# Attribution and Provenance Tracking for the GMRT Synthesis

Vicki Ferrini & Suzanne Carbotte

Lamont-Doherty Earth Observatory

Columbia University

LAMONT-DOHERTY
EARTH OBSERVATORY
THE EARTH INSTITUTE AT 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*)
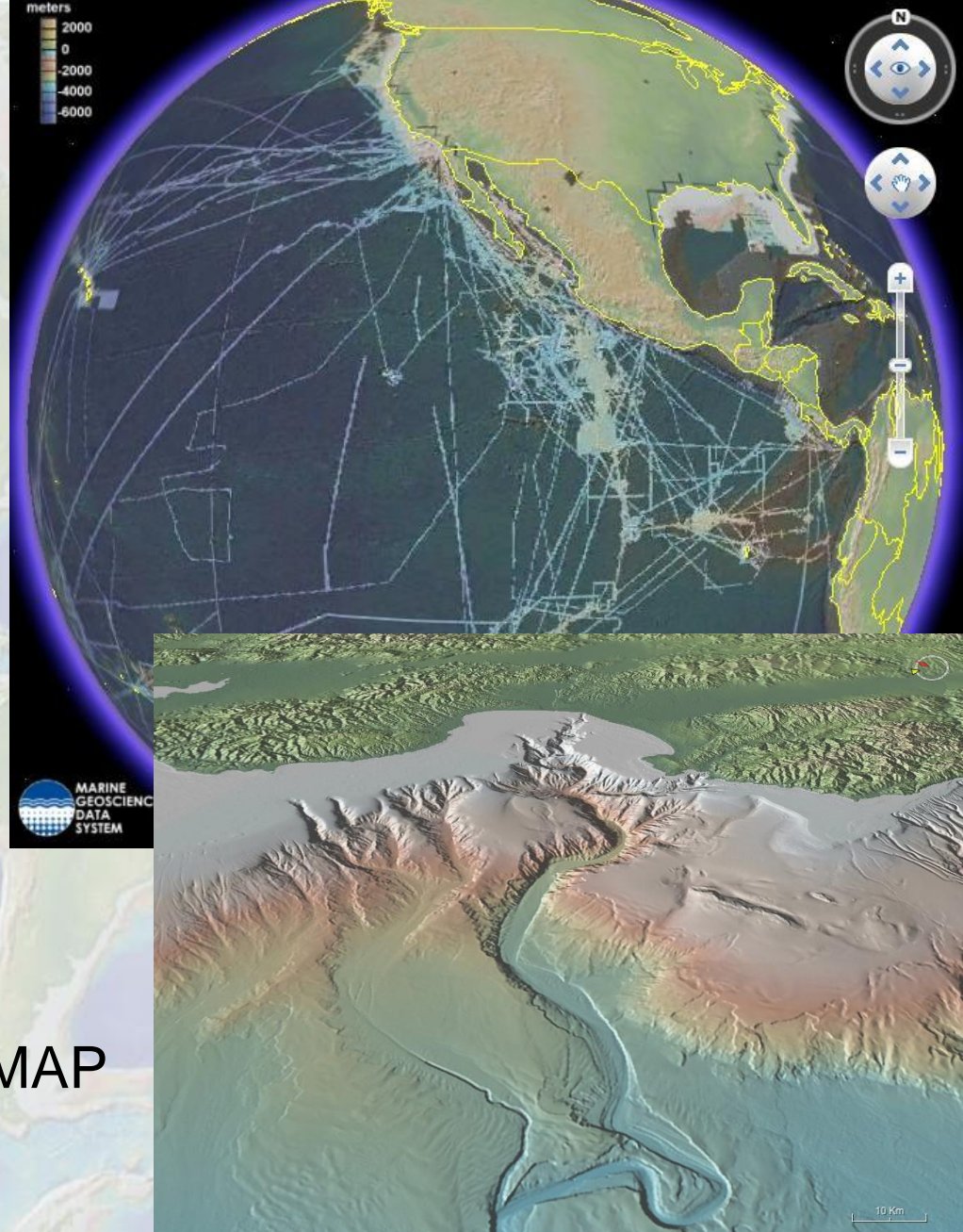
GMRT Evolution

