

IHO HYDROGRAPHIC COMMITTEE ON ANTARCTICA (HCA)
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International Bathymetric Chart of the Southern Ocean (IBCSO)
Status Report

General

After the inaugural Meeting of the IBCSO on 30 July 2004 during the XXVIIIth SCAR-Conference in Bremen not much progress has been reached. The implementation of IBCSO plans has been somewhat delayed because expert staff have left AWI, but the programme at AWI is ongoing and from the 15th October 2006 on a full-time position is established for this project. The project is executed under the umbrella of the IOC Consultative Group on Ocean Mapping (CGOM), under the IHO-IOC GEBCO project and under the SCAR Geoscience Standing Scientific Group on (GSSG).

<http://www.geoscience.scar.org/expertgroups/ibcso/index.htm> and

<http://www.awi-bremerhaven.de/GEO/Bathymetry/ibcso/>. The work will concentrate at the first step on the establishment of a network formed by Southern Ocean (SO) hydrographers and bathymetrists and on the establishment of a SO bathymetric data bank. The second step will focus on the collection of bathymetric data from scientific research vessels and hydrographic survey ships. Solid Earth topography will be extracted from the Antarctic Digital Database (ADD). The final product will be a Digital Terrain Model (DTM) which can be used for a wide range of scientific applications and interpretation, and primarily for mapping the Southern Ocean.

The IBCSO project is well established within organizations like the International Hydrographic Organization (IHO), the Intergovernmental Oceanographic Commission (IOC) of UNESCO and the General Bathymetric Chart of the Oceans (GEBCO). Special attention to IBCSO is given by the IHO Hydrographic Committee on Antarctica (HCA) where data exchange between the national Hydrographic Offices and scientific institutions is realized. The IBCSO proposal was presented to the thirty-seventh session of the Executive Council in Paris, 23–29 June 2004 and was adopted in IOC-Resolution EC-XXXVII.5 as an IBC Mapping Project.

Reports or presentations about IBCSO were made at the following conferences and meetings:

1. 1st Meeting of the Joint SCAR/SCOR Oceanography Expert Group, 7-8 October 2005, Venice
2. IOC Consultative Group on Ocean Mapping (CGOM), 17 June 2006, Bremerhaven
3. GEBCO Conference 14-23 June 2006, Bremerhaven
4. Written report submitted to the 2nd Joint SCAR/SCOR Oceanography Expert Group Meeting held at the XXIXth SCAR Conference 10-11 July 2006, Hobart, Tasmania, Australia.

Report to the 1st Joint SCAR/SCOR Oceanography Expert Group in Venice

The appointed IBCSO chief editor was elected as Member of the SCAR/SCOR Oceanography Expert Group in 2005 and attended the first meeting in Venice in October 2005. The Oceanography Expert Group (EG Ocean) recognized that all ocean science disciplines in the Southern Ocean require improved bathymetric data. Presentations of the IBCSO-project and POBACE (Polar Ocean Bathymetry Coordination Effort), a project submitted to the IPY, were given by the author of this report.

The IBCSO aim is to produce a high-resolution bathymetry map of the Southern Ocean, which would correspond to the existing Arctic Ocean map (IBCAO). Improved bathymetry is needed for (i) improved interpretation of geological processes; (ii) improved knowledge of topography as a key element in

defining ecosystems; and (iii) improvements in the bathymetry used as the bottom bounding layer in ocean circulation models and GCMs. Science and safe navigation are main arguments for implementation.

The sub-glacial bathymetry will be included when available. There are areas of sparse bathymetric data in the polar regions (particularly in the Southern Pacific). In addition, older data need quality control, and ice-covered areas have to be taken into account. A GEBSCO Digital Atlas has been produced, but new bathymetric data cover mostly the Antarctic Peninsula surroundings (Weddell Sea), the Atlantic sector and the Ross Sea. The Indian Ocean is not fully covered by digital data, but analogue data exist for this part of the SO. The existing bathymetric map of the Ross Sea based on satellite altimetry, is reliable only for large features (20-30km across). Additional data from other countries and other sources are being made available too slowly for the IBCSO time frame (until 2009) to be implemented. The implementation plan for IBCSO includes active data collection and digitization.

Efforts are needed to keep echo-sounders and multibeam sensors on ships running for the long transits. Each ship should carry a person responsible for the echo-sounding equipment on the ships to ensure useful data quality. All data should be submitted to NGDC in Boulder, Colorado, since all the data submitted there are available to others.

Following recommendations were adopted at this Meeting:

- A standard procedure/protocol should be advised for multibeam sensor operation on ships during cruises. There is no regulation/protocol at the moment.
- Multibeam measurements should become an ideal goal for every ship and every cruise
- If possible, repeated ship routes should be slightly modified from one cruise to another, not following exactly the same line every time, to provide new bathymetry data
- Hans-Werner Schenke provides a liaison between the EG-Ocean and the SCAR GSSG EG-IBCSO.
- EG-Ocean should ask the IPY Steering Committee to better coordinate bathymetric efforts and to establish a bathymetry policy, starting within the IPY frame but continuing beyond the IPY.
- A closer collaboration is required between the EG-Ocean and the SCOR working group on global data (data exchange and coordination issues). EG-Ocean should emphasise the value of data and information exchange between different groups.

GEBSCO Conference 14-23 June 2006, Bremerhaven

A short report about the status of the IBCSO project was presented during the GEBSCO-Conference in Bremerhaven to the GEBSCO Sub-Committee on Digital Bathymetry and the Guiding Committee. Both committees welcome and support this project. As the major data base the IHO Data Centre for Digital Bathymetry can be used for this project.

IOC-CGOM-X Meeting 17 June 2006, Bremerhaven

CGOM strongly supports the IBCSO project and the establishment of a bathymetric data base, and recommends close collaboration with the three umbrella organizations IOC, IHO and SCAR, especially to organize data acquisition and data retrieving. Survey activities of modern ice-breaking research vessels during the last decades using single and multibeam sonar systems have increased the bathymetric data stock, although considerable amount of collected data did not find its way into international data archives. The bulk of data is spread all over the world, often unprocessed and poorly documented. CGOM will support Meetings of the IBCSO Editorial Board which should be established as soon as possible. Momentarily no date for a meeting planned, this will be done in coordination with CGOM and GEBSCO. An informal IBCSO-Meeting could be held at the 10th International Symposium on Antarctic Earth Sciences in Santa Barbara, CA, August 26 – September 1, 2007 (ISAES 2007), at which a number members of the tentative Editorial Board, established at the first Meeting in Bremen (cf. HCA4-7.3C), will attend.

CGOM adopted seven recommendations. Recommendation 6 refers to the IBCSO project: Taking into account the IOC Resolution EC-XXXVII.5 of June 2004, asking to support the establishment of the IBCSO jointly with IHO and SCAR and invites the IOC Executive Secretary to endow the IBCSO Editorial Board with the mandate to prepare Term of References and to establish membership and to organize an inception meeting as soon as possible.

Report to the 2nd Joint SCAR/SCOR Oceanography Expert Group in Hobart

During the 2nd Meeting of the SCAR/SCOR EG Ocean possible ways to improve the bathymetric database were discussed. The Meeting agreed upon several action items.

A standard procedure or protocol should be advised for multibeam operations on ships during cruises. It is proposed to discuss the need for a meeting of multibeam experts and to establish a link to GEBCO as focal point for ocean mapping. This matter will be discussed during the SCOR Project Coordination meeting in London (7-9 December 2006).

Chairman of EG Ocean will request COMNAP to encourage ship operators to continually collect and exchange bathymetric data, preferably multi-beam data, and to take note that repeated ship routes should be slightly modified from one cruise to another, not following exactly the same line every time, to provide new bathymetry data.

The EG Ocean will contact the IPY Steering Committee to better coordinate bathymetric efforts and to establish a bathymetry policy. The IPY Project Office Director, David Carlson, was asked what the IPY was doing to promote the collection of bathymetric data in the polar regions. He suggested that the bathymetric community should take their concerns to COMNAP, which represent the ship operators. It was noted that Captain Hugo Gorziglia of the International Hydrographic Bureau (dir2@ihb.mc) is keen for the IHB to do what it can in support of the IPY, and is asking what the IPY expects in the way of echo sounding.

The IPY proposal POBACE (Polar Ocean Bathymetry Coordination Effort) (cf. HCA4-7.3C, Annex 3) should be resubmitted to IPY Steering Committee, it can be probably subsumed into the Plates and Gates proposal.

Forthcoming activities

The implementation of IBCSO plans has been somewhat delayed because expert staff have left AWI in 2004. But the programme is ongoing. A three year full-time position has been established on 15 October 2006, the work on IBCSO is resumed.

In the meantime new multibeam bathymetric data for the project are being collected on Polarstern-expeditions. Fig. 1 displays the track lines of all Polarstern-Cruises performed since the last HCA-Meeting.

A meta-data base for IBCSO, which will include data from all Polarstern expeditions, is under development at AWI. Data from new expeditions are processed, especially from the region of Bellinghausen and Amundsen Seas and could be made available. The mapping area has been extended into the central Scotia Sea in cooperation with the V.I. Vernadsky Institute in Moscow. Three new expeditions with RV Polarstern in the Northern and Eastern Weddell Sea have been conducted.

The future work (starting in autumn 2006) involves:

- (i) establishing an active network of Experts in SO Bathymetry to work by correspondence
- (ii) setting up an Editorial Board for IBCSO
- (iii) actualising the Terms of Reference
- (iv) developing a bathymetric data base and a meta data base
- (v) organizing an intersessional Meeting of the IBCSO Group of Experts including interested scientists from SCAR member countries; ocean mapper from IOC organisations; and hydrographer from involved National Hydrographic Offices

- (vi) Combining the existing bathymetry from the AWI Bathymetric Chart of the Weddell Sea (BCWS), the Indian Ocean Bathymetry from the GEBCO Digital Atlas Centenary Edition (GDA-CE), and the new bathymetric charts from the Ross Sea by V. Stagpoole and F. Davey, NZ
- (vii) integration of solid Earth topography and toponomy.

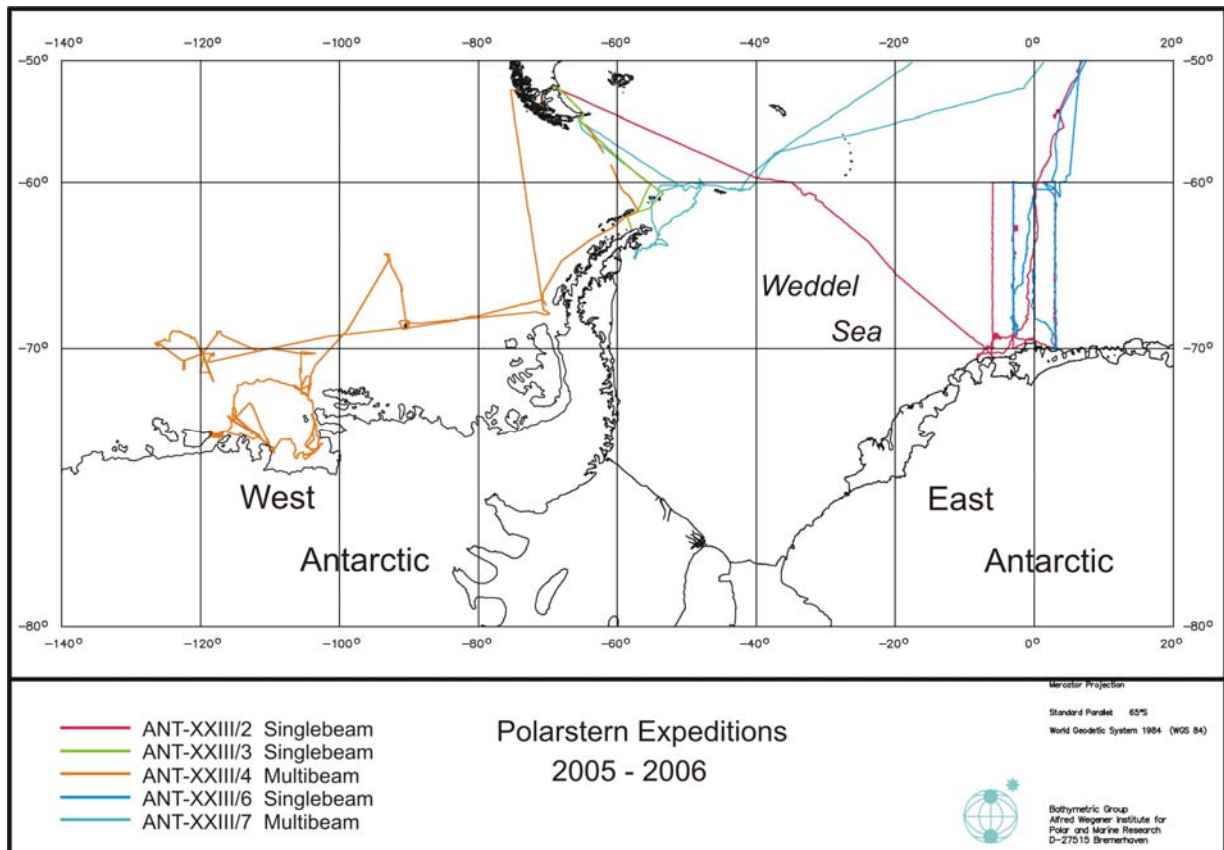


Fig. 1: Polarstern track lines between 2005 and 2006