GEBCO Cookbook Contribution: Assessing Errors in Bathymetric Grids

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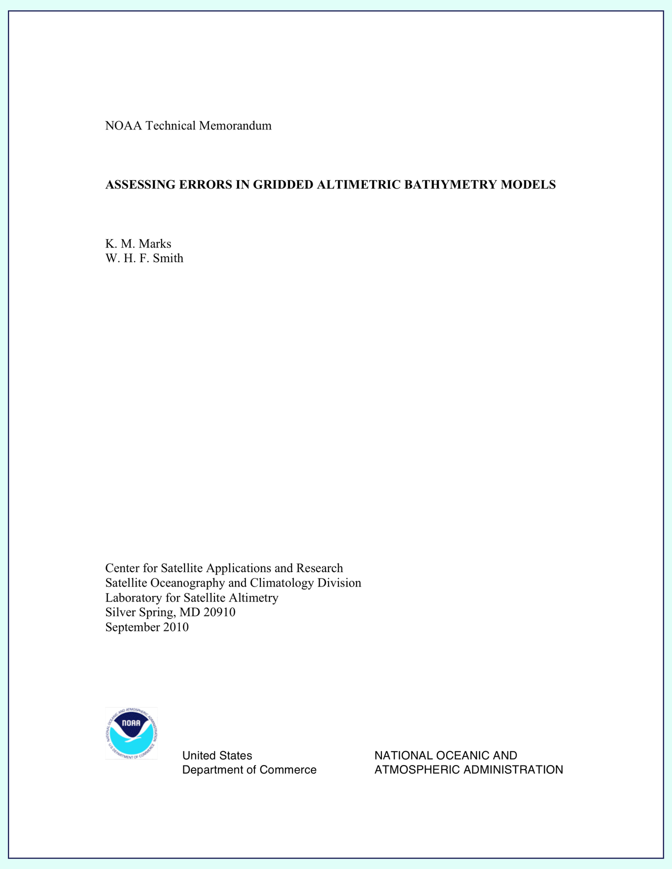
Abstract. At the GEBCO 25th meeting of the Technical Sub-Committee on Ocean Mapping (TSCOM) in September, 2009, a "Cookbook Working Group" was formed to write a "cookbook" to nurture and guide nascent regional mapping projects. One of the tasks was to test bathymetric grids resulting from numerical experiments using different interpolation schemes.

Marks and Smith developed a method of assessing errors in altimetric bathymetry models that was successfully employed in the manuscript "Evolution of errors in the altimetric bathymetry model used by Google Earth and GEBCO" (submitted to Marine Geophysical Researches, May, 2010). This method can also be used to assess errors in bathymetric grids produced by various interpolation schemes, thus providing a way to quantify how well the schemes are working.

We have prepared a NOAA Technical Memorandum that documents our error assessment method, and which can be incorporated into the GEBCO "cookbook" in fulfillment of the Cookbook Working Group task to test different interpolation schemes. In this poster we present salient portions of the memorandum.

NOAA Technical Memorandum

- Memorandum in preparation
- Contribution to the GEBCO "Cookbook Working Group" cookbook
- Documents in detail methods used in manuscript "Evolution of errors in the altimetric bathymetry model used by Google Earth and GEBCO," submitted to Marine Geophysical Researches, May, 2010
- Detailed steps for gathering public data and software are provided
- Gridding and error assessment methods are documented in easy-to-follow steps
- Corresponding computer programs and GMT routine command lines are documented in Appendices
- Data and software tools used are freely available for on-line download


NOAA Technical Memorandum

ASSESSING ERRORS IN GRIDDED ALTIMETRIC BATHYMETRY MODELS

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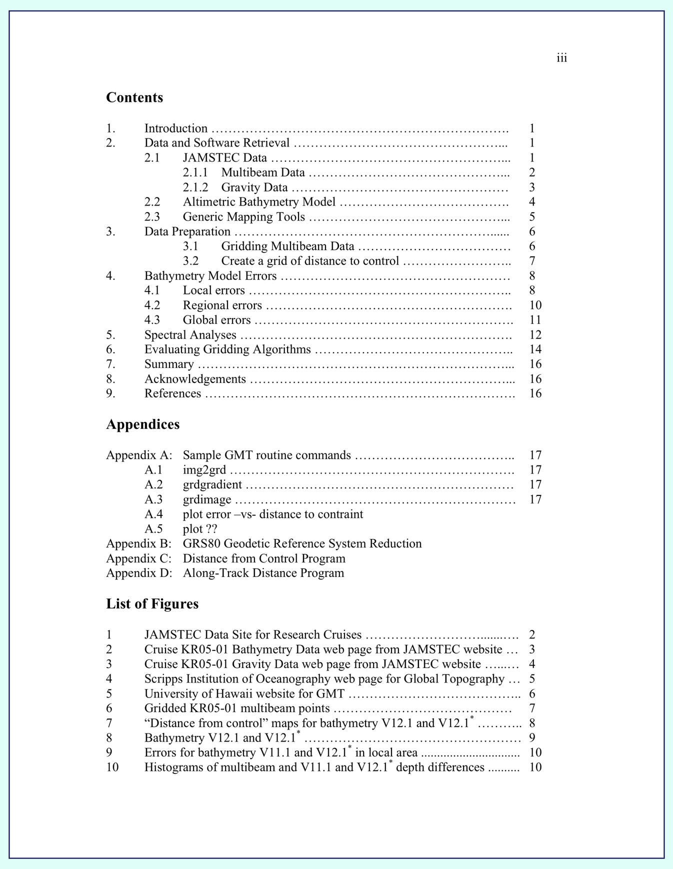
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION



Gather Data and Software

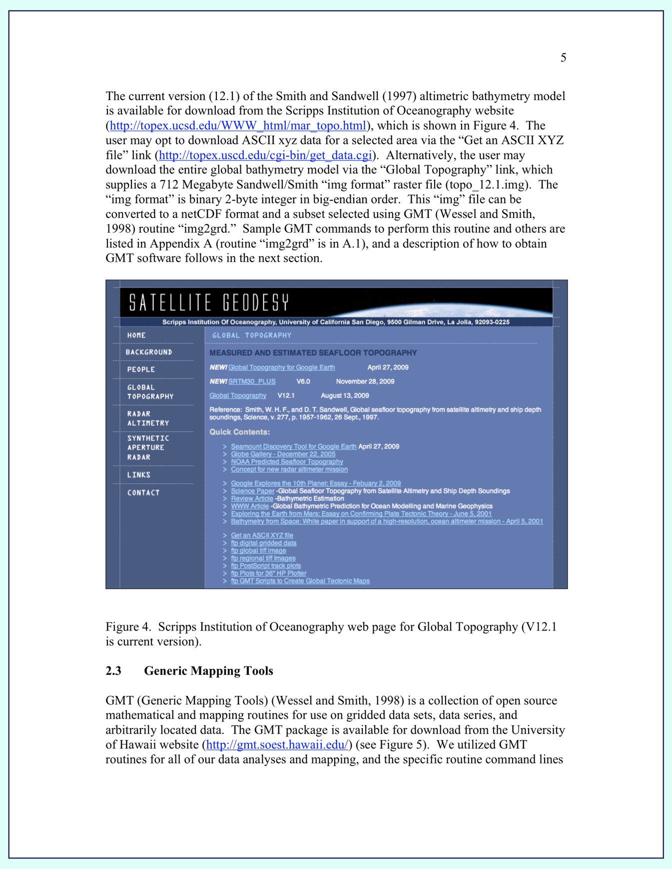
- Step-by-step instructions enable users to easily download JAMSTEC multibeam data, altimetric bathymetry models, and Generic Mapping Tools (GMT) software
- Users may provide their own data or download public data and proceed to section on data preparation

- JAMSTEC (Japan Agency for Marine Earth Science and Technology)
- SIO (Scripps Institution of Oceanography
- GMT (Generic Mapping Tools)

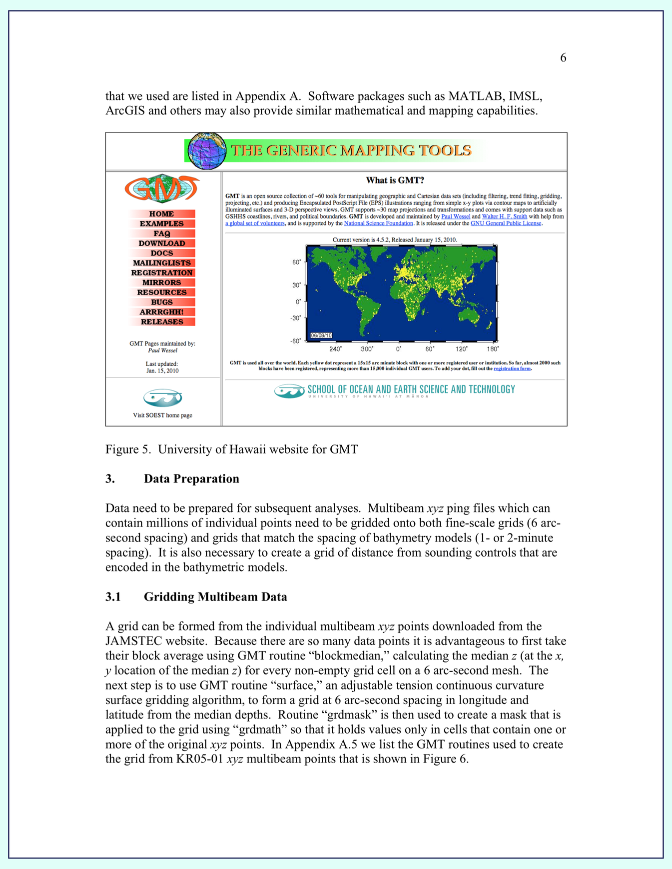
We thank JAMSTEC (Japan Agency for Marine Earth Science and Technology) for making their multibeam data freely available (http://www.jamstec.go.jp/cruisedata/e/).