- **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
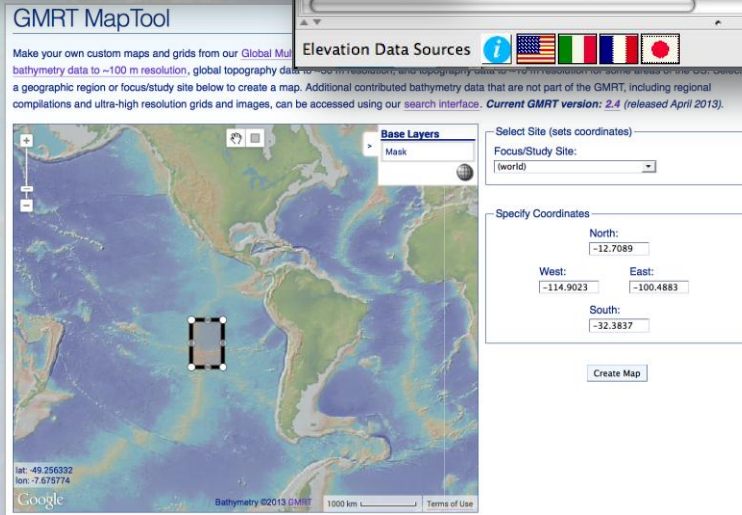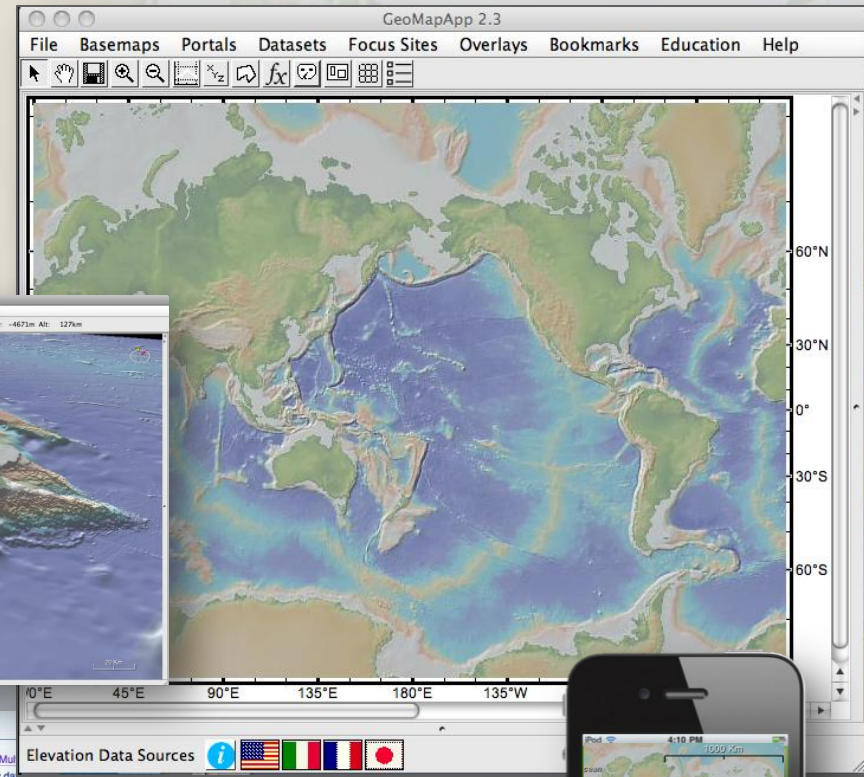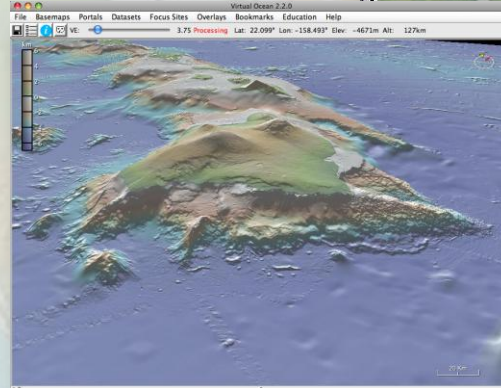
http://gmrt.marine-geo.org
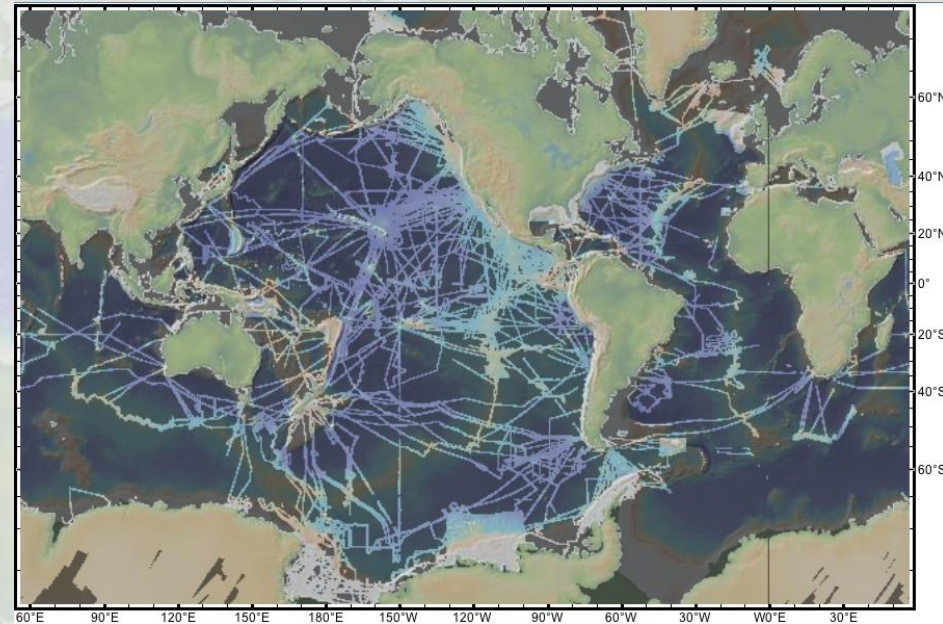
GMRTv2.5 - 731 cruises (Oct 2013)

