IBCSO version 1.0
The first release of the International Bathymetric Chart of the Southern Ocean

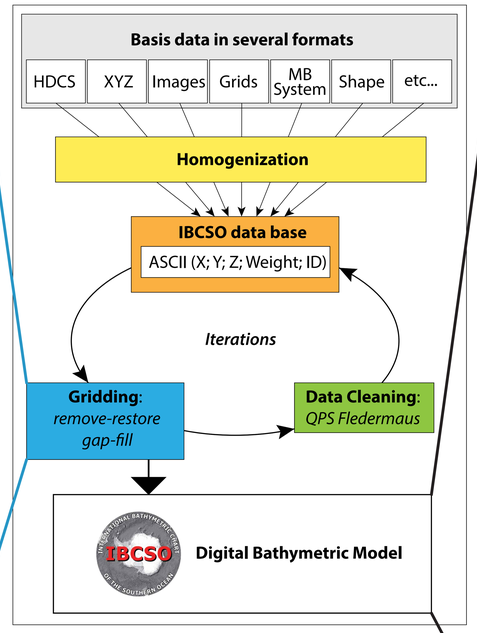
Jan Erik Arndt [1], Hans Werner Schenke [1], Martin Jakobsson [2], Frank O. Nitsche [3], Gwen Buys [4], Bruce Goleby [5], Michele Rebesco [6], Fernando Bohoyo [7], Jongkuk Hong [8], Jenny Black [9], Rudolf Greku [10], Gleb Udintsev [11], Felipe Barrios [12], Walter Reynoso-Peralta [13], Morishita Taisei [14], Rochelle Wigley [15]

1) Alfred Wegener Institut, 2) Stockholm University, 3) Lamond-Doherty Earth Observatory, 4) British Antarctic Survey, 5) Geoscience Australia, 6) Istituto Nazionale di Oceanografia e di Geofisica Sperimentale, 7) Instituto Geológico y Minero de España, 8) Korean Polar Research Institute, 9) Institute of Geological and Nuclear Sciences, 10) Institute of Geological Sciences, 11) Vernadsky Institute of Geochemistry and Analytical Chemistry, 12) Servicio Hidrográfico y Oceanográfico, 13) Servicio de Hidrografía Naval, 14) Hydrographic and Oceanographic Department Japan Coast Guard, 15) University of New Hampshire

Introduction

IBCSO is the first regional charting project covering the entire Southern Ocean. The main objective of the IBCSO was therefore to create the first seamless digital bathymetric model (DBM) of the Southern Ocean comprising all available bathymetric data from various sources around the globe. IBCSO version 1.0 is covering the area south of 60° S with a resolution of 500 m x 500 m based on a polar stereographic projection with true scale at 65° S. An Editorial Board was established that collectively gathered more than 4 000 million echosounding points from more than 30 institutions, in 15 different countries. All contributed data sets have been transformed into a generic ASCII XYZ data format, including weighting factors and unique source identification codes as points attributes. The DBM then was derived using an iterative process of gridding and cleaning the data.

Figure 1: *Scheme of working steps to create IBCSO version 1.0*



Remove-Restore method:

The remove-restore method [Hell and Jakobsson, 2011] retains details of the seafloor morphology where data density and quality is sufficient and at the same time prevents the occurrence of artifacts in areas with sparse data. The method works by gridding the whole dataset in a first step at a lower resolution, and the high quality, dense data in a second step at a higher resolution. The higher resolution grid then restores the lower resolution grid in areas where high quality, dense data was available.

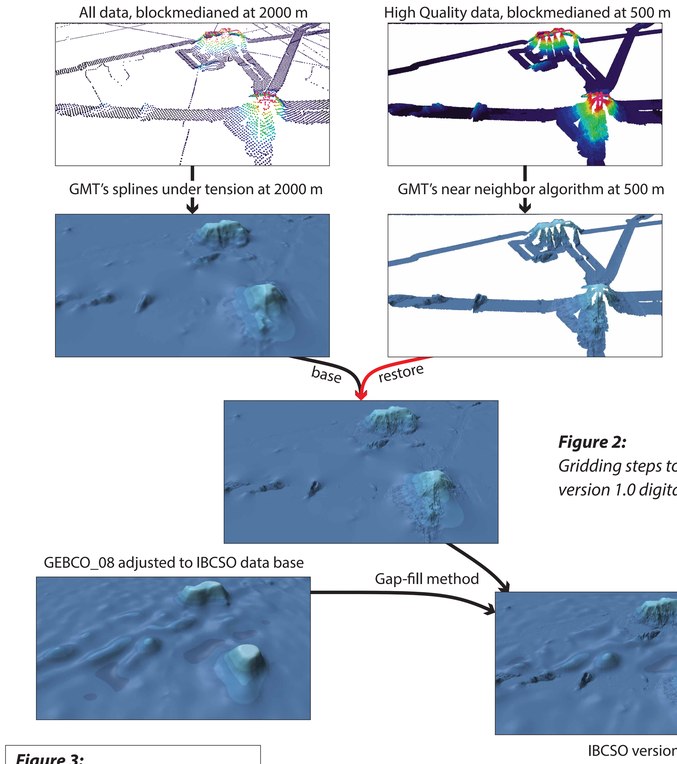
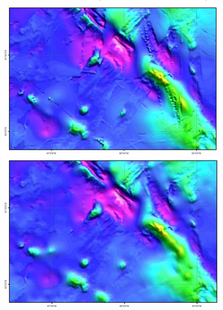