JAMSTEC Website

SIO Website



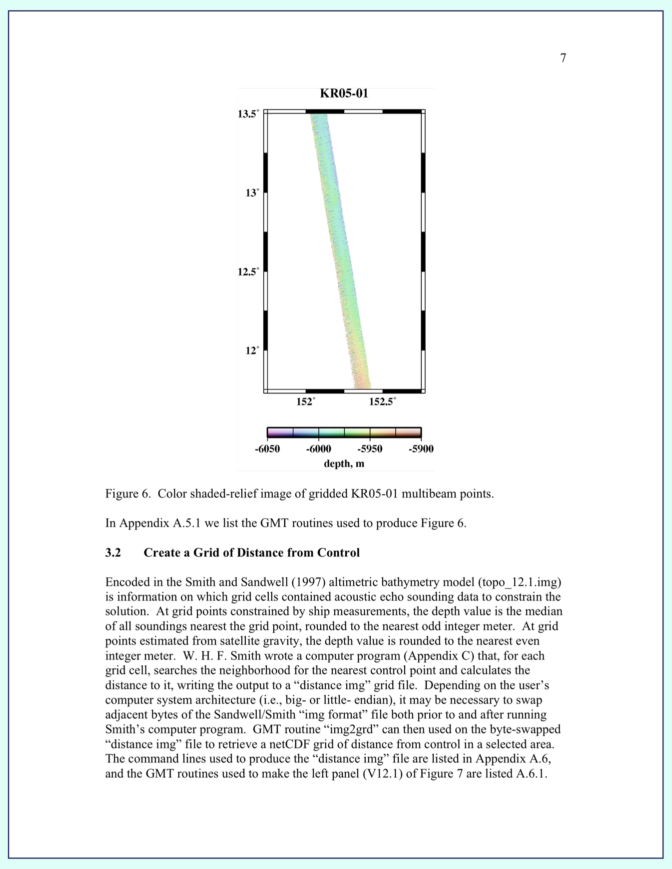
GMT Website



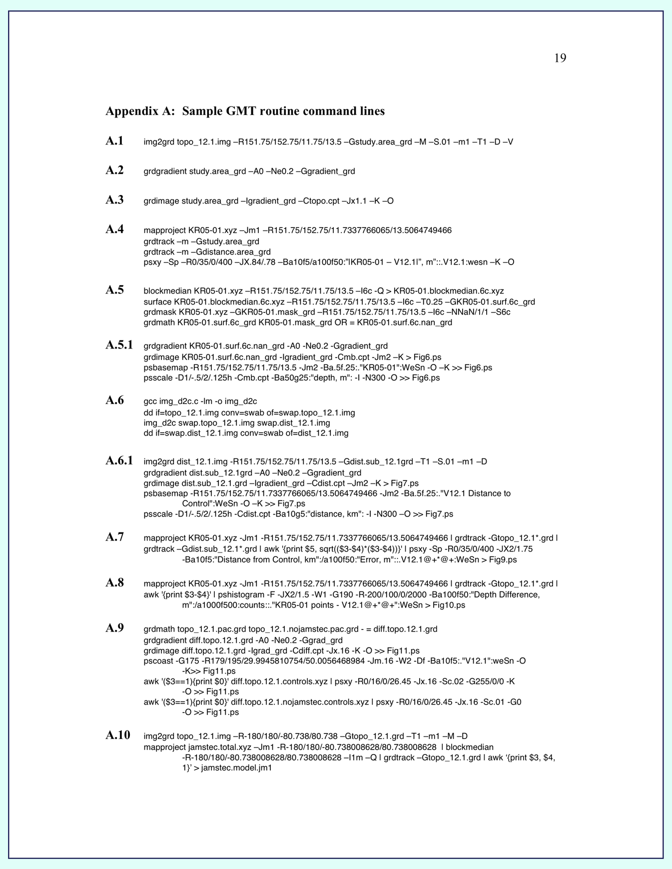
Data Preparation

- Example of how to grid multibeam data onto a 6 arc-second grid
- Gridding steps are documented in detail in Appendix
- Distance from control values at corresponding grid cell locations are needed for local error analyses
- Program to calculate distance from control is provided in Appendix
- With detailed documentation and programs provided in memorandum, users can easily perform error analyses on their own bathymetric grids