GMRT: Access

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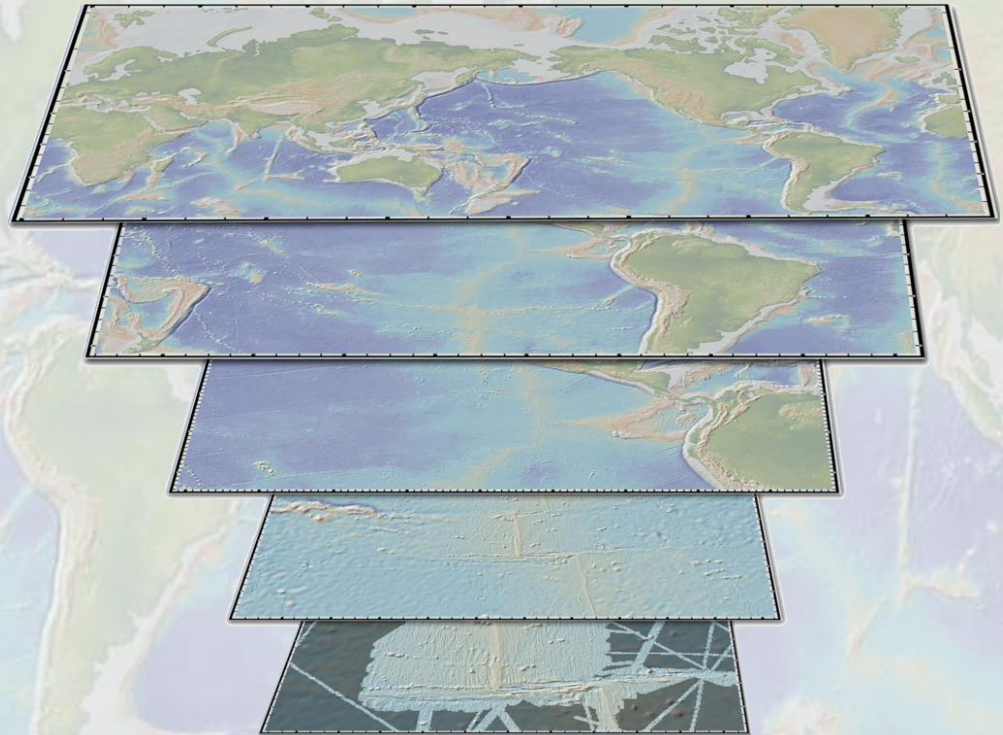 - Earth Observer
- Web Map Services
  - Images & Mask