Figure 2:
Gridding steps to generate the IBCSO version 1.0 digital bathymetric model

Figure 3:
Effect of the gap-fill bending tool



Gap-fill method:

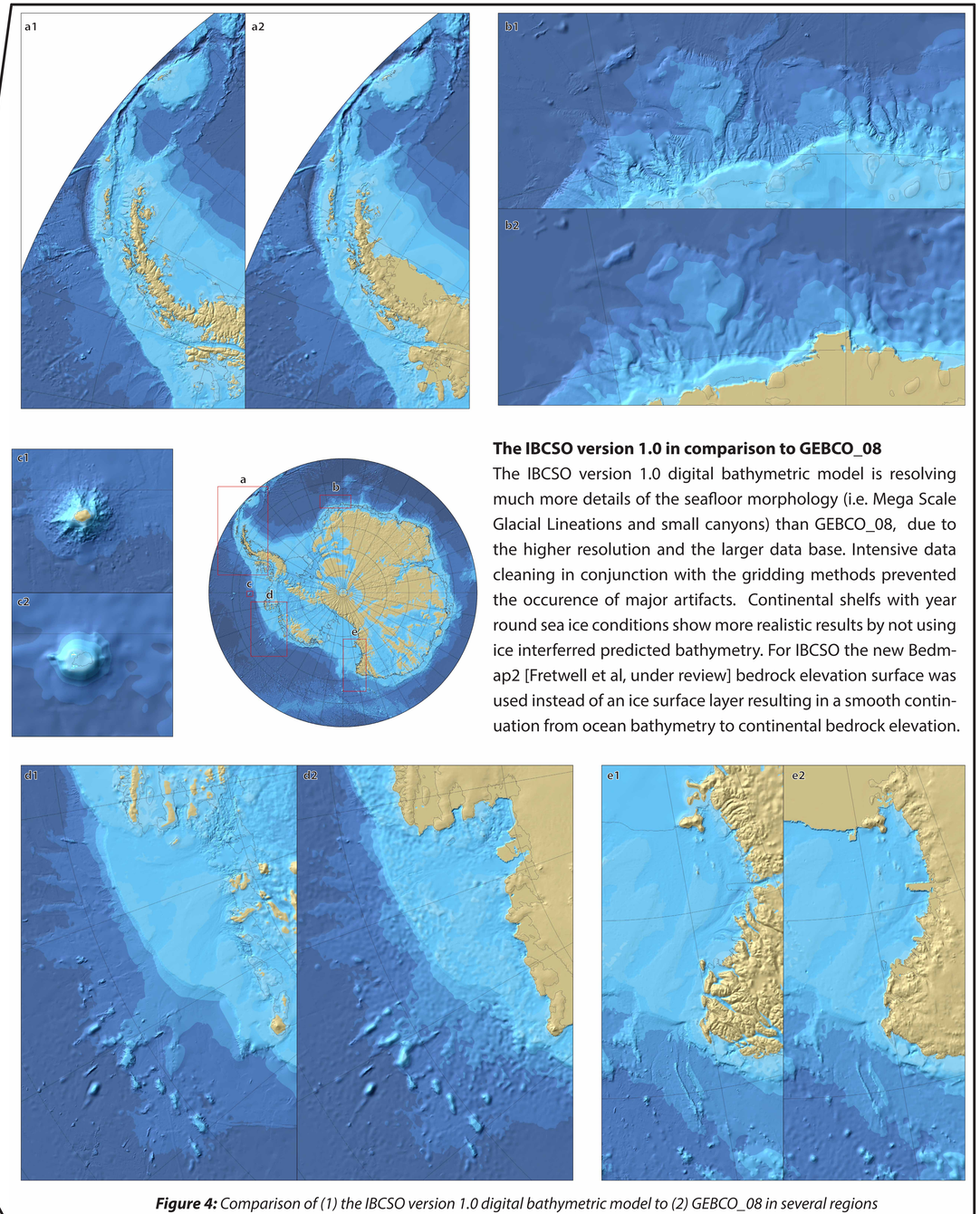
The gap-fill method was developed to fill areas without sounding data with adjusted predicted bathymetry. The method applies a bending tool to prevent the production of artifacts (see figure 3) for a 10 km transition zone between sounding data and predicted bathymetry. The tool uses a weighting function depending on the distance to the next sounding or the next cell outside the transition zone respectively. As a result, grid cells close to soundings are less influenced by predicted bathymetry than grid cells further away from soundings. Directly by sounding data constrained grid cells remain unchanged.

IBCSO retrieval:

The IBCSO products, DBM and an adjacent map, are going to be publically available by spring 2013 via www.ibcso.org and via the data portal PANGAEA.

Contacts:

Jan.Erik.Arndt@awi.de; Hans-Werner.Schenke@awi.de



The IBCSO version 1.0 in comparison to GEBCO_08

The IBCSO version 1.0 digital bathymetric model is resolving much more details of the seafloor morphology (i.e. Mega Scale Glacial Lineations and small canyons) than GEBCO_08, due to the higher resolution and the larger data base. Intensive data cleaning in conjunction with the gridding methods prevented the occurence of major artifacts. Continental shelfs with year round sea ice conditions show more realistic results by not using ice interferred predicted bathymetry. For IBCSO the new Bedmap2 [Fretwell et al, under review] bedrock elevation surface was used instead of an ice surface layer resulting in a smooth continuation from ocean bathymetry to continental bedrock elevation.

Figure 4: *Comparison of (1) the IBCSO version 1.0 digital bathymetric model to (2) GEBCO_08 in several regions*

Data contributors: