

**IHO HYDROGRAPHIC COMMITTEE ON ANTARCTICA (HCA)
4th Meeting, Kythnos, Greece, 6 – 8 September 2004**

**Dr.-Ing. Hans Werner Schenke
Status Report
Preparation of the new
International Bathymetric Chart of the Southern Ocean
(IBCSO)**

General

The preparation for the establishment of the new International Bathymetric Chart of the Southern Ocean (IBCSO) proceeded well since the last HCA Meeting in Monaco where the project was introduced (cf. HCA3-6.3B). The positive reply and the support given by the HCA to this project, documented in the minutes of the 3rd IHO/HCA Meeting, was very useful and supportive for the promotion of IBCSO in various meetings, conferences and workshops, which took place in the meantime.

It turned out that the involved governmental and intergovernmental organisations like to support this project and wish to release existing data, including meta information and auxiliary data, which are needed for map making.

At several occasions the IBCSO project was introduced and discussed. The results of the three major meetings will be presented.

GEBCO: 20th Meeting of the Guiding Committee (GC)

The 20th Meeting of the GEBCO GC took place from 1 to 6 April 2004 in Porto Venere, Italy. IBCSO was introduced to the GEBCO community as a project under the auspices of the IOC (within the Ocean Mapping Program), the IHO (mainly integrated in the HCA), and under SCAR. The GC supports this project and points out that the IHO DCDB can be used as data archive as well as data retrieval system. However, it is known to GEBCO, that large amounts of multibeam data from research vessels in Antarctic waters have not been released so far.

The GC further stressed that the new bathymetric charts of the Southern Indian Ocean, compiled by R.L. Fisher, are included in the GEBCO GDA-CE. They could be utilized for the production of the new IBCSO.

IOC: 37th Meeting of the Executive Council (EC)

The project of the IBCSO was presented at the IOC Executive Council Meeting, which took place from 23 to 29 June 2004 in Paris, by the Chairman of the Consultative Group on Ocean Mapping (CGOM) as a project under IOC Ocean Mapping program. The Draft Resolution EC-XXXVII.(4.3.2) (cf. Annex 1) was supported by several countries and subsequently accepted by the EC.

A final IBCSO proposal, including the Terms of References and the establishment of an Editorial Board under a new co-ordinating system, will be early enough submitted for approval to the respective governing bodies of IOC, IHO and the IOC GA in Paris in 2005.

SCAR: 28th SCAR Conference IBCSO Kick-Off Meeting

The Kick-Off Meeting for the IBCSO took place in the course of the 28th Conference of the Scientific Committee on Antarctic Research (SCAR), cf. <http://www.scar28.org>.

The Southern Ocean mapping program was subdivided into two major sessions:

1. The scientific part under the SCAR-28 Open Science Conference, during which five papers on 27 July 2004 in the Session “Bathymetry of the Southern Ocean” were presented, and
2. the more technical and organizational IBCSO Kick-Off Meeting on 30 July, 2002, cf. <http://www.scar28.org/SCAR/PDF/IBCSO.pdf>. The IBCSO Kick-Off Meeting was attended by the Secretary of the IHO/HCA, Ing. en Chef Michel Huet, and Dr. Ron Macnab representing the IOC (OM-Program).

Presentations from the sessions can be downloaded from

<http://www.awi-bremerhaven.de/GEO/Bathymetry/ibcso/KOPresent.html>

The IBCSO Kick-Off Meeting as well as the Session “Bathymetry of the Southern Ocean” in the Open Science Conference were attended by more than 25 people from 11 countries (AU, CA, DE, ES, GB, JP, KR, MC, NZ, RU, US). Great interest for collaboration was expressed by representatives from several other countries (AR, BR, CL, CN, FR, IN, IT, NO, UA, UY, ZA), which in fact means that more than 20 countries are interested in co-operation and collaboration in the IBCSO project. General consensus was achieved that the data should be archived in one data centre. Exchange of meta-information and data will be granted to all contributing groups in order to avoid double work in this ecologically sensitive environment.

IBCSO presentation at other meetings

The IBCSO proposal was also presented and discussed at the following meetings.

1. During the national meeting of the German IOC Section on 15 May 2004 the project was introduced to the German IOC delegation, which is composed of scientists from different disciplines (cf. Annex 2). The project received a good judgement and thus will be supported within the IOC programs.
2. IBCSO was briefly discussed during the last GEBCO/SCUFN Meeting in St. Petersburg. It was stated that the establishment of a new, consistent and uniform data archive may result in discoveries of new submarine features. As it was stated in the minutes of the 3rd HCA, the number of named submarine features are less in the Southern Ocean than in other parts of the world's ocean.
3. A new project idea was developed in Germany for the International Polar Year for planning and co-ordinating bathymetric surveys in the polar region. The project POBACE (#62) was developed at the AWI (cf. Annex 3). The proposal can be found under: <http://www.ipy.org/concept/ideas/national/idea062.pdf>

Data Holdings

Several countries hold large amount of soundings from multibeam (MB) as well as from narrow single beam (NBS) sonar systems. At the Lamont Doherty Earth Observatory (LDEO) all MB data from US research vessels are archived. The Antarctic Multibeam Bathymetry Synthesis (AMBS) is an integrated bathymetric and geophysical database for the Southern Ocean and Antarctica, developed at LDEO by funds from the US NSF Office of Polar Programs (OPP). MB data, measured in the region of the Antarctic Peninsula by the Spanish RV "Hesperides" are held by different universities in Spain (Madrid, Barcelona, Grenada).

A large amount of NBS data collected during the past 40 years by Russian vessels are held by the HDNO and research institutions (VNIIOkeangeologia).

Australia and New Zealand hold also a large amount of data in the Ross Sea and Indian/Pacific Ocean areas. New bathymetric charts were compiled in the Ross Sea by NZ.

MB data from the GB research vessel "J.C. Ross" is held by individual researches at the BAS, and may be available upon request. Drs. Larter, Livemore, and Morris have expressed their interest to collaborate in this project.

In general, MB and NBS data are held at the IHO-DCDB (at NGDC), GEBCO, LDEO, SCRIPPS, BAS, AWI, and at different locations in Australia, New Zealand, South Africa, Russia, and Spain.

Data Quality

The IBCSO Kick-Off Meeting recognized, that problems may occur by digitizing old data and merging them with actual data. It was agreed further that all MB and NBS data have to be carefully verified and cross-checked with other data (for example predicted bathymetry, gravity, etc.).

Finally it was accepted that original data only, along with quality/accuracy information, should be used instead of gridded data.

The collection of MB data during transits to and from research areas is very important, tracks should be placed in regions without data. QC of collected data is vital.

Links to other programs

There are links and interactions to several other international programs.

- The Antarctic Digital Database (ADD) maintained by BAS
- Seafloor Sounding in Polar and Remote Regions (SSPARR) US Res. Institutes
- Cybercartographic Atlas (Carleton Univ. CN)
- International Polar Year (IPY) POBACE, German Project Idea 62
- SCAR programs and Action Groups
 - o BEDMAP Ice thickness and sub-glacial topographic model of Antarctica
 - o Antarctic Spatial Data Infrastructure (ANTSDI)

Result from SCAR XXVIII

The IBCSO program will be proposed by the chairman of the SCAR Geoscientific Standing Scientific Group (SCAR GSSG) to become the status of an Action or Expert Group. The decision will be made during the next SCAR Delegates Meeting in September/October 2004.

OCEAN MAPPING

The Executive Council,

I

Noting with satisfaction the progress made in the implementation of GEBCO, at a 1:10 million scale, and the IBCs, which cover seven regions with a total of approx. 150 sheets, at a 1:1 million scale, **Recalling** that in April 2003 GEBCO successfully celebrated its Centenary in Monaco, where GEBCO was established in 1903 by Prince Albert I,

Welcomes the nomination by the IOC Executive Secretary of Dr Meirion Jones, UK, as Member of the GEBCO Guiding Committee;

Accepts:

