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Towards the planning of the 1995 Iceland Plateau project

Karl Gunnarsson

Greinargerð KG-95-03

TOWARDS THE PLANNING OF THE 1995 ICELAND PLATEAU PROJECT

Karl Gunnarsson, National Energy Authority, Iceland. March 23, 1995.

Enclosed is a series of maps that cover the proposed project area. Most of the maps are in Mercator projection and these are all in approximately the same scale, and can be viewed together on a light table. Some maps are in UTM or conical(?) projections, and these I have scaled to be roughly equivalent between 69° and 70°N. A list of Geodas shipboard data search and a reference lists are also attached. Copies of this material will be distributed to the working group:

- Hideki Shimamura, Hokkaido University.
- Shuichi Kodaira and Rolf Mjelde, University of Bergen.
- Ingi Ólafsson, Verslunarskóli Íslands.

THE DATA

Bathymetric information is not good in the area (Figs 1-4). Data is sparse. I think that the GEBCO map is probably the best map of the area, exept perhaps for Perry et al. (1977) which might have more details on the Kolbeinsey Ridge. The digital grid from the WEEGS project (fig. 2) is obviously smoothed, but correct for the main features. (I have heard that Bruce Appelgate, University of Hawaii, has been studying bathymetry on the Kolbeinsey Ridge. This might be relevant.)

A search of the Geodas international ship track data base was made, and is presented in terms of data type (see figs. 5a-d and attached list). The seismic reflection data (fig 5d) are mostly single channel data, exept for L-DGO multich. lines. I have drawn in roughly the position of German BGR-75 data (Hinz) in the Iceland Plateau area. This line is not published and not available. I have already written to Karl Hinz to ask about these data. (A large scale shot point map exists in University of Oslo, according to Steinar Gudlaugson).

A lot of multichannel reflection has been done on the Jan Mayen Ridge. Figure 6 shows the large 1985 survey we did in cooperation with the NPD (Oljedirektorated, Norway). These data are confidential, but limited use will be possible. Lines 8 and 11 are of interest as they extend west over Jan Mayen Basin and onto oceanic crust. See enclosed paper of Gudlaugson et al. (1988). A compilation of academic multich. lines is found in figures 7 and 8. Some of these lines extend west to about 12°W.

One OBS study exists on the east flank of the JMR (fig.10). I have this only in a preliminary report, and the results are not very clear.

A good coverage of low-altitude aeromagnetic data exist in the area south of 70°N (see fig. 12), but much less data are found north of this. Satellite gravity is good, except for small scale features. Ship data ara not enough to make a complete detailed map.

DISCUSSION AND SUGGESTIONS

I assume that the area for study extends from immediately west of the JMR to the Kolbeinsey Ridge crest. The JMR itself would also be interesting to study, but a lot of refraction and

ESPs have been done there already, and it is questionable if the proposed methods will do much better. Then there is the point of not dissipating the effort in trying to do to much.

Immediately west of JMR is the JM Basin, a probably continental margin extensional basin covered by flood basalts or sills at shallow depth, that mask deeper structure in reflection data. Then there is a step up westwards to the oceanic crust from the times of about magnetic anomaly 7. It is interesting to study this transition. The oceanic crust extending to the Kolbeinsey Ridge crest is characterized by irregularities or steps in the sea-loor, and it is of interest to sea how these are related to crustal/mantle structure. Then the crestal region of KR is a special area to be investigated.

The distance from the JMR to the Kolbeinsey ridge is about 300 km. If the number of OBS are 25-30, a single line would have 10-15 km between station, but two parallel lines 20-25 km. As we can expect that the upper crustal seismic phase extends out to roughly 10km range, and the main crustal phase (layer 3) out to 40 km, the smaller intervals would provide reversed coverage for the upper crustal layer, but the larger not. The 20 km invervals are, however, quite sufficient for a complete reversed coverage of the layer 3 phase, and 25-30 km interval would likely be acceptable.

If we accept to reduce the resolution of the uppermost crust, a station interval of 20-30 km could thus be acceptable, and make two lines possible. Along-strike transverse profiles could be shot in a setup like this, but reversal would still be limited. About 40 km between lines would reverse the layer 3 phase, but we would have to more than double that distance for a possible mantle phase. Other options for better upper crustal resolution would include a reduction of the area covered by the project.

The spreading direction on the KR is about 105°, and the profiles should preferably be close to this. It is difficult to pick a seismic line that has a suitable location. There is also little to see below the basaltic basement in available sections. There is only one reflection line, BGR-5-75 (or "Pr.5"; see fig. 5d and 9) that goes all the way to the KR axis. This line is not available (difficult to get) and the eastern end is to far to the south. If single channel seismic registration is possible in the '95 cruise, I don't think it worth while to try to follow existing lines with not ideal locations.

The magnetic anomaly map shows a history of small scale ridge jumps in the area east of KR-axis, west of anom. 5 and south of about 69.7°N. As this could possibly include some transform fault crustal anomalies it would be best to avoid this area. In the case of one maine profile, we could run it from just south of 70°N to the bight in the JMR (see fig. 13). Note that south of the western bulge in the Jan Mayen Ridge the contrast between the JM-Basin and the oceanic crust seems to be less, as seen in bathymetry, seismic reflection and gravity.

Two parallel lines with about 50 km intervals could be located as suggested in fig. 13. There seems to be a change in the character of the ridge axis just south of 70°N, as there is a deeper valley to the north, and a suggestion of a slight east-wards migration of the spreading axis south of this. One line would be north and one south of this change. At the JM-Basin end they would join with the 1985 multichannel lines no. 8 and 11.

Finally, the above discussion is just my preliminary thoughts, and I don't have a firm opinion on the ideal configuration of the project. One could think of a pattern that would concentrate more on strike lines and consist of a square grid, but then the long profile would have to be made shorter. Then it should be remembered that for a reversed mapping of the Moho a station must be located about 50 km outside the end of the section.

A LIST OF THE FIGURES:

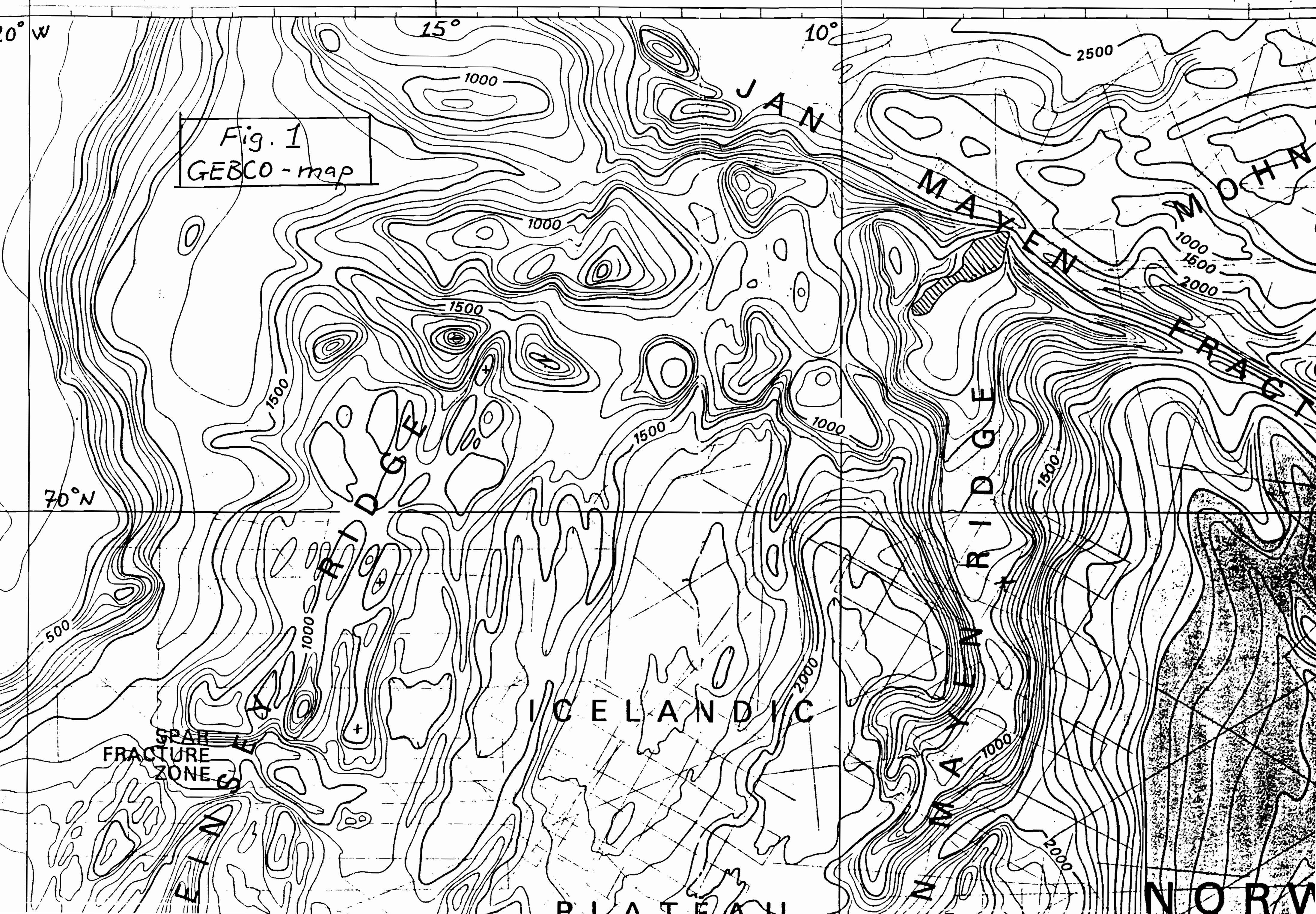


Fig. 1
GEBCO-map

Digital bathymetric model from Geotech (WEEGS project). Icelandic limits dashed.