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

GMRT Components

Global & Regional Grids (>= 500 m res.) *e.g. GEBCO_08, IBCAO*
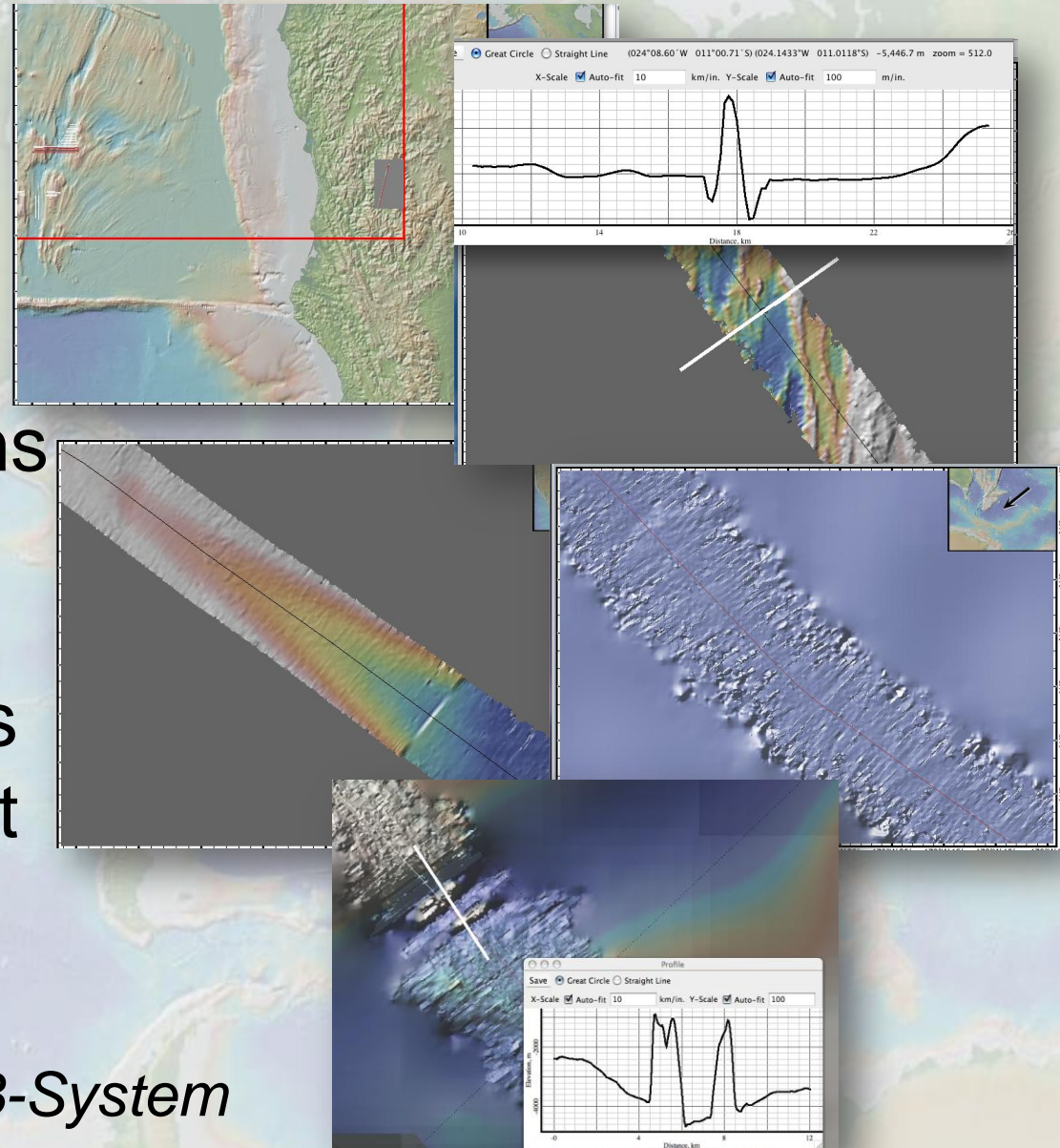
Contributed Grids (< 500 m res.)