- (i) the Biennial Report (May 2001–April 2003) of the IOC Consultative Group on Ocean Mapping (CGOM) submitted in accordance with Clause I of its Terms of Reference;
- (ii) the Summary Report of the 9th Session of IOC/CGOM, held in Monaco, 10–12 April 2003; and the Recommendations annexed to the Summary Report of the CGOM highlighting the importance of the construction of marine geological/geophysical overlay sheets, and the production of a digital grid with finer spacing from original compilation materials;

Strongly supports the establishment of an International Bathymetric Chart of the Southern Ocean (IBCSO), for which a planning meeting will be organized by Alfred Wegener Institute for Polar Research (AWI) in Bremen, Germany, 30–31 July 2004;

Invites Member States to:

- (i) include more bathymetric charting in their marine research programmes, in particular in regions with sparse data;
- (ii) continue to pay great attention and to contribute funds for training in ocean mapping, either on shore or on board research vessels or survey ships

II

Invites Member State representatives to express in writing their views to the IOC Executive Secretary on the proposal streamlining the ocean mapping support mechanisms by bringing together GEBCO and IBCs under a joint IOC-IHB Ocean Mapping Board; and

Instructs the IOC Executive Secretary to work with the IHO Secretariat on the elaboration of the terms of reference of such a Board with the aim of submitting a final proposal for this new co-ordinating mechanism to the respective governing bodies of IOC and IHO, in 2005, for their final approval.

Annex 2

Dr.-Ing. Hans Werner Schenke
AWI, Bremerhaven

Sitzung der Deutschen IOC-Sektion
Hamburg, 14. Mai 2004

Proposal to support the IOC Draft Resolution EC XXXVII (4.3.2.) Ocean Mapping:
International B**athymetric C**hart of the S**outhern O**cean (IBCSO)************

**to be tabled at the
Meeting of the German IOC-Section at the BSH on 14.5.2004
in preparation of the
37th Session of the IOC Executive Council
on 23 – 29 June, 2004 in Paris**

Introduction

The knowledge of sea floor topography south of sixty degrees southern latitude, i.e. in the Southern Ocean, can still be characterized as sparse and patchy. We presently plan to compile and compute a new bathymetric data set for the Southern Ocean on the basis of existing, though currently widely spread data. The work should be done within the IOC Ocean Mapping Program under the roof of IOC and IHO and the technical guidance of GEBCO.

Remote location and permanent or seasonal sea ice cover led to the fact, that there are large areas within the Southern Ocean, where no in-situ information about form and structure of the sea floor is available. Predicted bathymetry from space-borne altimetry is still a major source for the physiographic understanding of the region.

However, the survey activities of modern ice-breaking research vessels during the last decades, using single and multibeam systems, have increased the bathymetric data stock, although considerable amounts of the data collected did not find its way to international data bases. The bulk of this data is spread all over the world, often unprocessed and poorly documented.

Goals

- § Circum-Antarctic gridded bathymetric data sets, probably in varying resolutions, embedded in a WebGIS environment,
- § A homogeneous set of depth contours,
- § An integrated metadata infrastructure compliant to international standards (ISO, FGDC),
- § A circum-Antarctic bathymetric map series, aspired scale 1:1,000,000, and
- § Bathymetric data for the creation of the new Nautical Charts in Antarctica (IHO/AHC).

Benefits

Currently there is no specific Circum-Antarctic bathymetric data set. Bathymetries have been derived for many local areas of interest in the Southern Ocean. These loose patches co-exist with the actual global data sets.

On the other hand, bathymetric information gained increasing importance for all kinds of marine sciences over the last decades. Marine geologists, biologists, chemists, oceanographers, etc. take

multifarious samples to describe and understand partitions of the marine environment according to their specific scientific topics.

The bottom topography often turns out to be a crucial information in order to locate and interpret results from marine sampling. Moreover when regionalization of spot data is necessary, i.e. interpolation from distributed sample points to areas for budget analyses, flux estimations, etc. the local bathymetry plays a key role. Another point emphasizing the importance of an accurate bathymetry is its influence on ocean circulation and respective modelling.