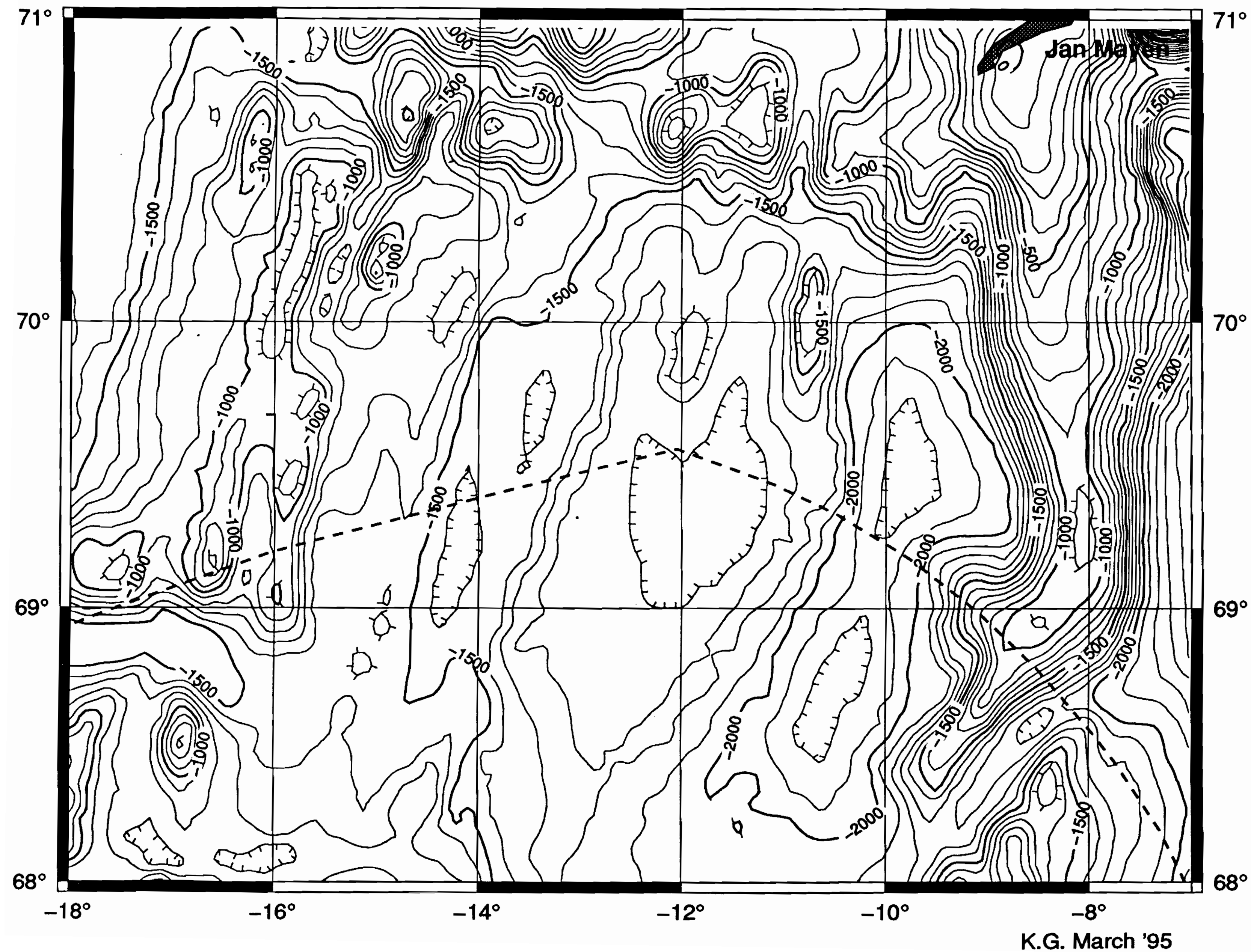


Fig 2

Fig. 3 Vogt '80

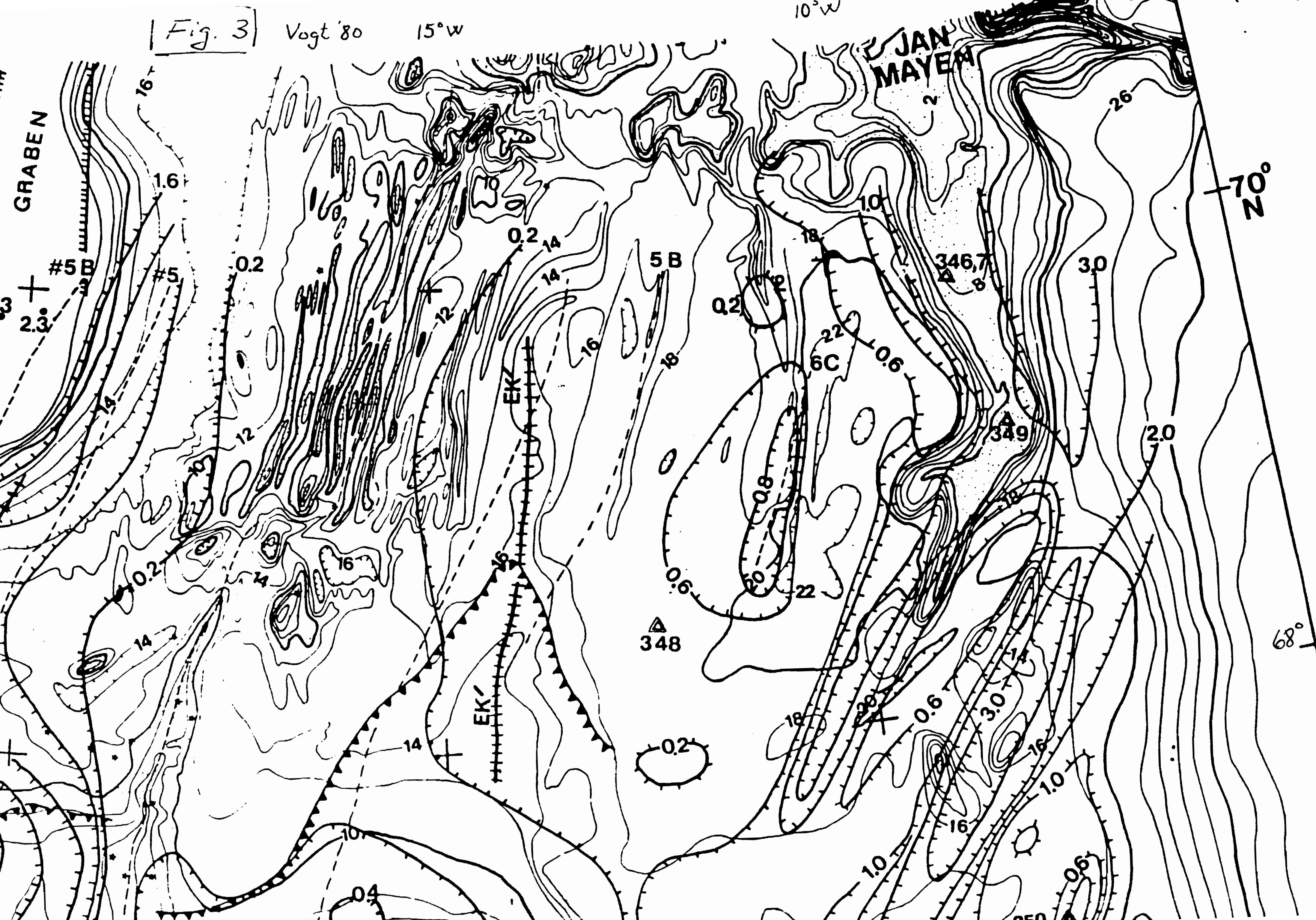
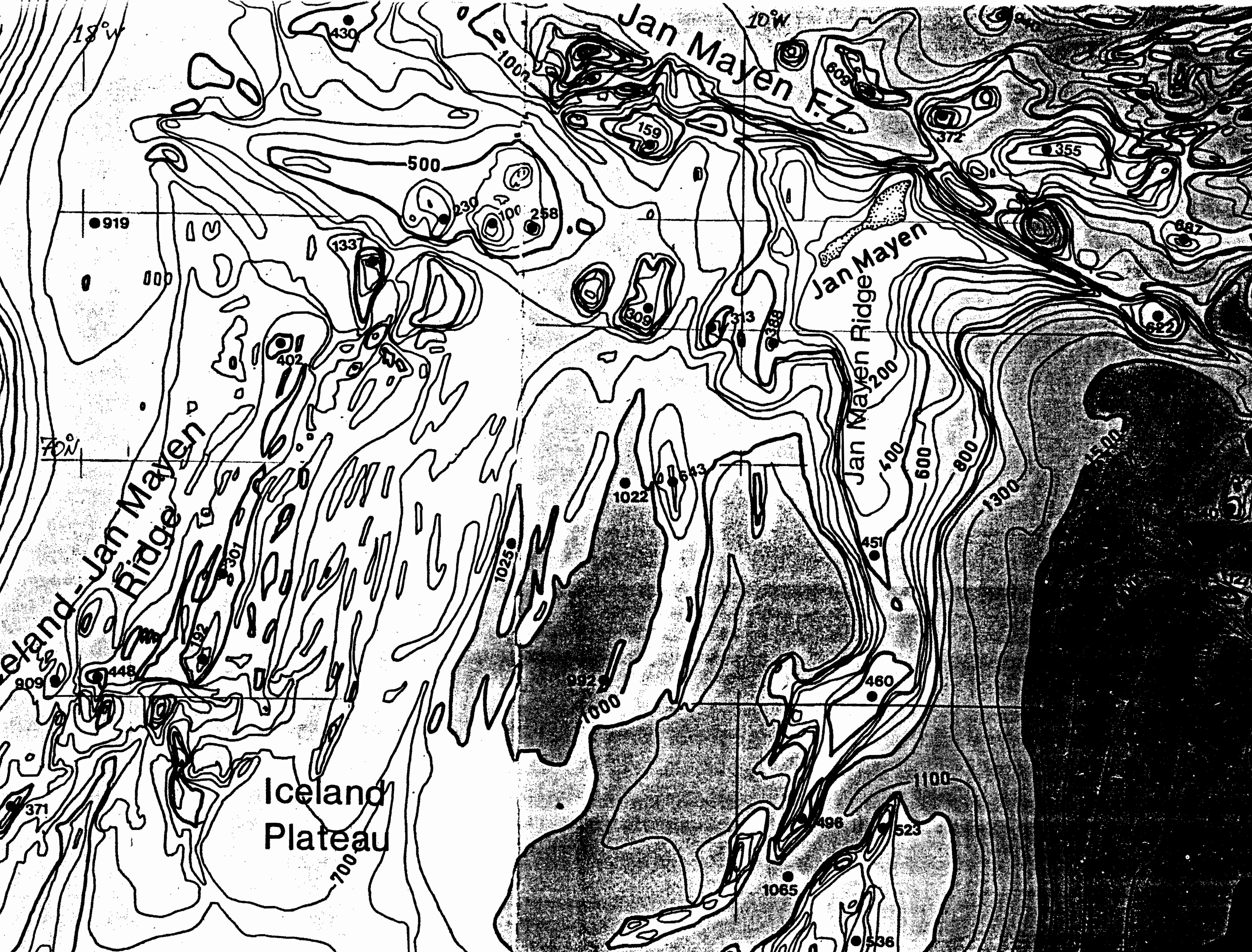

