GEBCO Sheet G.07
(Weddell Sea and the Bransfield Strait)

BATHYMETRIC CHART OF THE WEDDELL SEA (compiled 1997, extended 2001)

(Update history: a subset of this sheet was released as GEBCO sheet 97.2 in the 1997 release of the GEBCO Digital Atlas covering the area of the Weddell Sea south of 65°S and west of 0°W. Subsequently updated and extended in the region 60°S to 65°S; 75°W to 15°W in the northern Weddell Sea and around the Antarctic Peninsula, the Bransfield Strait and westwards. Also updated and extended in the region 66°S to 72°S; 2°W to 2°E)

Chief Editors:	Hans Werner Schenke (Alfred Wegener Institute for Polar and Marine Research, Bremerhaven, Germany) and Gleb B. Udintsev (Vernadsky Institute of Geochemistry and Analytical Chemistry, Moscow)
Sheet Limits:	60°S to 79°S; 75°W to 2°E (see below for detailed coverage)
Scale:	Contours compiled and digitised on Mercator sheets at a variety of scales between 1:250,000 and 1:1 million
Horizontal Datum:	WGS-84
Contour Units:	bathymetric depth in uncorrected metres (assuming a sound velocity in seawater of 1500m/s - see note below)
Contours present:	100m intervals down to 7200m
Coastline Source:	SCAR Coastline of Antarctica, version 3.0 (full resolution version at scale of 1:1 million and better).
Digitised by:	Alfred Wegener Institute for Polar and Marine Research, Bremerhaven, Germany

Geographic Coverage:

60°S to 66°S; 75°W to 15°W
65°S to 66°S; 15°W to 2°W
66°S to 79°S; 75°W to 2°E

Published Charts: Printed charts published by the Alfred Wegener Institute as a series of nine sheets (533-535, 551-553, 566-568) as part of the 1:1 million scale "AWI Bathymetric Chart of the Weddell Sea, Antarctica". Sheets 533-535 published jointly with Vernadsky Institute of Geochemistry and Analytical Chemistry. Coverage as follows:

60°-66°S: 75°-55°W (533); 55°-35°W (534); 35°-15°W (535)

66°-72°S: 66°-50°W (551); 50°-25°W (552); 25°-0°W (553)
72°-78°S: 75°-50°W (566); 50°-25°W (567); 25°-0°W (568)

Note on contour units: Prior to contouring for use in GEBCO charts, echo-soundings are normally corrected for regional variations in the velocity of sound in seawater by the use of Carter's Tables (NP132, "Echo-Sounding Correction Tables", 3rd Edition, D.J.T. Carter, Hydrographic Department, Taunton, 1980). However, for GEBCO Sheet G.07, such corrections were not made as there is considerable uncertainty on the accuracy of Carter's Tables in the area of the Weddell Sea and the sound velocity was assumed to be 1500m/s throughout the water column. By way of comparison it may be noted that, for the Weddell Sea area, the corrections from Carter's Tables are as follows:

Contour depth (m)	200	500	1000	1500	2000	2500	3000
Correction (m)	-8	-18	-29	-39	-47	-53	-55

Contour depth (m)	3500	4000	4500	5000	5500	6000
Correction (m)	-54	-51	-45	-36	-24	-8

PREPARATION OF GEBCO SHEET G.07

This data set was compiled in two parts; Area A (65°-79°S: 66°-0°W) which was submitted by AWI to BODC in 1997 and Area B (60°-66°S: 75°-15°W) which was submitted by AWI in 2001. Area B updates the bathymetry of Area A in the overlapping area between 65°-66°S. In 2001, AWI also provided BODC with updated bathymetry for the area from 2°W to 2°E.