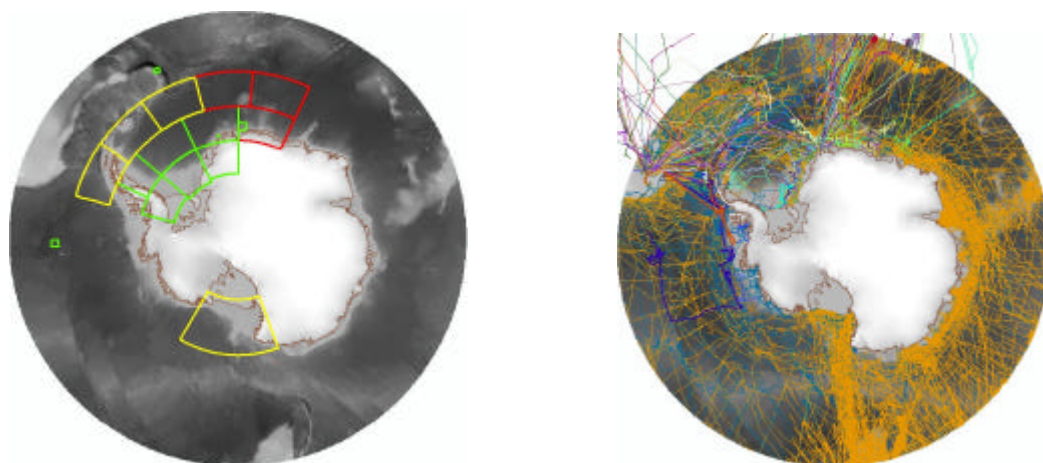
Last not least, safe navigation is still an issue around Antarctica obviously depending on the quality and resolution of bathymetric charts and data sets.

Programme

It is proposed to start an initiative in the framework of IOCs and IHOs Regional Mapping Projects (IBCs) to create a new "International Bathymetric Chart of the Southern Ocean" (IBCSO). Main goal will be the collection and compilation of all available Southern Ocean bathymetric data in order to generate a new Southern Ocean bathymetry. In addition, to compiling the data already collected, new data sets, e.g. from the proposed US SSPARR project and from coming research cruises, should be integrated. The data inventory will support coming Southern Ocean research activities, e.g. related to the IPY campaign 2007/8, so that bathymetric white spots can be identified, prioritized and, hopefully, filled with data in the near future. A proposal covering these aspects is submitted to the ICSU-IPY Planning Group under the acronym POBACE (Polar Ocean Bathymetry Coordination Effort).

The IBCSO initiative will be carried out under the roofs of IOC, IHO and SCAR. The work will be tackled under consideration of the excellent experiences made in the successful IBCAO project. So far, IBCSO was presented to SCAR (2002), to the CGOM (2003), to the GEBCO-GC (2004) IHO, and has been fruitfully discussed during the 3rd Meeting of the IHO Hydrographic Committee for Antarctica (HCA) in Monaco, September 2003.

The IBCSO Editorial Board as well as a detailed working and competence plan should be established during the IBCSO Kick-off meeting on Friday, July 30th 2004. The Kick-off will be held in the framework the XXVIII SCAR Conference in Bremen, Germany.



Polar Ocean Bathymetry Coordination Effort (POBACE)

A suggestion for an International Polar Year (IPY) initiative

Martin Klenke & Hans Werner Schenke

Alfred Wegener Institute for Polar and Marine Research, Postbox 120161, D-27515 Bremerhaven, Germany
Tel.: +49 471 4831 1167, E-Mail: mklenke@awi-bremerhaven.de, WWW : <http://www.awi-bremerhaven.de/GEO/Bathymetry/>

Sea floor topography is a pivotal basic data for many marine scientific disciplines. Fields of application include, but are not limited to (i) oceanographic modelling at all scales in order to predict regional and global ocean circulation and its impact on climate, (ii) geological modelling of ocean basin evolution, (iii) constraining plate tectonics and intraplate volcanism from the pattern of seafloor fabric, (iv) geo-bio-chemical spot sample regionalization and calculation of areal particle fluxes and budgets, (v) evaluation of fisheries resources and habitats, (vi) assessing the impact of coastal sediment transport and pollution.