15°W
10°W
JAN MAYEN
70° N
68°
GRABEN
#5B
#5
5B
6C
EK
EK'
346,7
349
348
0.2
0.6
0.8
1.0
1.6
2.0
2.3
3.0
10
12
14
16
18
22
26

Fig. 4

Grønlie '79



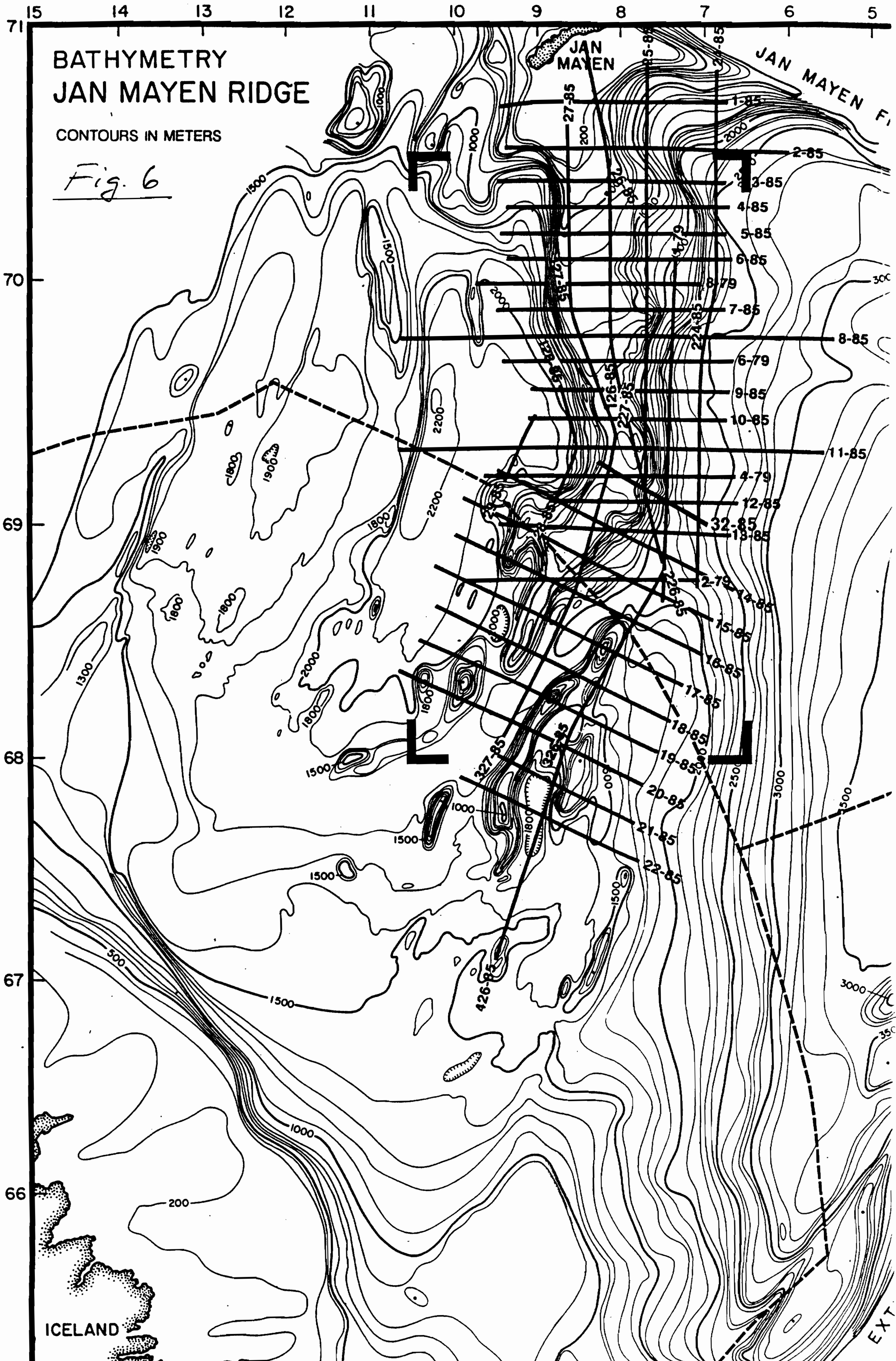

BATHYMETRY
JAN MAYEN RIDGE
CONTOURS IN METERS
Fig. 6
JAN MAYEN
ICELAND
1-85
2-85
3-85
4-85
5-85
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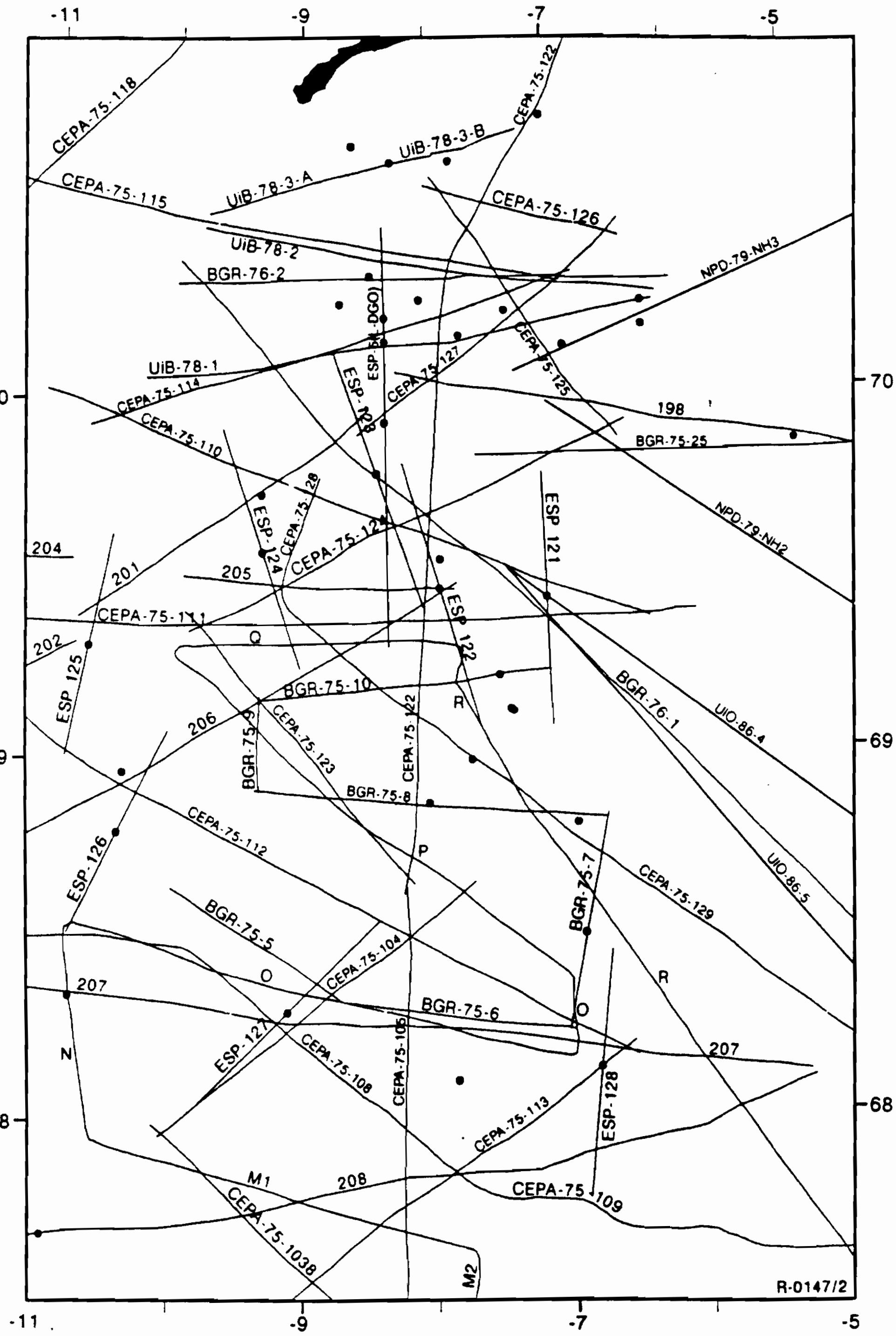
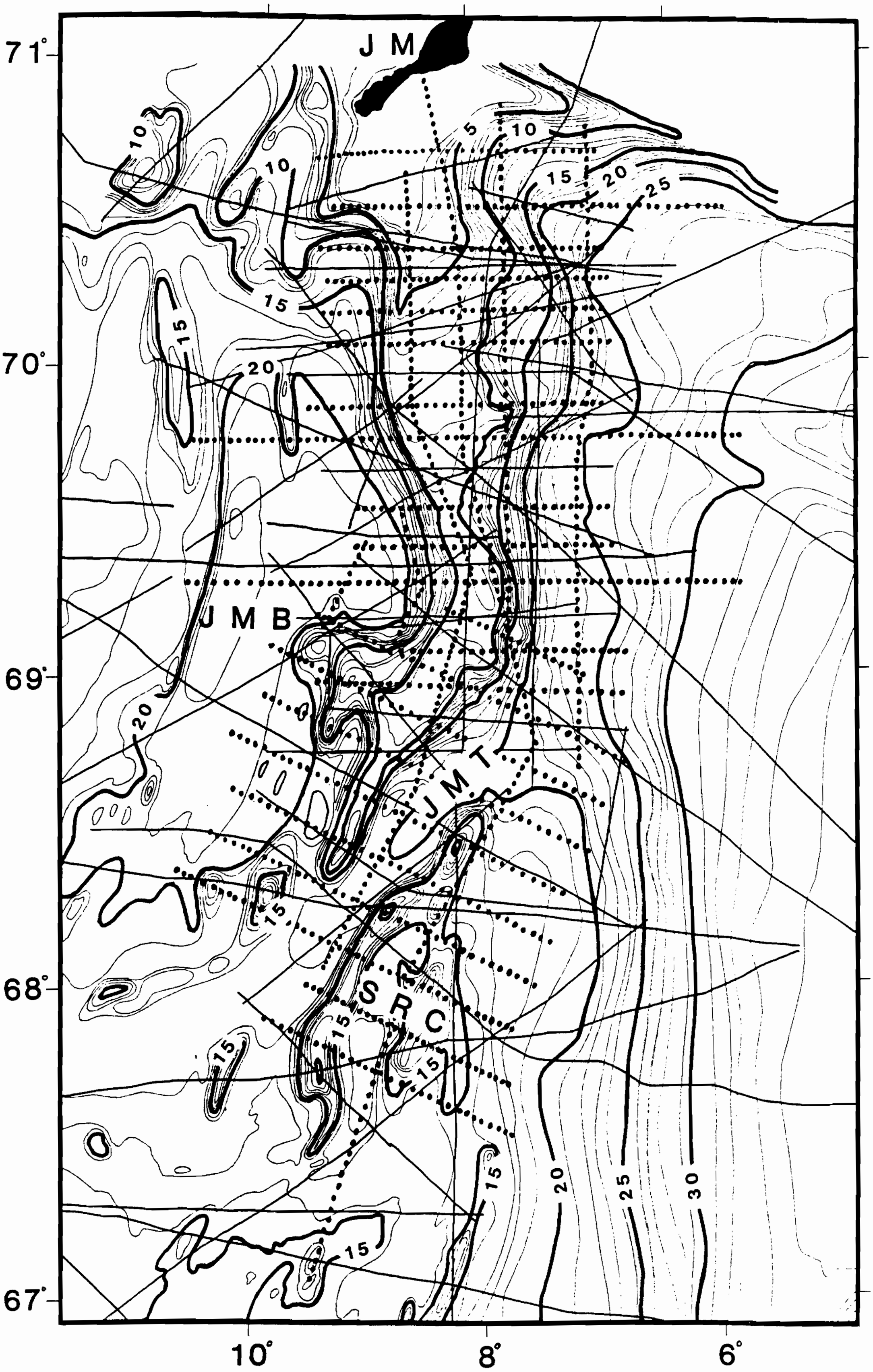
Fig. 7



ESP-profiles	CNEXO 1975: CEPA-75-no.	BGR 1976: BGR-76-no.
Sonobuoy stations	I.O.S 1977: L,M. etc.	UiB 1978: UiB-78-no.
Multichannel seismic reflection lines	L-DGO 1978: no.	UIO 1986: UIO-86-nr.
