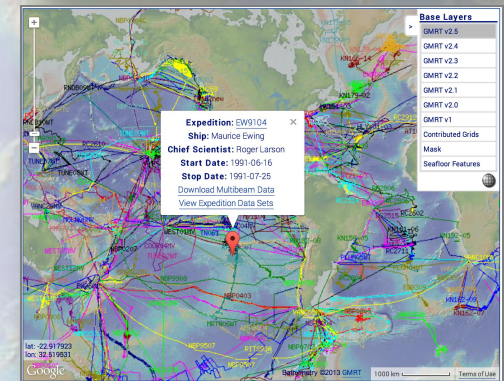
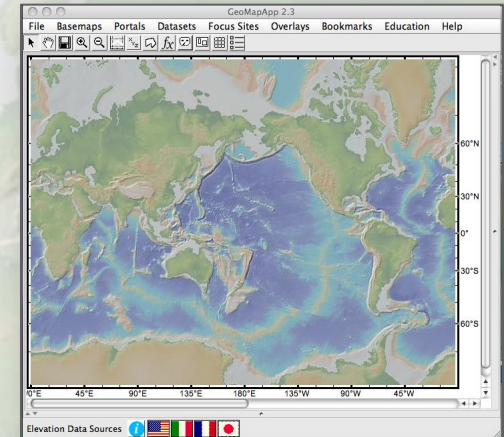
Increased availability of raw MB data from US Academic Fleet since 2009 as a direct result of data stewardship services provided by Rolling Deck to Repository (R2R)