PREPARATION OF AREA A

Authors: Hans Werner Schenke, Heinrich Hinze, Fred Niederjasper, Tilo Schone, Bernd Hoppmann, and Semme Dijkstra, Alfred Wegener Institute for Polar and Marine Research (AWI), Bremerhaven, Germany

Until the AWI started its scientific activities in the Weddell Sea in 1983 using the ice breaking research vessel RV Polarstern, few soundings were available for compiling a bathymetric chart of the area. Since then more than 40 expeditions have taken place in the region, including more than 20 cruises of RV Polarstern with continuous multi-beam echo-sounding using either Seabeam or Hydrosweep systems.

Area A is based on the Polarstern data and on additional echo-sounding data supplied by several national Hydrographic Offices and research institutions. Due to the hostile nature and high latitude of the area, the data coverage is very irregular and the quality of the data is highly variable with navigation uncertainties and recording errors. Digital Terrain Modelling (DTM) techniques were used to assist in the assimilation of the soundings. Prior to final acceptance, each track of data was verified by checking for crossover errors and for reasonable navigation (e.g. checking ship speed) and by comparing the data with the developing DTM, with neighbouring soundings and with the morphological fabric of the area. Obviously erroneous data were corrected if possible (e.g. by adjusting the navigation) or eliminated. During the verification, the data were assigned a quality factor for use in weighting the contribution of the data in the construction of the DTM. Within the DTM the grid size varied from 0.5 to 2.5 n.miles depending on the data density and the complexity of the underlying topography.

All verified depth data were included in the final calculation of the DTM which was then contoured automatically at 50m intervals and plotted out. The plots were evaluated against other available geophysical and geological data such as satellite altimetry, gravity, magnetic, tectonic and seismic data. Various fabrics resulting from tectonic effects, glacial and oceanographic erosion are observed in the Weddell Sea and the contours were adjusted to be consistent with the properties of such fabrics. Correlations found in well surveyed areas were used to predict the bathymetry in ice covered areas or to supplement the bathymetry in sparsely surveyed areas. If structures in the bathymetry did not appear plausible, the reliability of the depth data was re-evaluated. Reported but unconfirmed or suspect depths were omitted if they conflicted with the morphological evidence of other sources.
By comparing the depth data with the other data it was possible to verify the plausibility of the sea floor structures together with their extension and orientation. The contours were manually adjusted as necessary during this interpretive phase of the compilation, particularly in the sparsely sounded areas. It should be noted that, due to ice cover, there is a paucity of soundings in the western, central and southern parts of the Weddell Sea and the contours in these regions are somewhat speculative.

Drafting and final contouring was carried out at scales of 1:1 million or better; the exact scale being dependent on the density of data and the roughness of the topography. The resulting contours were smoothed by hand and manually digitised. After a careful edgematching of the various sheets, the digital data set was then submitted to BODC for incorporating into the GEBCO Digital Atlas. The digital trackline control information was generated automatically from the soundings database maintained within the AWI's mapping system.

PREPARATION OF AREA B

Chief Editor:	H.-W. Schenke, G. B. Udintsev, D. E. Teterin
Scientific Compilation:	G. B. Udintsev, D. E. Teterin, G. V. Agapova, S.Barthel

The sheet was extended into Area B in the framework of a joint German-Russian collaboration between AWI and the V.I. Vernadsky Institute for Geochemistry and Analytical Chemistry, Moscow. In addition to the multibeam data collected by RV Polarstern, the compilation benefited from extensive multibeam surveying by RV Akademic Boris Petrov. Bathymetric contouring was based on a newly established data base comprising all existing single and multi beam data. In data sparse areas, the method of morphological interpolation was utilized and additional information from satellite radar altimetry gravity anomalies was included. The initial computer contouring was made from a DTM at scales of 1:400,000 and 1:800,000 in 100 m contour line intervals. This was followed by a manual interpretative editing of the seafloor topography, utilizing the morphological regularities and radar altimetry information. The final contours were digitised by scanning and, after vectorising, included in a Geographic Information System (GIS) for the cartographic visualization and charting. The contour lines were generalized, smoothed and edited for the final scale of 1:1 million. The digital data set was then submitted to BODC for incorporating into the GEBCO Digital Atlas together with digital trackline control information generated automatically from the soundings database.

DATA SOURCES USED FOR GEBCO SHEET G.07 (Area A)

Although multi-beam data from RV Polarstern provided the singlemost extensive source of data, analogue and digital sounding data were also supplied by many other organisations for use in compiling Area A. In particular, the following Hydrographic Offices contributed data:

Servicio de Hidrografia Naval, Buenos Aires, Argentina
Diretoria de Hidrografia e Navegacao, Niteroi, Brazil
Hydrographic Department, Tokyo, Japan
Statens Kartverk, Stavanger, Norway
Hydrographic Office, Cape Town, South Africa
Hydrographic Office, Taunton, UK
Defense Mapping Agency, Washington, USA
Head Department of Navigation & Oceanography, St. Petersburg, Russia

The following scientific institutions or individuals supplied data:
British Antarctic Survey, Cambridge, UK (C. Doake, B. Harrods)
Bureau Gravimetrique International, Toulouse, France
Institute of Geophysics, University of Texas, USA (B.J. Sloan, L.A. Lawver)
Japan Oceanographic Data Centre, Tokyo
Lamont Doherty Earth Observatory, New York, USA (A.L. Gordon, B. Huber)
National Geophysical Data Center, Boulder, USA
National Institute of Polar Research, Japan
Norwegian Polar Research Institute (A. Solheim)
Sevmorgeologia, Russia (V. Krukov, V. Masolov, V. Pozdeev)

Digital data sets used as an aid to interpreting the bathymetry included those referenced in:

Heidrich, B., Sievers, J., Schenke, H.W. and Thiel, M. (1992), Digitale topographische Datenbank Antarktis. Nachr. a.d. Karten- u. Verm. wesen I/107, p.127-140.

Sandwell, D.T. and Smith, W.H.F. (1992), Global Marine Gravity from ERS-1, GEOSAT and SEASAT reveals New Tectonic Fabric. EOS trans. AGU 73, p.133, Fall 1992 AGU Meeting Supplement.

Schone, T. (1997), Ein Beitrag zum Schwerefeld im Bereich des Weddellmeeres, Antarktika: Zur Nutzung von Altimetermessungen des GEOSAT und ERS-1, Ber.Polarf.220.

Additional background data were extracted from publications, especially:

Ghidella, M.E. and LaBreque, J.L. (1990), Consideraciones sobre la morfologia del Mar de Weddell oeste basados en datos aerogeofisicos. In CLAF 1991, p34-44.

Hoppe, H. and Thyssen, F. (1988), Ice thickness and bedrock elevation in western Neuschwabenland and Berker Island. Annals of Glaciology 11, p.42ff.

Huybrechts, P. (1992), The Antarctic ice sheet and environmental change: a three-dimensional modelling study. Ber.Polarf. 99

Japanese Antarctic Research Expeditions (1980-1987), Data Reports 76 to 149.

Kobarg, W. (1988), The tide-dependent dynamics of the Ekstroem Ice Shelf, Antarctica. Ber. Pol. forschung 50

Pozdeyev, V.S. and Kurinin, R.G. (1987), New data on the morphology of the ice cover and relief of the subglacial bed and seabed bottom in the southern part of the Weddell Sea basin. In. Antarktika. Doklady Komissii 26, p.66-71, English translation 1987.

Robin, G. de Q. (1958), Seismic shooting and related investigations. Norwegian-British-Swedish Antarctic Expedition, 1949-52. Scientific Results, Vol.V, Glaciology III. NPI, Oslo.

Vaughan, D.G., Sievers, J., Doake, C.S.M., Hinze, H., Mantripp, D.R., Pozdeev, V.S., Sandhager, H., Schenke, H.W., Solheim, A. and Thyssen, F. (1994), Subglacial and Seabed Topography, Ice Thickness and Water Column Thickness in the Vicinity of Filchner-Ronne-Schelfeis. Polarforschung 64 (2), p.75-88.

DATA SOURCES USED FOR GEBCO SHEET G.07 (Area B)

Source Data

The singlemost extensive source of data for compiling Area B bathymetry was provided by the cruises of RV Akademic Boris Petrov and RV Polarstern:

- Alfred Wegener Institute for Polar and Marine Research, Germany: RV "Polarstern" Antarctic expeditions (since 1983): Multibeam data from SeaBeam and Hydrosweep system, single beam data from navigation echo sounder, narrow beam echo sounder and Parasound sediment echo sounder. Multibeam surveys by Hans Werner Schenke, Fred Niederjasper and Tilo Schone.

- Vernadsky Institute of Geochemistry and Analytical Chemistry, Moscow, Russia: RV “Akademik Boris Petrov” Antarctic expeditions GAP 95 and GAP 98: Multibeam data from Hollming Ekhos II system and from narrow beam echo sounder. Multibeam surveys by Gleb Udintsev, Hans Werner Schenke, and Tilo Schone.

Supporting data and information, including analogue and digital sounding data, were provided by many other organizations. In particular, use was made of the following:

Scientific Databases:

- IHO Data Centre for Digital Bathymetry, Boulder, Colorado; U.S. National Geophysical Data Centre, GEODAS searches on bathymetry: November 1992, April 1993, May 1999, October 1999

- Antarctic Digital Database, Version 3.0, 2000, ADD Consortium, Scientific Committee on Antarctic Research, Scott Polar Research Institute, Cambridge, UK.

- Marks K.M., McAdoo D.C., 1992, Gravity Atlas of the Southern Ocean. National Geophysical Data-Centre-A for Marine Geology and Geophysics. Reports. MGG-7, Wash. (D.C.), U.S. Dept. Commerce.

- Sandwell D.T., Smith W.H.F., 1997, Marine Gravity Anomaly from Geosat and ERS-1 Satellite Altimetry, J. Geophys. Res., v. 102, p. 10,039-10,054.

- Smith, Walter H. F.; Sandwell, David T., 1997, Global sea floor topography from satellite altimetry and ship depth soundings, Science, v. 227, 5334, p. 1956-1962.

- GEBCO Sheets 5.16 and 5.18, bathymetric contours, track lines and bedrock contours

National Hydrographic Offices:

- Nautical Charts (various scales): Argentina, Russian Federation, United Kingdom

- GEBCO Ocean Plotting Sheets (OPS) 1:1,000,000: Argentina, Republic of South Africa, United Kingdom; 1:5,000,000: Russian Federation

- Digital Data: Russian Federation, United Kingdom, United States of America

Scientific Publications:

- Gracia E., Canals M., LiFarran M., Sorridas J., Pallas R., 1997, Central and Eastern Bransfield Basins (Antarctica) from high-resolution swath-bathymetry data. Antarctic Science, 9 (2), p. 168-180

- Lawver L.A., Sloan B.J., Barker D.H.N., Ghidella M., von Herzen R.P., Keller R. A., Klinkhammer G.P, 1996, Distributed, Active Extension in Bransfield Basin, Antarctic Peninsula: Evidence from Multibeam Bathymetry. GSA Today, v. 6, No. 11, p. 1-7, 16-17

- Schenke, H.-W., Dijkstra, S., Niederjasper, F., Hinze, H., Hoppmann, B., Schone, T., 1998, The New Bathymetric Charts of the Weddell Sea: AWI BCWS, In: Ocean, Ice, and Atmosphere: Interactions at the Antarctic Continental Margin, Stanley S. Jacobs and Raymond F. Weiss (eds.) - Washington, DC: American Geophysical Union, 1998 (Antarctic Research Series; Vol. 75) 371-380.

- Tectonic Map of the Scotia Arc, 1985, 1:3,000,000; BAS (Misc.) 3, Cambridge, Survey.

- Vegas R., Acosta J., Uchip E., 1995, Continental-Oceanic Crustal Transition in the Bransfield Trough and the South Scotia Ridge (Antarctica); preliminary results, in: E. Banda et al. (eds.) Rifted Ocean-Continent Boundaries, p. 265-289, Kluwer Academic Publisher.