	BGR 1975: BGR-75-no.	NPD 1979: NPD-79-NHno.
		IFP 1987: ESP-no.

Fig. ~~2.2~~ Multichannel seismic reflection and refraction data acquired on the Jan Mayen Ridge by academic institutions 1975-87

From special report NPD/NEA



~~FIG. 1~~. The grid of multichannel seismic reflection lines used in this study superimposed on bathymetry. The new survey lines are shown as dotted lines. Contour interval 100 m with contours labelled every 500 m. JM = island of Jan Mayen, JMB = Jan Mayen Basin, JMT = Jan Mayen Trough, SRC = southern ridge complex.

Fig. 8 · Gudlaugsson et al. '88

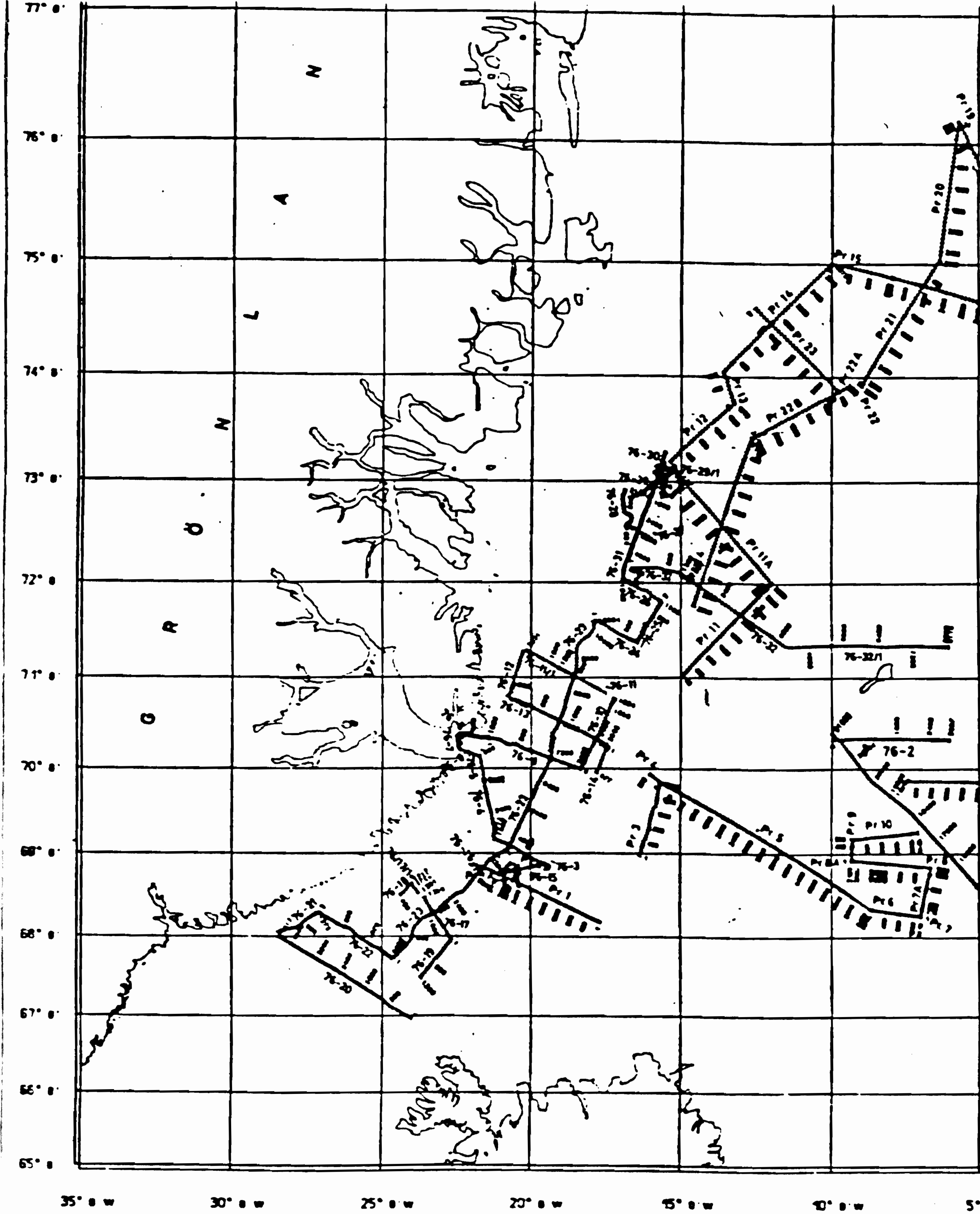


Fig. 9

BGR-profiles multi-ch.

