Assembly and Editing of Sounding Data

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ABSTRACT

The National Geospatial-Intelligence Agency (NGA), the Naval Meteorology and Oceanography Command (METOC, NAVO), the National Oceanographic and Atmospheric Administration (NOAA), and the Scripps Institution of Oceanography (SIO) are working under a memorandum of understanding to produce cautionary overlays for bathymetry charts using a combination of ship soundings and satellite-derived gravity anomalies. More important, we plan to assign depth uncertainties to our global charts. These charts will be merged with the GEBCO effort to improve the global bathymetry grid, and will have numerous other scientific and practical applications.

APPROACH

Task 1. - Improve gravity from satellite altimetry (Year 1, complete)

This 3-year effort was funded by the National Science Foundation, NASA, ConocoPhillips, and ExxonMobil. Work was performed by David Sandwell and Walter Smith (NOAA). This involved retracking all of the raw radar altimeter waveforms from the ERS-1 and Geosat altimeters and constructing a new global marine gravity model. Before this effort, the satellite-derived gravity models had accuracies of 4-7 mGal in comparison with shipboard profiles [*Sandwell and Smith*, 1997]. The new models have accuracies of better than 3 mGal. The V16.1 gravity data are available in a variety of formats at:
http://topex.ucsd.edu/WWW_html/mar_grav.html

Task 2. - Cleanup of unclassified ship soundings (Years 1 and 2)

We are evaluating and editing bathymetry data from 5700 cruises of archive ship data; approximately 1800 of these cruise data were not used in our previous global bathymetric grids because they failed statistical tests. These data come from a variety of sources including: 4900 cruises from the National Geophysical Data Center (NGDC); about 500 cruises from the SIO and Lamont archives; and 104 cruises from IFREMER. This data cleanup effort involves: 1) hand editing of the soundings in the 5700 cruises to flag bad data; 2) separating the cruise data into well-navigated and poorly-navigated groups; and 3) constructing trial bathymetry grids to identify additional outliers. In addition to the contributions from our partners we have assembled grids and multibeam swath data from a variety of sources:

LDEO - Ridge Multibeam Synthesis Project	GEOMAR - Wilhelm Weinreb
IFREMER - Marcia Maia and Louis Geli	University of Hawaii - Brian Taylor
WHOI - GLOBEC - Robert Beardsley	University of New Hampshire - CCOM
International Hydrographic Bureau - Tony Pharoah	JAMSTEC - Ryoichi Iwase

GEBCO - Pauline Weatherall (Digital Atlas Manager, BODC)
GEBCO - Colin Jacobs (Bathymetric Editor, NOC)

Task 3. - Construct new global bathymetry at 1 minute resolution (Years 1, 2 and 3)

This task will be performed in collaboration with NOAA, the Navy, and NGA. Here we will use the 1-minute gravity grid from Task 1 and all available edited soundings to develop the regional variations in topography/gravity transfer function that are used to map band-pass filtered gravity into bathymetry [*Smith and Sandwell*, 1994]. A preliminary version of this grid V9.1 is available at:
http://topex.ucsd.edu/WWW_html/mar_topo.html

DATA EDITING

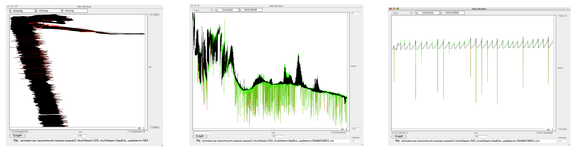

Figure 1: cmEditor, a program written by JJ Becker, was used to display and edit sounding data by hand. The navigation window (*left*) shows the longitude and latitude spanned by the cruise. The data window shows predicted sea floor depths in black and measured sounding data in green (*middle*) and allows the user to zoom in and identify bad data points (*right*). Bad data is shown in red in all windows.