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
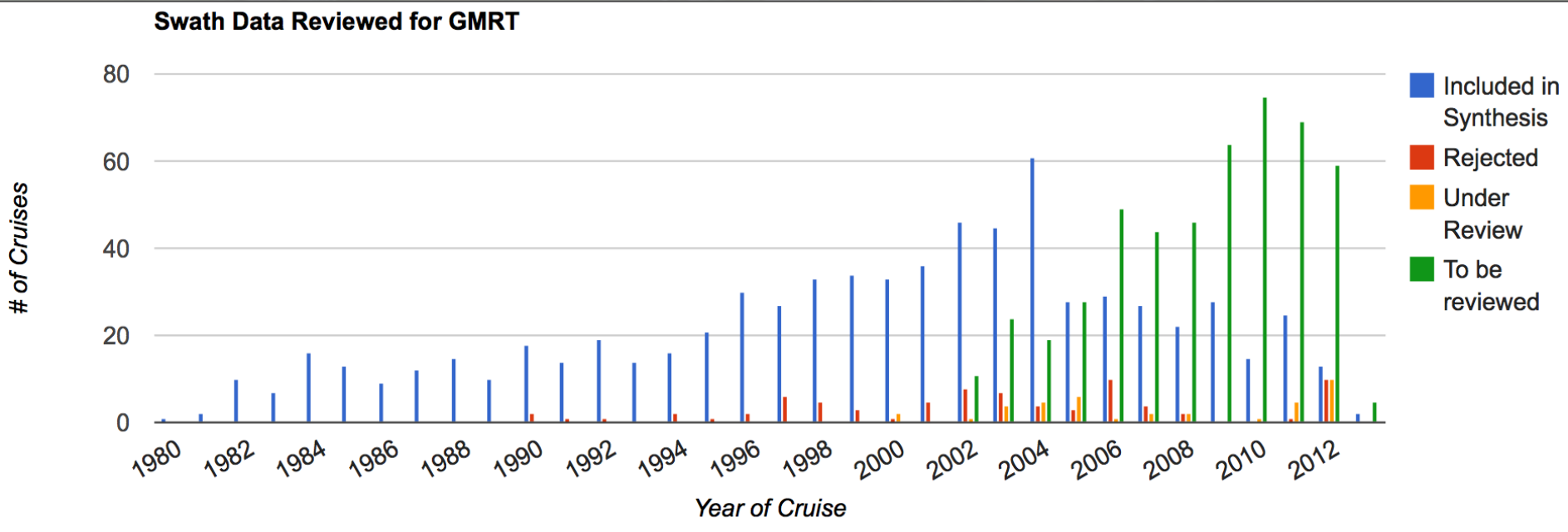- Quality assessment for grid weighting and resolution

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

Swath Data Reviewed for GMRT

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)

rvdata.us

GMRT V2.3 100-m Swath Cove

Oct 2012

GMRT V2.5 100-m Swath Cove

Oct 2013

Tracking and Managing MB Content for GMRT

Relational DB
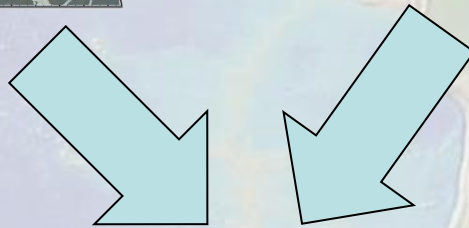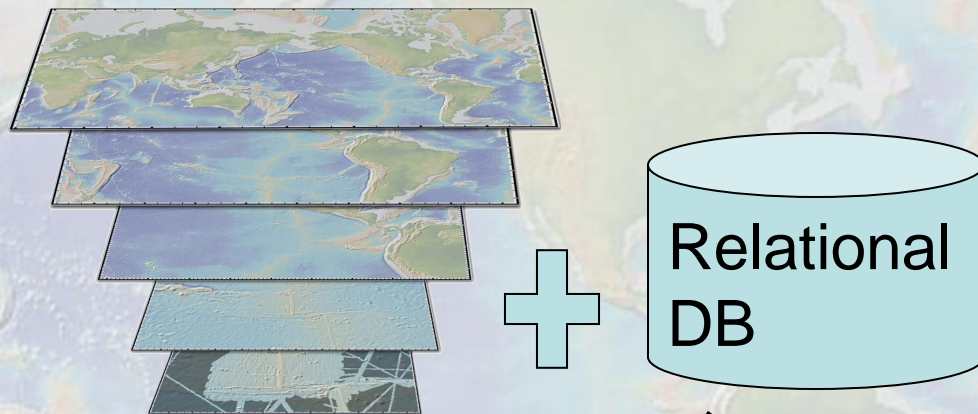
MB data files
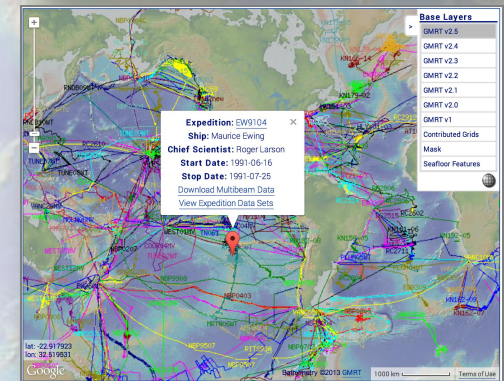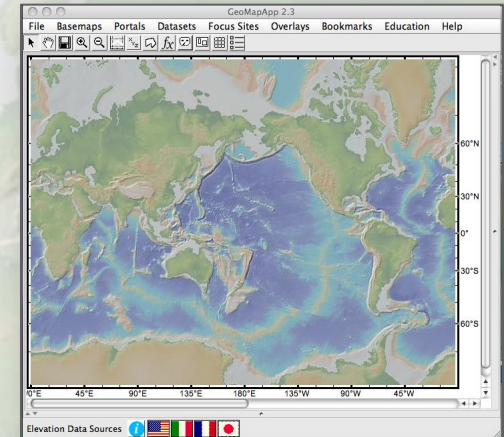
GMRT Access & Web services

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 &

Cruise-level Provenance

GMRT Contributors

Portal Links

- Portal Home
- About GMRT
- What's New
- Related Links
- **Contributors »**
- Known Issues
- MediaBank
- 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

Tile-level Attribution & Provenance?

AT03-23 (1998)
J. Cowen
Atlantis
SeaBeam 2100
GMRT V2.1

EW9904 (1999)
M. Tolstoy
Maurice Ewing
Atlas Hydrosweep DS
GMRT v1

EW0207 (2002)
S. Carbotte
Maurice Ewing
Atlas Hydrosweep DS2
GMRT v1

MB files

MB files

MB files

Merged Compilation

data + metadata

Quality weighting

Tile-level Attribution & Provenance?
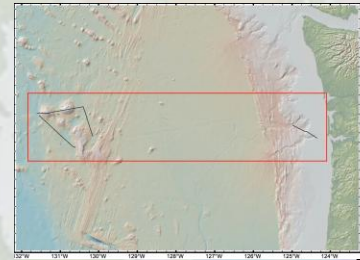
Merged
Compilatio
n

AT03-23 (1998)
J. Cowen
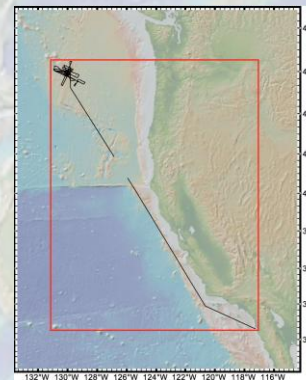*Atlantis*
SeaBeam 2100
GMRT V2.1

MB
files

EW9904 (1999)
M. Tolstoy
Maurice Ewing
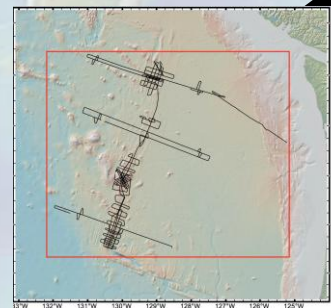Atlas Hydrosweep DS
GMRT v1