Hinz and Schlüter
1979

N75

Refraction
Sørnes
Navrestad

Weigel, 1986 (personal letter and initial report)

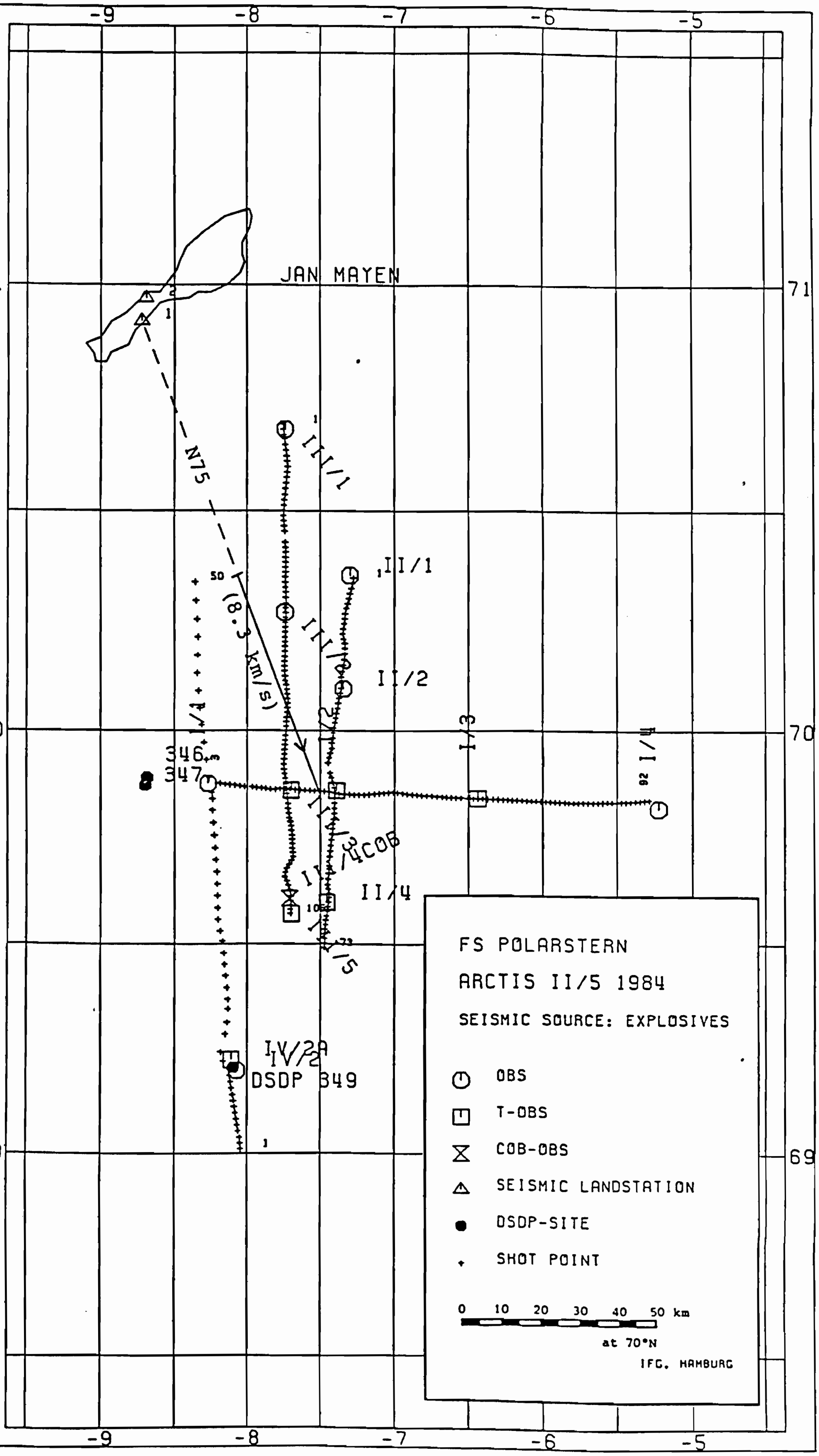
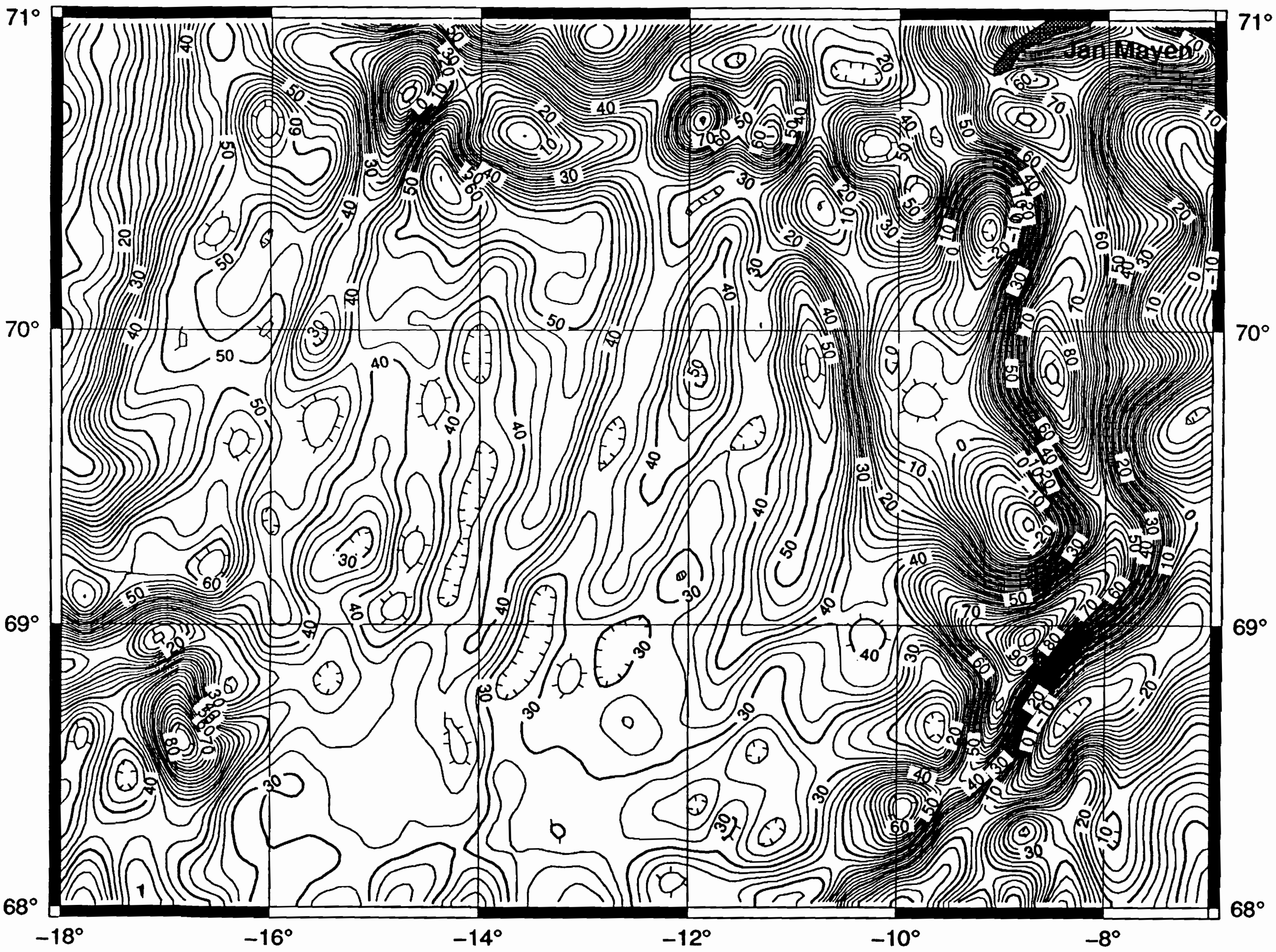


Fig 10

Fig.

Fig 11.