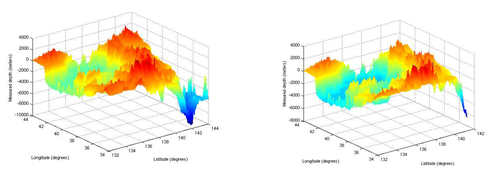

Figure 2: Mesh plots showing the longitude, latitude, and measured sea floor depths before bad data is removed (*left*) and after bad data is removed (*right*)

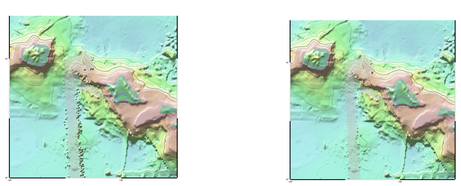

Figure 3: An example of updated bathymetry grids, with bad data (*left*) and after bad data has been removed (*right*)

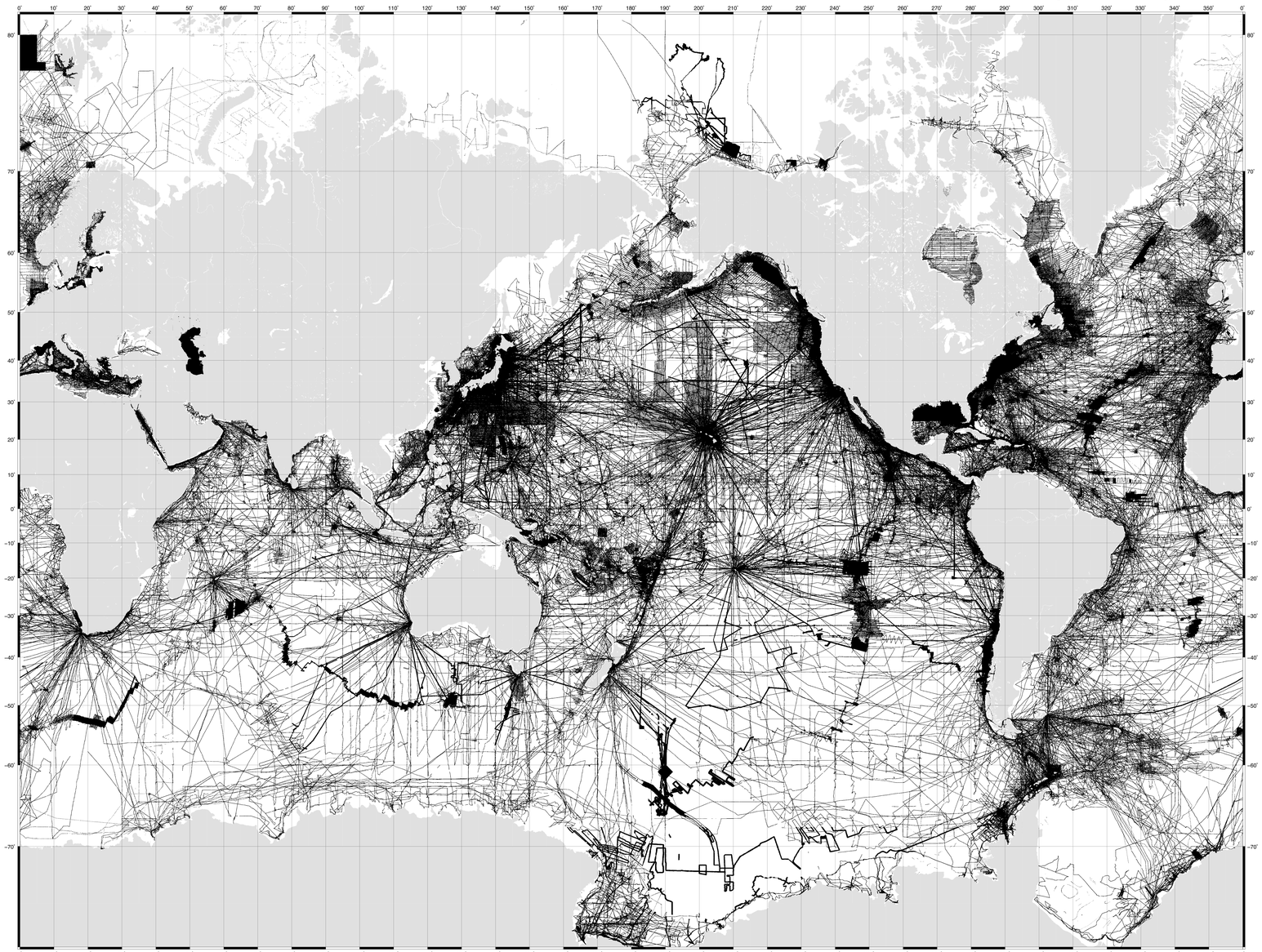

Figure 4: Composite image of cruises that have reported sounding data

Funding provided by the Office of Naval Research - Award Number:N00014-06-1-0140

COMMENTS

Feel free to leave comments. Are we missing important public domain data?

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