Tracking and Managing MB Content for GMRT



MB data files

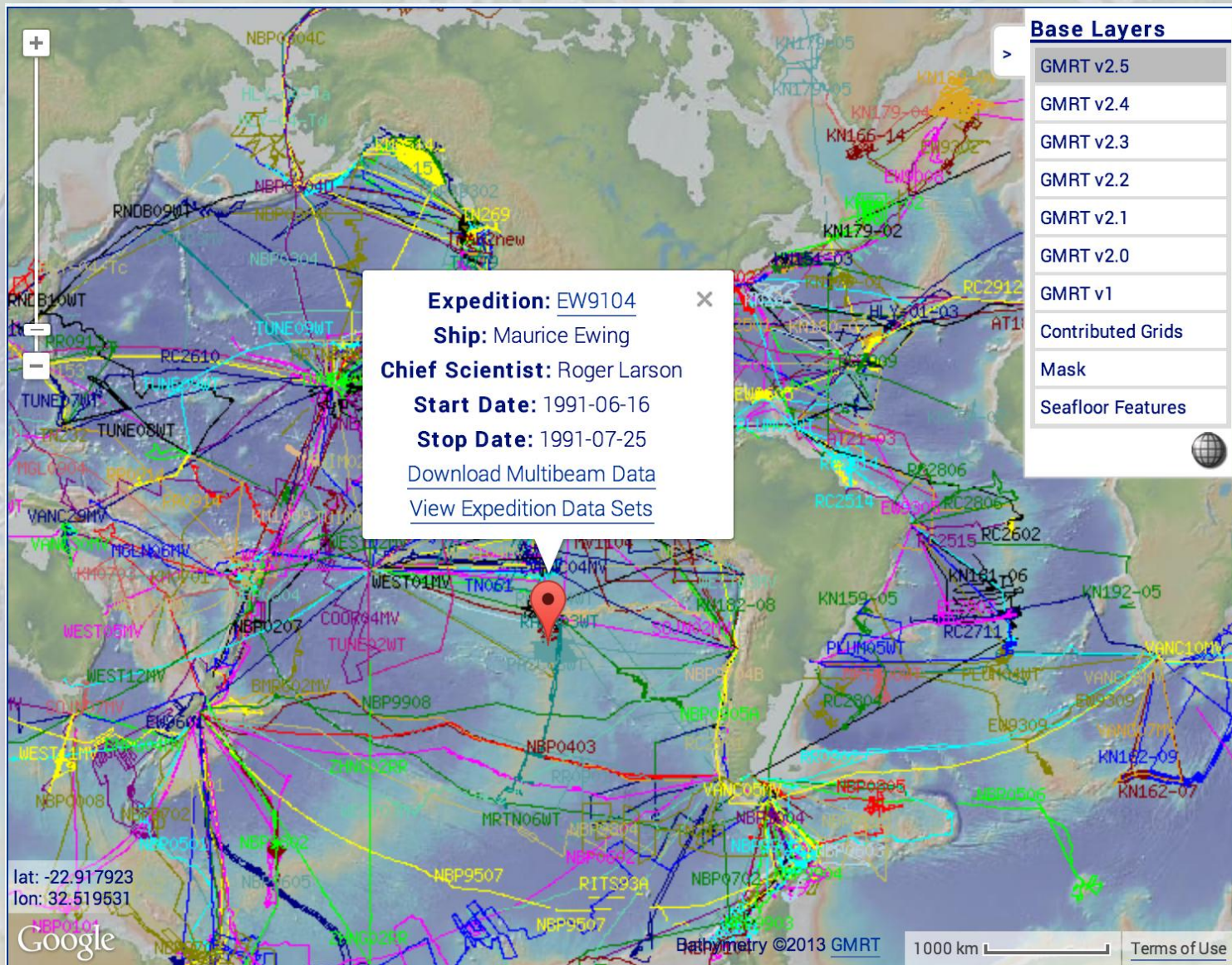


GMRT Access & Web services

Attribution & Provenance

- Critical for data sharing
- Different levels of attribution for different use cases
 - Credit to original data collectors & synthesizers
 - Information about input sonar data system & performance
 - Proper citation!
- Provenance
 - Access to source data files
 - What was done to data?
- Reproducibility

Cruise-level Attribution & Provenance



Cruise-level Attribution &

R2R Quality Assessment Dashboard

This dashboard provides information about [Quality Assessment](#) (QA) tests performed by R2R. QA tests do *not* assess the scientific utility of data, but are intended to identify *suspicious data* which may indicate sensor problems. QA is performed on data files as originally delivered from vessels. This dashboard shows the output of the initial implementation of R2R QA protocols, and includes details of QA tests, thresholds used and results. We welcome your input; please contact us [HERE](#) with comments or suggestions.

SEARCH BY:

Vessel: Cruise:

Device Type:

Multibeam Filesets for MGL1211

Cruise Title: *Evolution and Hydration of the Juan de Fuca Crust and Uppermost Mantle*

View:

Vessel: Marcus G. Langseth

Total Filesets: 1

Click column headings to sort

Rating	Device	Cruise	Vessel	across track slope	has minimum metadata	has surface sound velocity	# of sound velocity profiles	% expected data files	% files all valid altitude	% files all valid navigation	% files all valid ping rate	% files all valid sonar draft	% files all valid swath width	% files all valid time range	% files with amplitude	% files with bathymetry	% files with data records	% files without bad times
	Multibeam Kongsberg EM122	MGL1211	Marcus G. Langseth															

QA Summary

GMRT Contributor

Portal Links

- [Portal Home](#)
- [About GMRT](#)
- [What's New](#)
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- [Virtual Ocean](#)



Multibeam Adv

Home

Langseth

Navigation

- [Help Desk](#)
- [Tech Reports](#)
- [Tech Resources](#)
- [Ship Visits](#)

08/13/2012 — admin

CruiseID: MGL1214

Date: 2012-07

Objective(s): Conduct Patch Test & Provide Tools/Training to Optimize Data Quality

MAC Resource(s) Deployed: [Cookbook: SIS Configuration Backup](#)

[Cookbook: SIS Software Install](#)

[Cookbook: SIS Software Uninstall](#)

[Tool: Sound Velocity Profile \(SVP\) Editor \[v.1.0.2\]](#)




MAC Participant(s): Ferrini, Johnson

Related Report(s): [Langseth 2012 Quality Assurance Team Report](#)

Cruise-level Provenance

GMRT Contributors

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- [Tutorials](#)
- [GeoMapApp](#) 
- [Virtual Ocean](#) 
- [EarthObserver](#) 

Access GMRT

- [Create Map/Grid](#)
- [Download for GoogleEarth](#)
- [Web Services](#)

[Multibeam Surveys](#)

[Contributed Grids](#)

[Surveys not included](#)

In addition to the cruises that have been added to the GMRT Synthesis, several cruises that have been reviewed have not been included. This lists those cruises and some information about why the data have not been processed and included.

A125-04 *Not needed - no new coverage*

 [A125-25 \(1991\)](#) *Not needed - no new coverage*

A125-39 *Not needed - no new coverage*

A129-03 *Not needed - no new coverage*

 [A131-09 \(1994\)](#) *Not needed - no new coverage*

 [A131-11 \(1994\)](#) *Not needed - no new coverage*

 [ACLV01RR \(1999\)](#) *Not needed - no new coverage*

 [AT03-24 \(1998\)](#) *Not needed - no new coverage*

 [AT07-04 \(2001\)](#) *Not needed - no new coverage*

 [AT07-06 \(2002\)](#) *Not needed - no new coverage*

 [AT11-03 \(2003\)](#) *Not needed - no new coverage*

 [AT11-09 \(2004\)](#) *Not needed - no new coverage*

 [AT11-26 \(2005\)](#) *Not needed - no new coverage*

Cruise + File-level Attribution & Provenance

The screenshot displays the GeoMapApp 2.6.0 interface. The main map shows bathymetry data with overlaid cruise tracks. A sidebar on the right contains a 'Multibeam Bathymetry Sw...' panel with options like 'Close', 'Detach Table', and 'View All Expeditions'. Below the map is a 'MARINE GEOSCIENCE DATA SYSTEM' banner with navigation links. The main content area is titled 'Field: Marine EW9903' and includes a table of lead scientists and awards.

Lead Scientists	Role	Institution	Award
Harding, Alistair	Scientist:Chief	SIO	OCE98-12612
		UCSB	OCE98-11948

Below the table is a 'Multibeam Bathymetric Data' section with a 'MARINE GEOSCIENCE DATA SYSTEM' banner and a 'MGDS - Data Download' section. The 'MGDS - Data Download' section includes a table of file names and sizes.

File Name (click to view/download)	File Size
9903hs.d069.mb21.gz	7.5 MB
9903hs.d070.mb21.gz	4.5 MB
9903hs.d071.mb21.gz	3.3 MB
9903hs.d072.mb21.gz	3.2 MB
9903hs.d073.mb21.gz	3.2 MB
9903hs.d074.mb21.gz	3.2 MB
9903hs.d075.mb21.gz	3.1 MB
9903hs.d076.mb21.gz	3.1 MB
9903hs.d077.mb21.gz	3.2 MB
9903hs.d078.mb21.gz	3.0 MB
9903hs.d079.mb21.gz	2.2 MB
9903hs.d080.mb21.gz	3.2 MB
9903hs.d081.mb21.gz	0.5 MB
9903hs.d082.mb21.gz	2.0 MB
9903hs.d083.mb21.gz	3.2 MB

At the bottom left, a text box contains the text 'cruise: EW9903, file: 9903hs.d093.gz' circled in red. Below this is an 'Elevation Data Sources' section with a globe icon and the USA flag.

Tile-level Attribution & Provenance?

AT03-23 (1998)

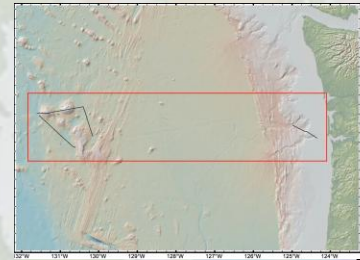
J. Cowen

Atlantis

SeaBeam 2100

GMRT V2.1

MB
files



EW9904 (1999)

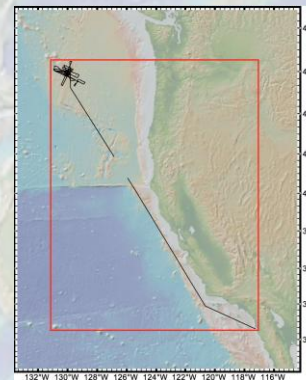
M. Tolstoy

Maurice Ewing

Atlas Hydrosweep DS

GMRT v1

MB
files



EW0207 (2002)

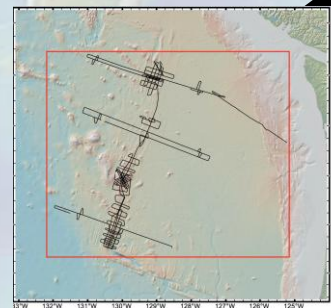
S. Carbotte

Maurice Ewing

Atlas Hydrosweep DS2

GMRT v1

MB
files

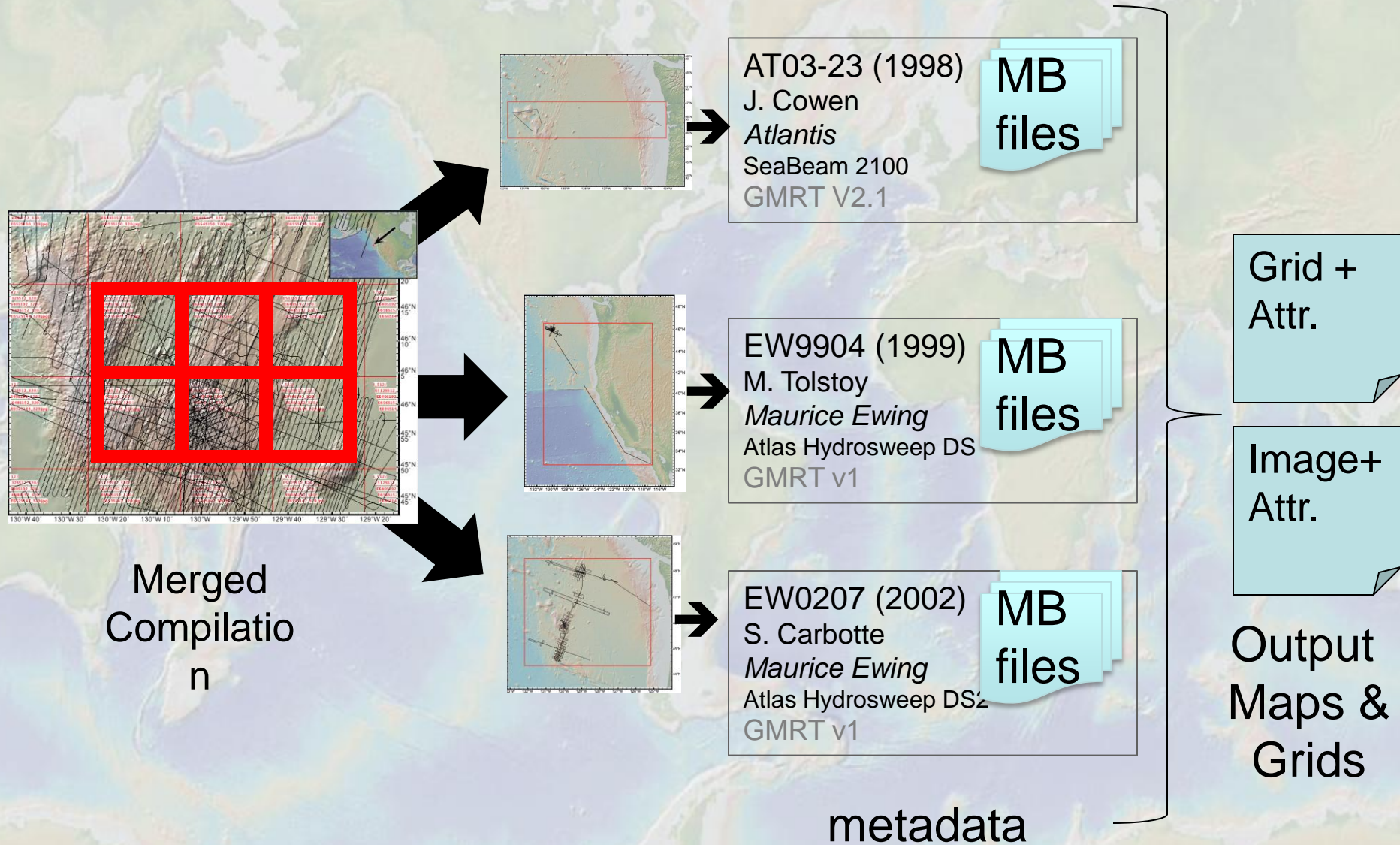


Merged
Compilation

data + metadata

* *Quality weighting*

Tile-level Attribution & Provenance?



Next Steps...

- Expose GMRT processing details on attribution pages for cruises in GMRT (QC Reports)
- Enhance Web Services
- Publish processed data with Data DOIs
- Link processed data to raw data (via DOI)
- DOIs of contributed grids where possible
- Explore & develop tile-level attribution
 - Scalability
 - Formats (e.g. NetCDF, BAG, Web Services?)