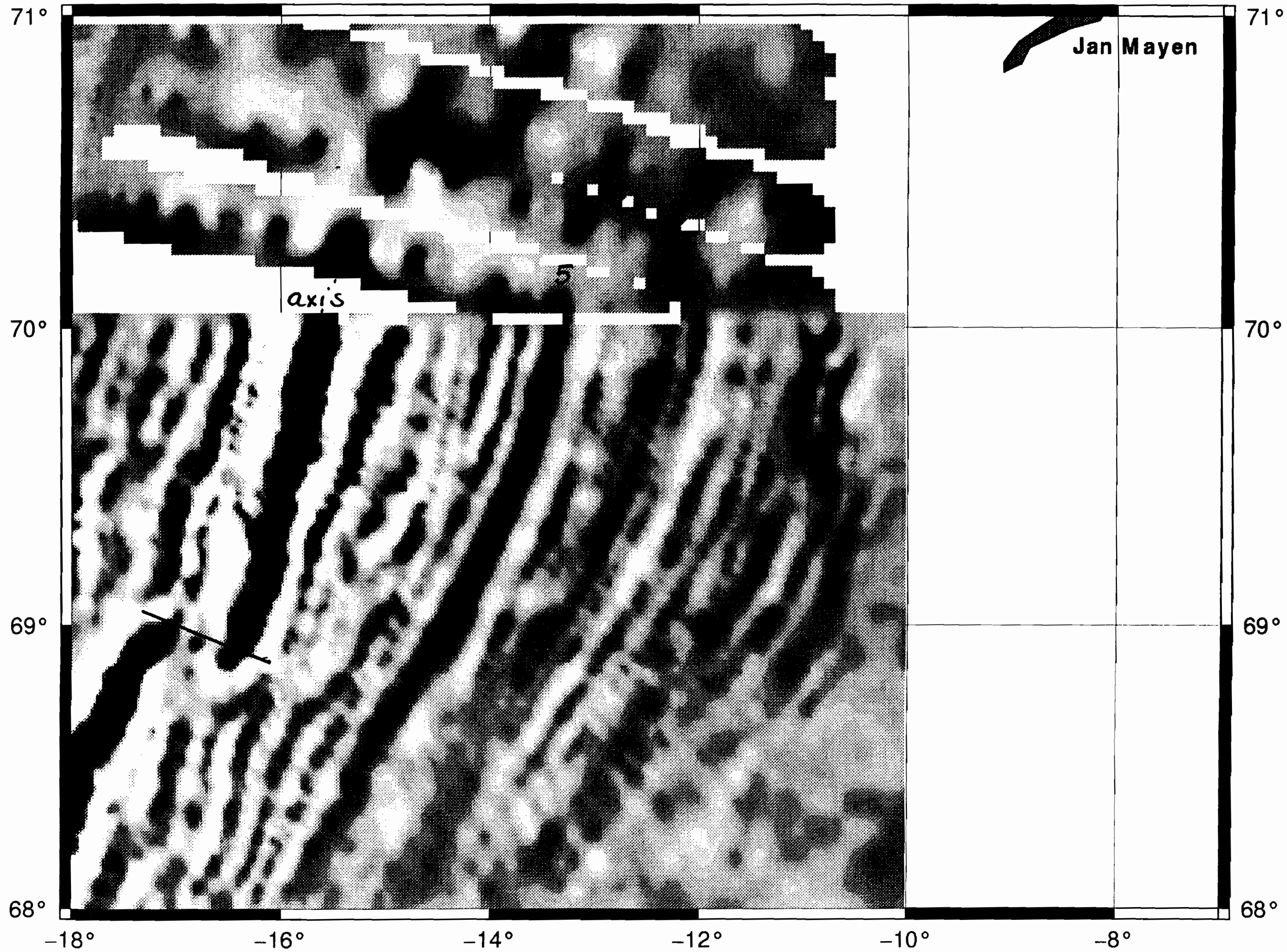
Gravity (satellite), free-air



K.G. March '95

Fig. 12

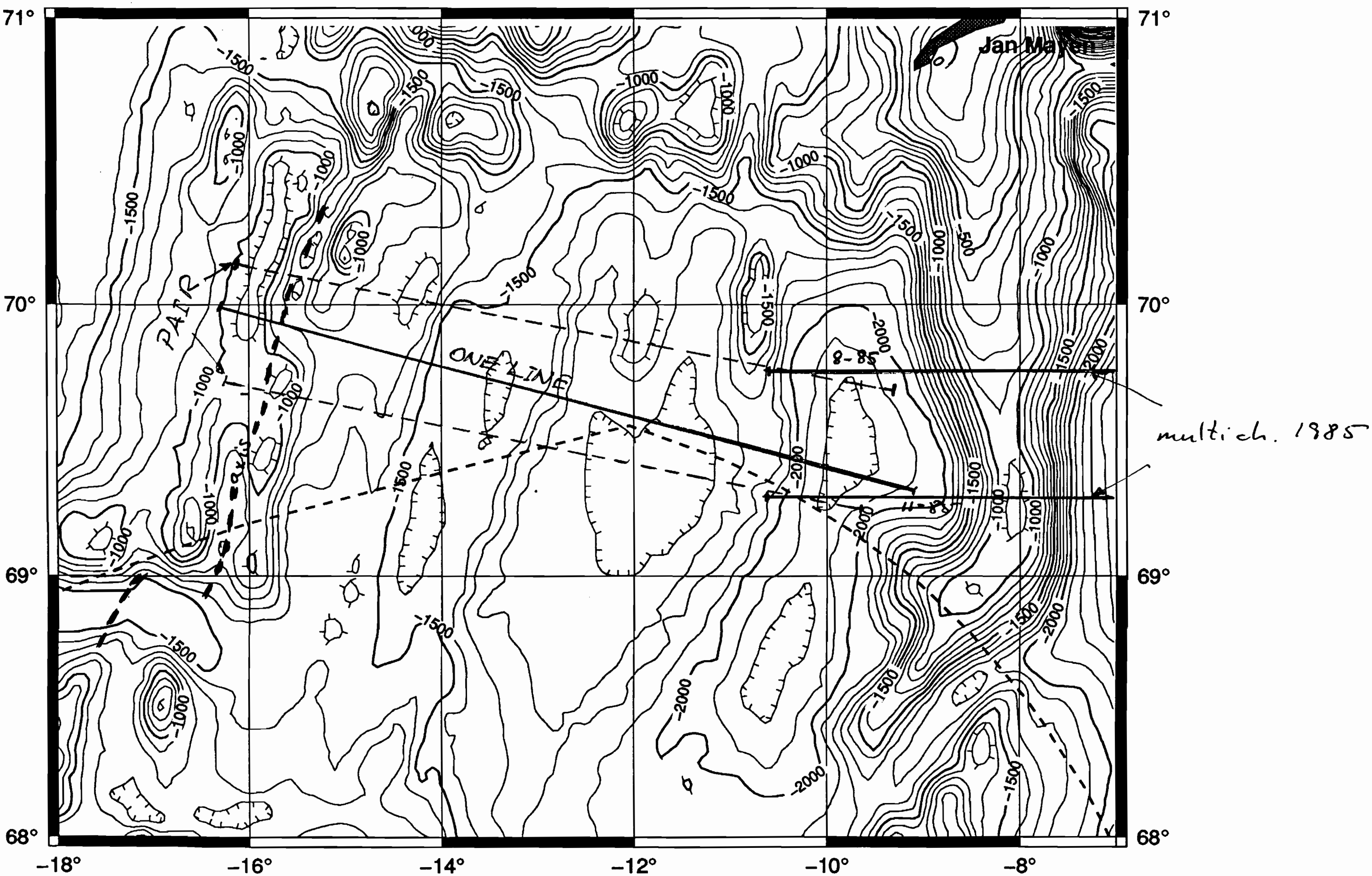
Magnetics, DNAG-compilation. Square root of anomaly; white/black : −25/+25 $nT^{1/2}$



K.G. March '95

Fig. 13

Digital bathymetric model from Getech (WEEGS project). Icelandic limits dashed.