Nevertheless, our bathymetric knowledge in general is poor and fragmentary. In fact, most of the relief of Moon and Mars is known in better spatial resolution than the bottom topography of the world's oceans. Globally, the biggest uncertainties remain in the remote and partly ice-covered regions of the Arctic and Antarctic waters. On the other hand, we learned that particularly the Polar seas have a critical impact on the global climate, e.g. through bottom water formation controlling the global thermohaline circulation.

Recognizing this, two international projects are currently working on the improvement of our bathymetric knowledge in the Arctic and Antarctic oceans: The well established "International Bathymetric Chart of the Arctic Ocean" (IBCAO) and the "International Bathymetric Chart of the Southern Ocean" (IBCSO) which is currently about to start. Both projects are carried out under the auspices of the Intergovernmental Oceanographic Commission (IOC) of UNESCO and the International Hydrographic Organization (IHO). Scientific reference is given by the International Arctic Science Committee (IASC) and the Scientific Committee on Antarctic Research (SCAR).

The Arctic Ocean mapping project IBCAO already provides a detailed inventory of existing bathymetric data sets in Arctic waters. The IBCSO project will lead to such an inventory for the Southern Ocean by the end of 2004. Both enquiries in return supply us with an explicit image of the distribution of the "bathymetric white spots".

During the envisaged IPY many vessels will travel the polar oceans fulfilling research and logistic missions. Almost all ships will be equipped with sonar systems, at least a single beam aperture. The Polar Ocean Bathymetry Coordination Effort (POBACE) is targeting on the collection of respective sonar data and the coordination of ship tracks in order to enhance our bathymetric source data stock. The initiative will raise new data sets as easy and cheap byproducts of other missions. Up to now, sonar data from many vessels does not find its way to international data bases. Moreover, vessels, particularly when concerned with logistic tasks, tend to sail the same track lines over the years. In many cases, even minimal track shifts could raise exciting new data sets.

Hence, deliverables of the POBACE initiative will include:

- ? ? Setting up a communication infrastructure between possible data providers and scientists interested in bathymetric information, preferably using existing IASC and SCAR channels.
- ? ? Definition and rating of areas of interest to be mapped on the basis of the IBCAO and IBCSO data inventories and the manifold Arctic and Antarctic scientific programs and tasks.
- ? ? Collection of the ship tracks planned in the Polar oceans during the IPY and respective metadata in a central facility allowing scientists an easy track query and visualization via internet.
- ? ? Checking of the tracks planned against the potential mapping areas identified and, where necessary, desired and applicable, track adjustments in close cooperation with the originators.
- ? ? Organization of data collection, distribution and processing following the cruises.
- ? ? Publication of the data products and integration in the IBCAO and IBCSO data bases for future improvements and revisions.

If successful, POBACE will lead to an ongoing international effort to communicate and better coordinate ship movements in the Polar oceans in order to increase our bathymetric knowledge, and therewith, raise synergistic potentials, encourage multidisciplinary work, and enhance the cost effectiveness of Arctic and Antarctic research.

Note:

A draft version of this proposal have been sent to various potential contributors and interested parties around the world on Dec 1st, 2003 asking for feedback on the idea. Until today (Dec 8th) we got a couple of positive responses and expressions of willingness to cooperate in the POBACE initiative, for instance from:

- ? ? Margo Edwards, University of Hawaii and the coming head of the US Arctic Icebreaker Coordination Committee (coordinating Arctic and Antarctic operations)
- ? ? Ron Macnab, Geological Survey of Canada, chairman of the IBCAO Editorial Board
- ? ? Paul Wessel, University of Hawaii, Chair Dept. Geology and Geophysics, SOEST
- ? ? Robert Anderson, Hawaii Mapping Research Group, University of Hawaii and one of the initiators of the NSF funded "Seafloor Sounding in Polar and Remote Regions" (SSPARR) program
- ? ? Bernard Coakley, Geophysical Institute, University of Alaska Fairbanks
- ? ? Garrik Grikurov, All Russian Research Institute for Geology and Mineral Resources of the World Ocean, VNIIO, Russian Federation.