GEBCO Sheet G.01

(Arctic Ocean)

INTERNATIONAL BATHYMETRIC CHART OF THE ARCTIC OCEAN (IBCAO)
(Contours computed from Version 1.0 of the IBCAO grid dated July 2001)

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Sheet limits: 64°N to 90°N; 180°W to 180°E

Horizontal Datum: WGS-84

Scale: Contours derived from a 2.5km by 2.5km bathymetric grid in polar stereographic projection co-ordinates

Contour Units: Bathymetric depth in corrected metres

Contours present: 20m, 50m, 100m, 150m, 200m, 300m, 400m, 500m and at 500m intervals thereafter down to 5500m. Additional contours at 100m intervals from 500m to 3400m are also present in southern boundary region between 95°W and 5°E.

Coastline Source: NIMA World Vector Shoreline (1:1 million scale) except for the coast of Greenland and northern Ellesmere Island where an updated coastline was provided by the National Survey and Cadastre, Denmark (KMS).

Reference: Jakobsson, M., N.Z. Cherkis, J. Woodward, R. Macnab and B. Coakley (2000). New grid of Arctic bathymetry aids scientists and

mapmakers, Eos, Transactions, American Geophysical Union, v.81, no.9, p.89, 93, 96

PREPARATION OF GEBCO SHEET G.01

The bathymetric contours for sheet G.01 were derived from version 1.0 (dated July 2001) of the IBCAO gridded bathymetric data set produced at intervals of 2.5km by 2.5km in polar stereographic projection co-ordinates and submitted to BODC by Martin Jakobsson. The grid was based on an extensive database of soundings collected in the region from a variety of sources as listed below. In regions of sparse soundings, these data were augmented with contour information as follows:

In the central Arctic Ocean, data were incorporated from a newly published Russian map (HDNO et al., 1999) while information was extracted from an earlier NRL chart (Perry et al., 1986) for the area of Bering Strait. Similarly, contour information was taken from NRL maps (Cherkis et al., 1991; Matishov et al., 1995) in the Barents and Kara Seas. In the southern Norwegian-Greenland Seas, Baffin Bay and parts of the Canadian Arctic reference was made to the digital version of GEBCO sheet 5.17. Bathymetry in the Gulf of Bothnia was derived from a 2'(E-W) by 1'(N-S) digital grid compiled by Seifert and Kayser (1995). On the continental shelf of Siberia in the Laptev and East Siberian Seas and the Kara Sea (east of 80°E), soundings were extracted from a suite of navigational charts published by the Russian Head Department of Navigation and Oceanography (HDNO, 1989-1998). These soundings were used to manually draw contours (at intervals of the order of 5m) which were subsequently digitized for input to the grid. Where no contour information was available in data sparse areas e.g. around Greenland, provisional contours were prepared by the IBCAO group to facilitate the gridding process.

All data were imported to Intergraph's GIS system MGE (Modular GIS Environment) with projection parameters set to polar stereographic on the WGS-84 ellipsoid, with a true scale at 75°N. The data were corrected for sound velocity using Carter's Tables or CTD profiles where available, and colour-coded by depth value to facilitate a visual inspection of outliers, cross-track errors and the fit between contours and sounding data. Suspicious soundings were removed, and where contours showed major discrepancies with the soundings, the contours were manually adjusted to fit the new trackline data.

All data were then exported to an XYZ co-ordinate system for further processing and for gridding using the GMT public domain software. Prior to gridding, the data were pre-processed with a block-median filter in GMT. Gridding at a cell size of 2.5 x 2.5km was performed with the 'surface' program, fitting a surface of continuous curvature to all points. Three-dimensional visualization of the gridded data highlighted discrepancies that had to be resolved in the input data set, after which the data were re-gridded and re-inspected for residual discrepancies. This process was continued until the results were deemed satisfactory.

For the creation of GEBCO sheet G.01, contours were generated from the 2.5 x 2.5km grid using Z/I Imaging's tool Modular GIS Environment (MGE) Terrain Analyst (MTA). A cubic parametric curve was fitted through the generated contours for removal of minor deviations along the contour lines. The contour nodes were then converted from polar stereographic co-ordinates to geographic latitude and longitude co-ordinates. The

bathymetric contour data set was filtered to cut down on the volume of points using the Douglas-Peucker algorithm. This data set was then submitted to BODC for inclusion in the GEBCO Digital Atlas.

Final editing of the contour data set to remove any small artefacts that were generated during the gridding process was carried out at BODC by Norman Cherkis in July 2001. He was also responsible for edge-matching the contours with adjacent sheets in the GEBCO Digital Atlas. The digital coastline data sets were also added to the contour data set at BODC. Trackline control information was provided by Martin Jakobsson in the form of a digital file containing the position of sounding points in the IBCAO database.

DATA SOURCES

Echo-sounding data archives of US National Geophysical Data Centre, US Naval Research Laboratory, Canadian Hydrographic Service and Royal Danish Administration of Navigation and Hydrography

US Navy and British Royal Navy submarine cruises 1957-88

Multibeam data collected by Norwegian Petroleum Directorate

Multibeam data from RV Polarstern 1990, 1994, 1995, 1997

Swedish ice-breaker Oden cruises 1991,1996

US SCICEX project, single beam bathymetry, six submarine missions 1993-1999

Canadian Hydrographic Service (1979), GEBCO Sheet 5.17, map, scale 1:6,000,000

Cherkis, N.Z., H.S. Fleming, M.D. Max, P.R. Vogt, M.F. Czarnecki, Y. Kristoffersen, A. Midthassel and K. Rokoengen (1991). Bathymetry of the Barents and Kara Seas. Geological Society of America Map and Chart Series, MCH047, scale 1:2,313,000, 1 sheet.

Head Department of Navigation and Oceanography, All-Russian Research Institute for Geology and Mineral Resources of the World Ocean, and Russian Academy of Sciences (1999). Bottom relief of the Arctic Ocean. Head Department of Navigation and Oceanography, St. Petersburg, map, scale 1:5,000,000, 1 sheet.

Head Department of Navigation and Oceanography (1989-1998) Hydrographic Charts: 11139, 11140, 11142, 11143, 11150, 11152, 11155, 12230, 12334, 12335, 12344, 12348, 12401, 12404, 12407, 12417, 12428, 12433, 13317, 13410, 13420, 13421, 13425, 13426, 13432, 14305, 14321, 14403, 14404, 14411, 14420, 14421, 14427, 14433, 14434, 15430, 16442, 18330, 19448, 19453, 698, 948-955; scales from 1:10,000 to 1:700,000.

Matishov, G.G., N.Z. Cherkis, M.S. Vermillion and S.L. Forman (1995). Bathymetry of the Franz Josef Land Area. Geological Society of America Map and Chart Series, MCH080, scale 1:500,000, 1 sheet.

Perry, R.K., H.S. Fleming, J.R. Weber, Y. Kristoffersen, J.K. Hall, A. Grantz, G.L. Johnson, N.Z. Cherkis and B. Larsen (1986). Bathymetry of the Arctic Ocean. Geological Society of America Map and Chart Series, MC-56, scale 1:4,704,075, 1 sheet.

Siefert, T. and B. Kayser (1995). A high resolution spherical grid topography of the Baltic Sea. Meereswissenschaftliche Berichte/Marine Science Reports, Institut fur Ostseeforschung, Warnemunde, Germany