K.G. March '95

KEY KALT Kolbeinsey-allt Bathymetry

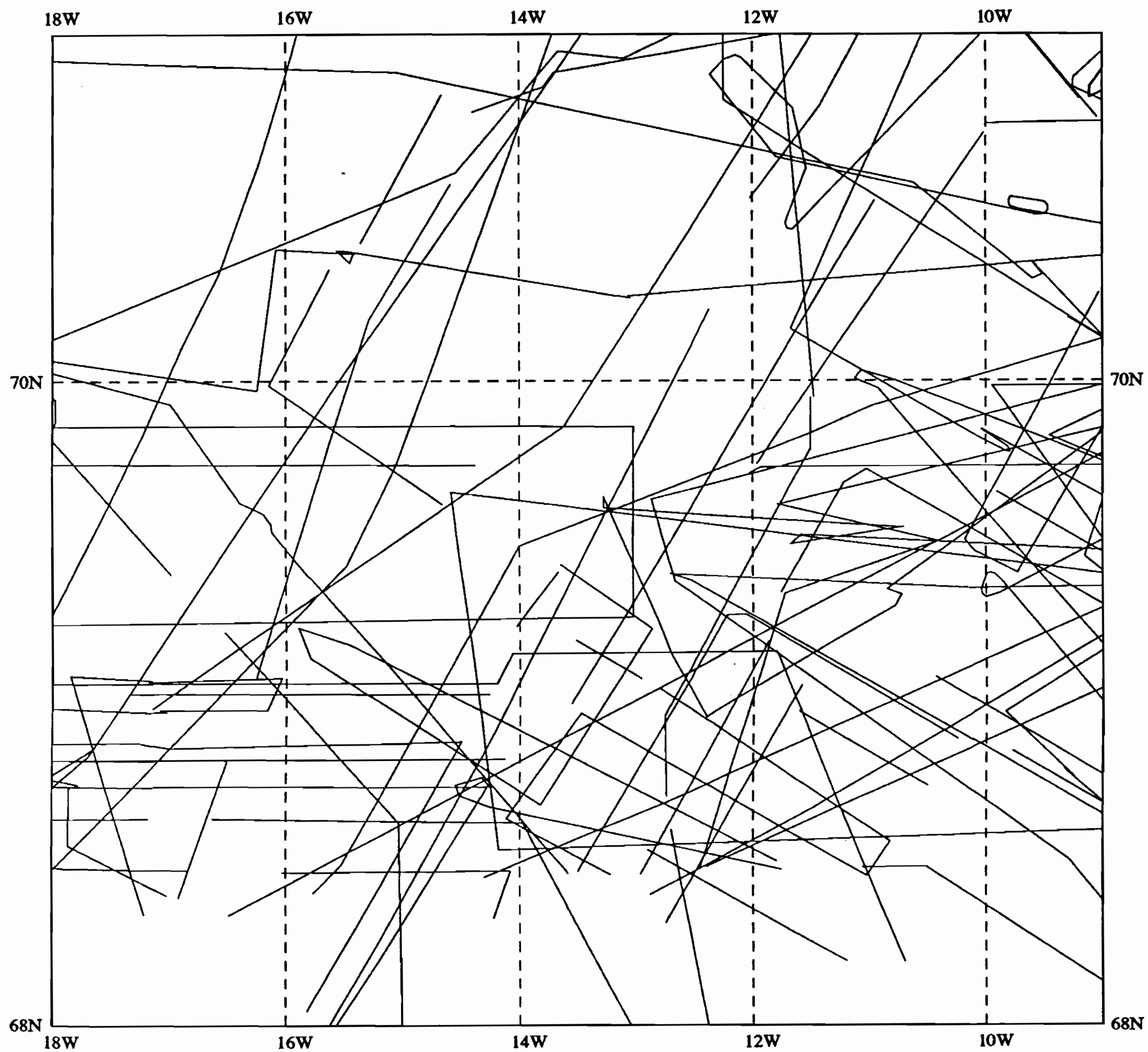
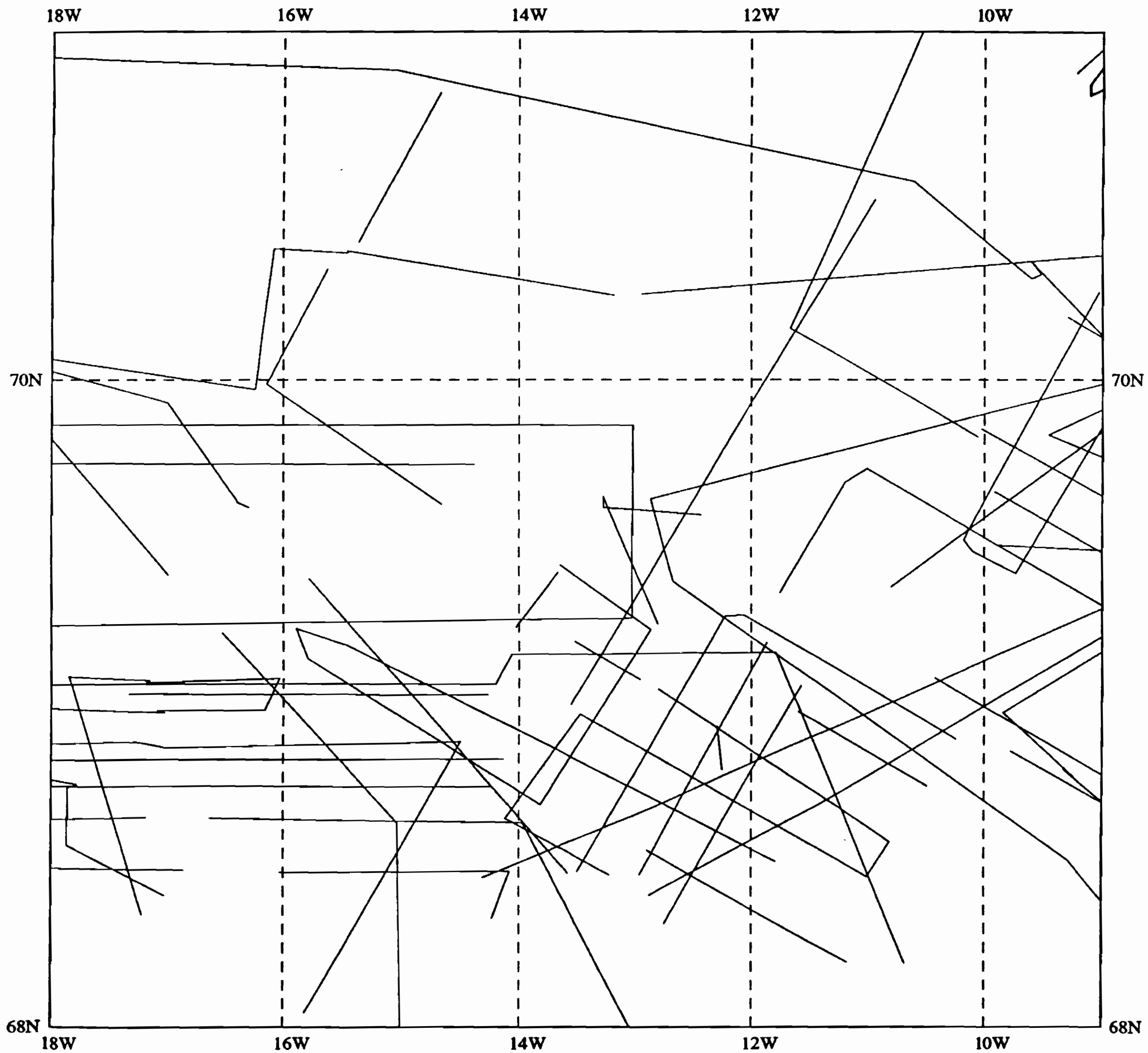