MB
files

EW0207 (2002)
S. Carbotte
Maurice Ewing
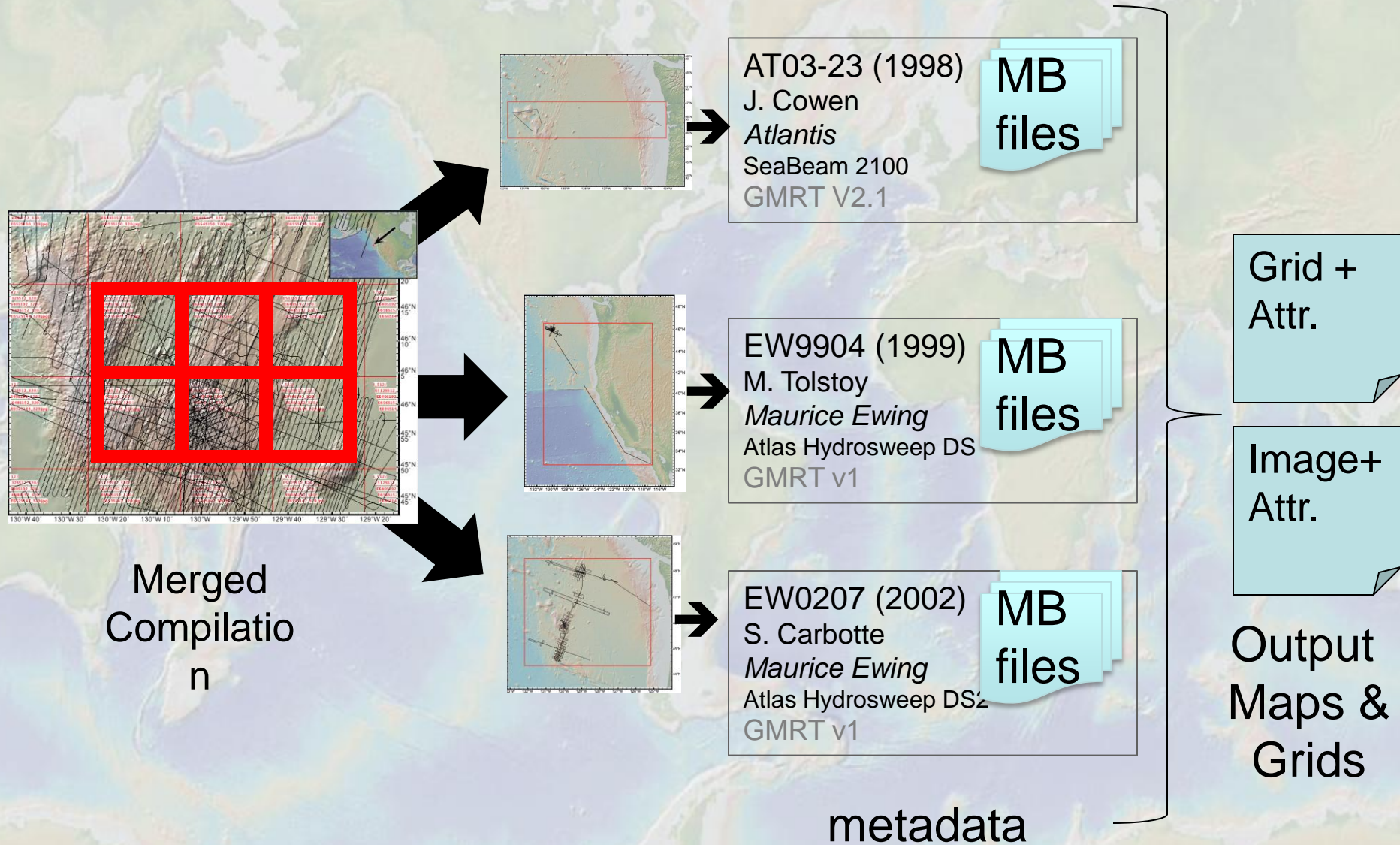Atlas Hydrosweep DS2
GMRT v1

MB
files

Grid +
Attr.

Image+
Attr.

Output
Maps &
Grids

metadata

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?)