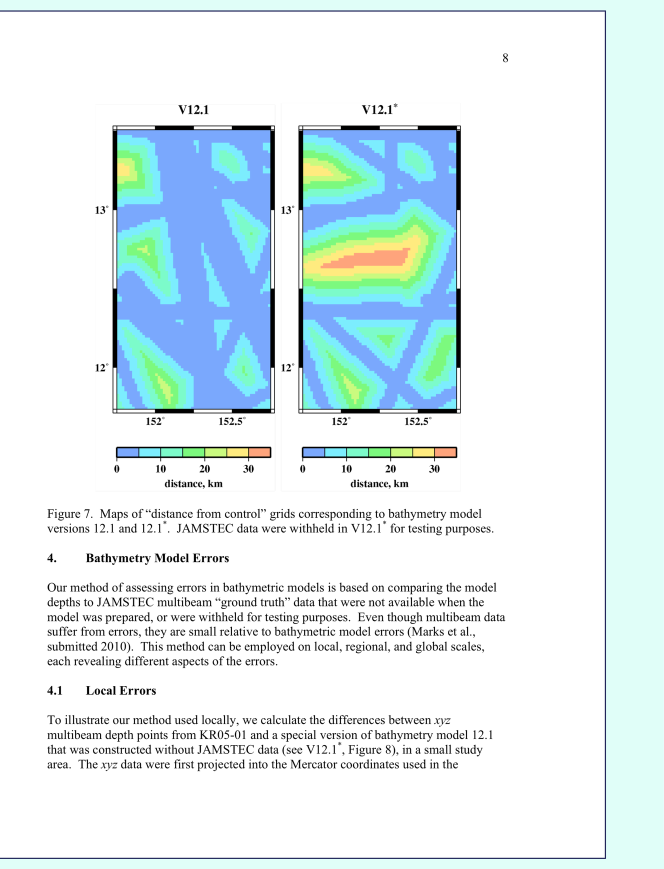
Gridding Multibeam Data on 6" Grid



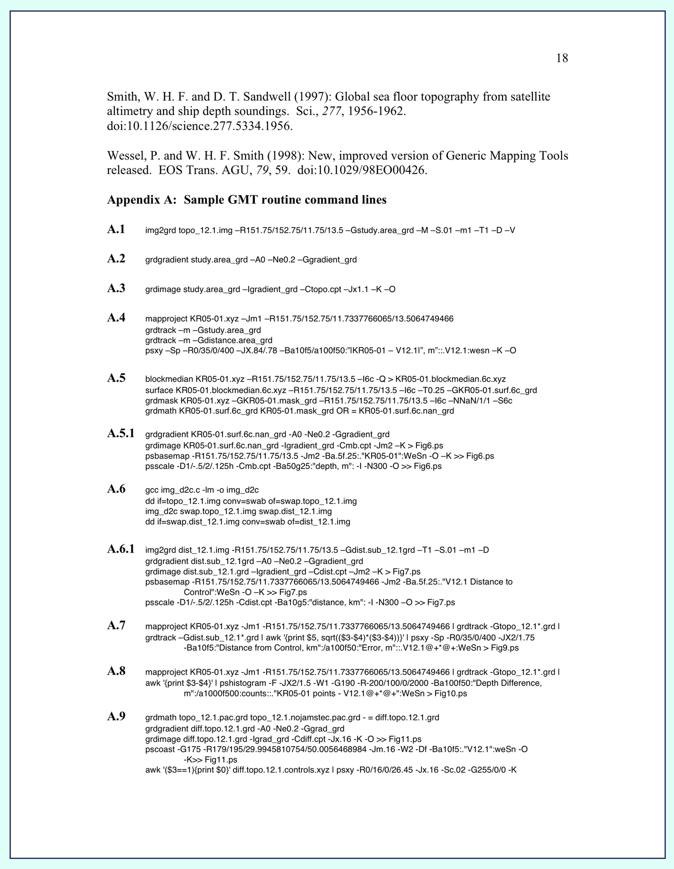
Gridding Documented in Appendix



Distance from Control Maps



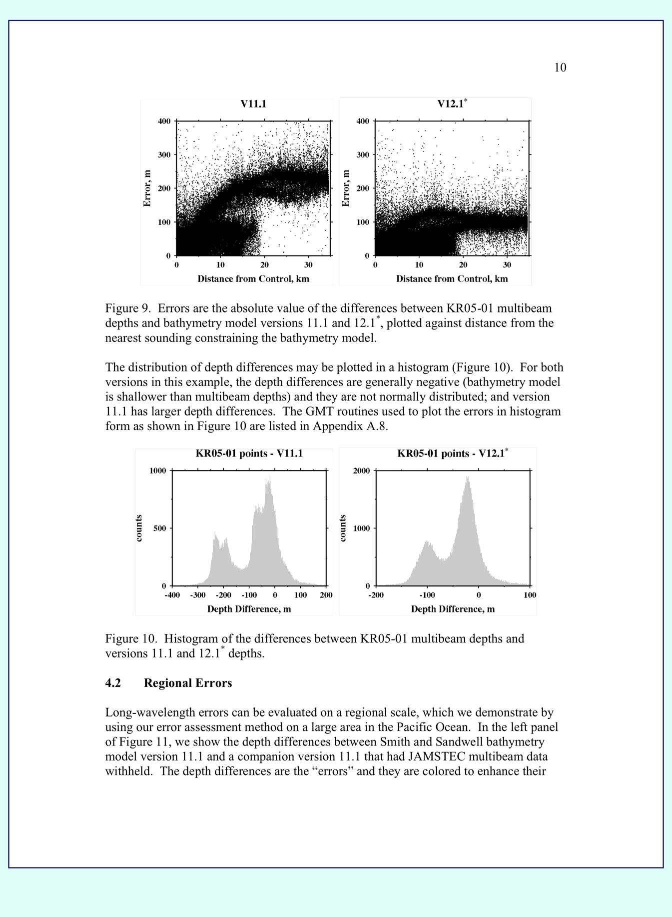
Distance to Control Program in Appendix



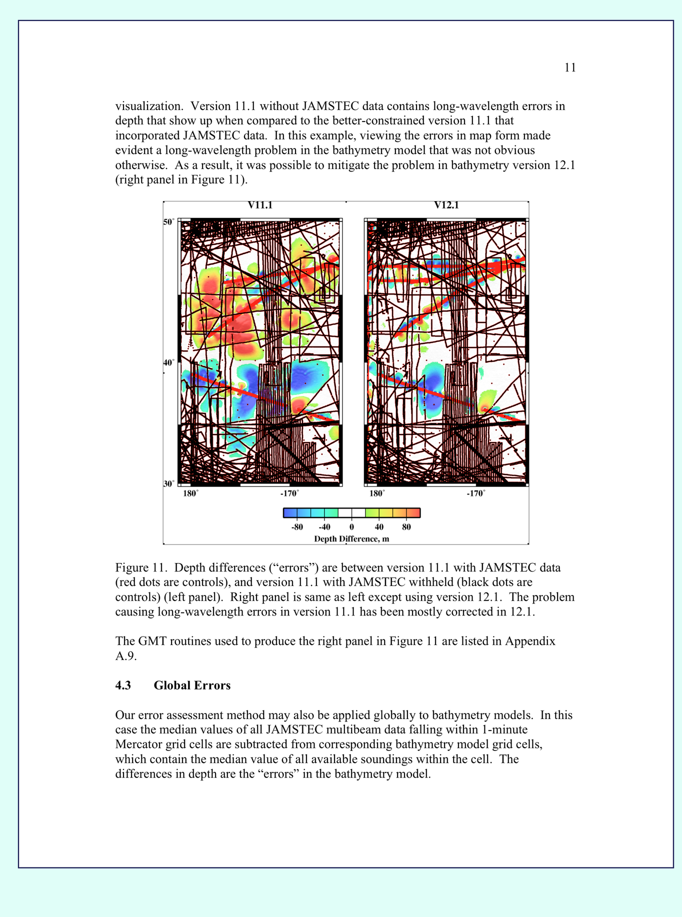
Assessing Gridding Errors

- Local errors are differences between multibeam data and gridded bathymetry with focus in survey gaps
- Regional errors are differences between gridded bathymetry and a control grid
- Global errors are differences between global JAMSTEC multibeam data and altimetric bathymetry model with JAMSTEC withheld
- Error assessment method can be applied to any type of bathymetry grids, and can be used to test grids produced by various interpolation schemes
- Technical memorandum documents steps to perform error assessments in detail
- Users can test gridding algorithms by assessing errors in resulting grids

Local Errors



Regional Errors



Global Errors