Fig. 5a

KEY KALT Kolbeinsey-allt Gravity

Fig. 56



KEY KALT Kolbeinsey-allt Magnetics

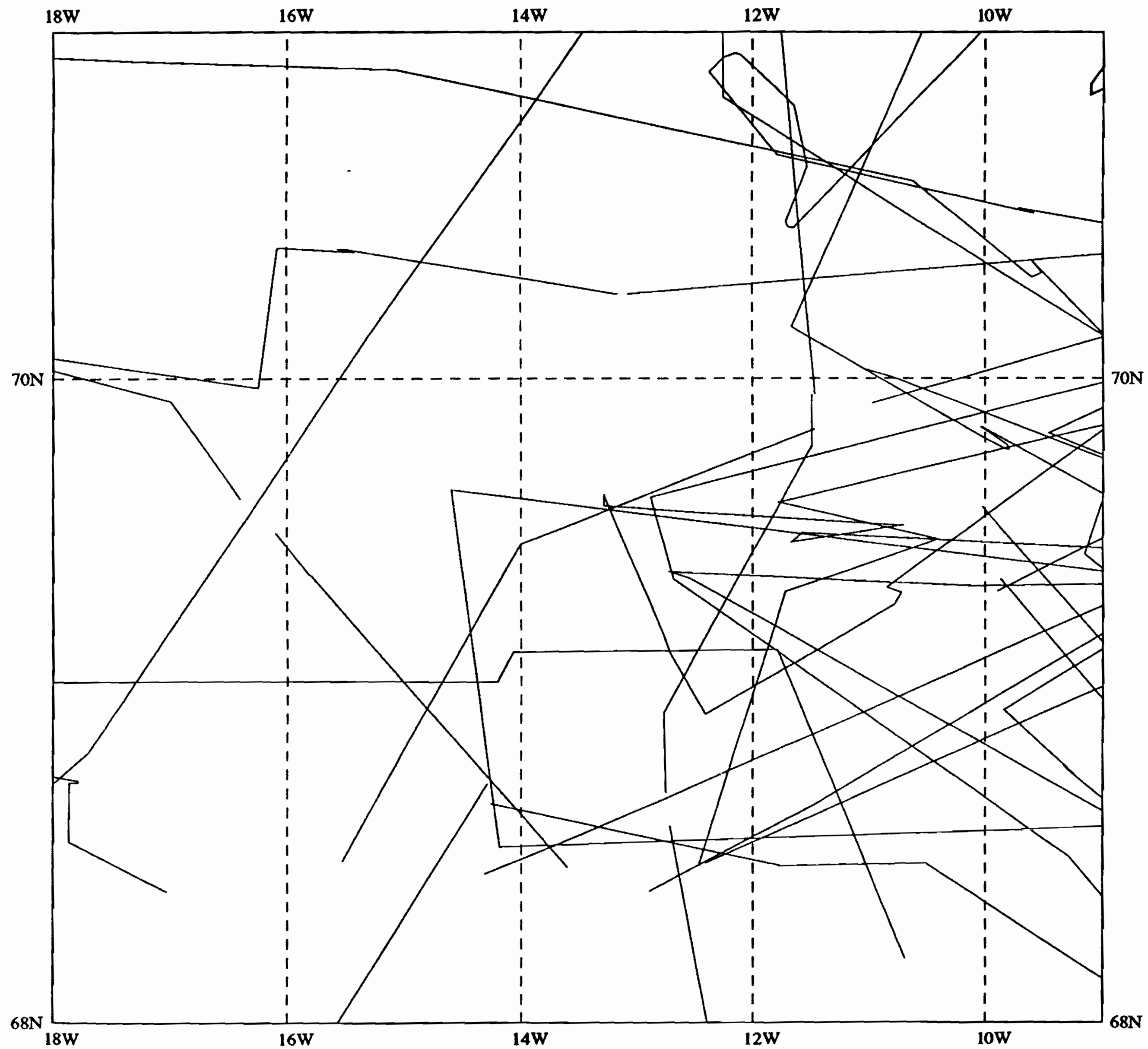


Fig 5c

KEY KALT Kolbeinsey-allt Seismics

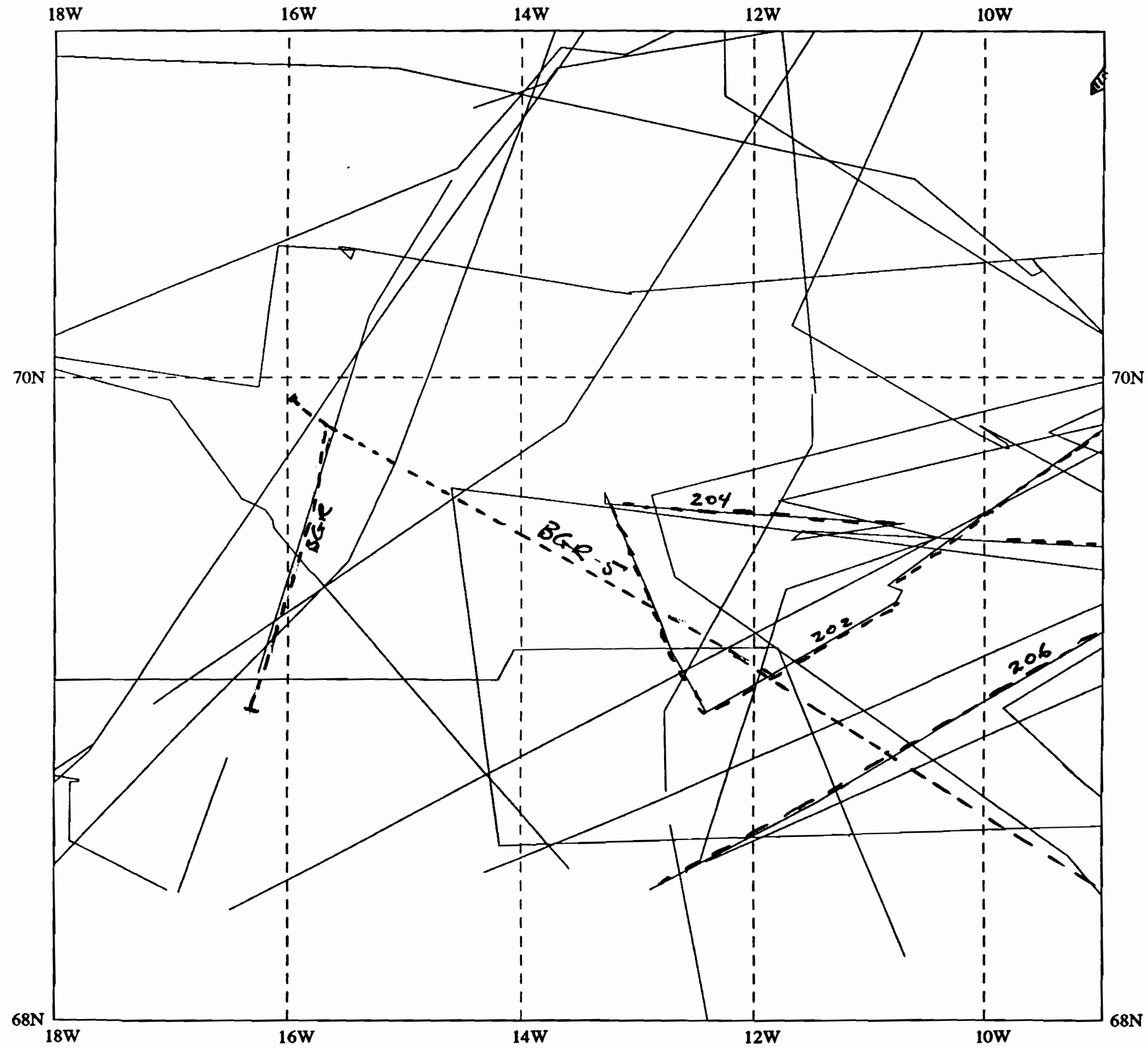


Fig. 5d

GEODAS data base

---- multichannel

LDGO lines in data

BGR lines not in data base

****

searching for analog and digital data

****

1 areas selected

71.000
-18.000 -9.000
68.500

****

Geophysical data summary in nautical miles

LAMONT (LDGO)

NGDC-Num	Survey	Nav	Bath	Mag	Grav	Seismics	ss/ref	dig recs
01010189	C2114	364	364	364	200	364	0	1010
01030117	V2703	343	343	326	313	343	0	632
01030131	V2803	133	133	133	120	133	0	173
01030157	V2910	207	207	207	207	207	0	342
01030169	V3010	400	400	400	400	400	0	693
totals	5	1446	1446	1429	1240	1446	0	2850

US NAVY

NGDC-Num	Survey	Nav	Bath	Mag	Grav	Seismics	ss/ref	dig recs
09070001	ARTI001	487	487	487	0	487	0	0
09260014	LY72C	238	238	238	0	238	0	1023
09260015	LY72D	153	153	0	0	153	0	389
09260019	LY73E	246	246	0	0	246	0	1556
09760001	72-11-05	107	107	0	0	0	0	157
09760002	71-11-04	211	211	0	0	0	0	303
09770002	73-16-02	125	125	0	0	125	0	315
09770003	74-16-04	172	172	0	0	172	0	763
09870001	PLRSEA90	7	7	0	0	0	0	5
totals	9	1746	1746	725	0	1421	0	4511

SCRIPPS INST.OC

NGDC-Num	Survey	Nav	Bath	Mag	Grav	Seismics	ss/ref	dig recs
15050036	DSDP38GC	177	177	177	0	177	0	246
totals	1	177	177	177	0	177	0	246

USSR

NGDC-Num	Survey	Nav	Bath	Mag	Grav	Seismics	ss/ref	dig recs
29050002	AKU15	990	981	0	990	0	0	532
totals	1	990	981	0	990	0	0	532

FRANCE

NGDC-Num	Survey	Nav	Bath	Mag	Grav	Seismics	ss/ref	dig recs
67010020	70005711	10	10	0	0	0	0	41
67010056	75003112	395	380	343	0	0	0	1205
67010057	75003113	437	437	393	0	0	0	1250
totals	3	841	826	735	0	0	0	2496

INT. GRAV. BUR

NGDC-Num	Survey	Nav	Bath	Mag	Grav	Seismics	ss/ref	dig recs
77010004	ME28	187	187	0	187	0	0	111
77020001	KT 1	752	752	0	752	0	0	371
totals	2	938	938	0	938	0	0	482

GERMANY

NGDC-Num	Survey	Nav	Bath	Mag	Grav	Seismics	ss/ref	dig recs
83050008	CMTR06C	75	75	0	0	0	0	49
83050024	MTR61C	152	152	0	0	0	0	65
83050025	MTR71C	72	72	0	0	0	0	28
totals	3	298	298	0	0	0	0	142

grand totals	24	6437	6413	3067	3168	3044	0	11259

1,4 Megabytes

JMR - IP ; REFERENCES AND RELATED LITTERATURE, compiled in 1994

This is a collection of references relevant to mainly Jan Mayen Ridge, but also Iceland Plateau. The list is not jet perfect - some ref. are missing and a lot is irrelevant for the present project.

Works resulting from the the NPD/OS surveys of the Jan Mayen Ridge

1) Reports by NPD/OS and contractors:

Avtale mellom Oljedirektoratet og Geco A.S. (An agreement regarding seismic surveying on the Jan Mayen ridge in 1985).

Geco 1985: M/V Malene Östervold. Vessel description. Updated 02.07.85.

Geco 19? Processing report?

Hill, D., 1985: Supervision report - Oljedirektoratet - J.M. Ridge - July/August 1985. Delph Management Ltd., Surrey, England.

Ólafsson, I., 1988. Tolkning av sonarbøje data. Statusrapport -november 1988. Orkustofnun, OS-88054/JHD-28 B.

Karl Gunnarsson, 1984: The Jan Mayen Ridge 1985 Seismic Survey, an initial planning proposal. Orkustofnun, KG-84/05.

Karl Gunnarsson, 1985a: Proposed sonobuoy locations for 1985 Jan Mayen Ridge Seismic Survey. Orkustofnun, KG-85/05.

Karl Gunnarsson (Orkustofnun), Morten Sand (Oljedirektoratet) & Steinar T. Gudlaugsson (Univ. of Oslo). Geology and hydrocarbon potential of the Jan Mayen Ridge. Oljedirektoratet (OD-89-91), Orkustofnun (OS-89036/JHD-07).

The present report.

Ingi Ólafsson & Karl Gunnarsson. The Jan Mayen Ridge - Velocity structure from analysis of sonobuoy data. Orkustofnun, OS-89030/JHD-04. Reykjavík, August 1989.

Reprocessering - Jan Mayen Ryggen. Geophysisk vurdering av testlinje reprocessert av fire processeringsselskap. OD-92-88. NBS (1992).

2) Academic studies:

Åkermoen, Thor. *Jan Mayen Ryggen: et seismisk stratigrafisk og strukturelt studium.* Cand. Scient oppgave i anvendt geofysikk. Institutt for Geologi, Universitetet i Oslo. Høsten 1989.

Eggen, Svein S., 1984: Jan Mayens-ryggen geologi. NDP-contribution No 20, Oljedirektoratet, desember 1984, 14 pp., 29 p. total.

Gudlaugsson, S.T., Gunnarsson, K., Sand, M. & Skogseid, J., 1988. Tectonic and volcanic events at the Jan Mayen Ridge microcontinent. Í Morton A.C. & Parson, L.M. (eds). Early Tertiary Volcanism and the opening of the NE Atlantic. Geological Society Special Publication No. 39, pp. 85-93.

Johansen, Jan-Morten. *Modellering av det magnetiske anomalifeltet over Jan Mayen Ryggen.* Cand. Scient oppgave i anvendt geofysikk. Institutt for Geologi, Universitetet i Oslo, 1992.

Rudjord, Jan Erik. *Jan Mayen Ryggen - seismiske hastigheter og tyngdemodellering.* Cand. Scient oppgave, i anvendt geofysikk. Institutt for Geologi, Universitetet i Oslo. Våren 1990.

Other references and related litterature:

Bott, M.H.P., 1985: Plate tectonic evolution of the Icelandic transverse ridge and adjacent regions. J. Geophys. Res., 90, 9953-9960.

Bott, M.H.P., 1987: The continental margin of central East Greenland in relation to North Atlantic plate tectonic evolution. J. of the Geol. Soc. London, 144, 561-568.

Brooks, C.K., T.F.D. Nielsen, 1982: The Phanerozoic development of the Kangerdlugssuaq area, East Greenland

Dillon,W.P. and Paul, 1978:

Dillon, W.P. and others, 1986: Resource potential of the western North Atlantic Basin. The Western North Atlantic Region. (The Geology of North America, Vol. M.), p. 661-676.

Claypool, G.E., and Kaplan,I.R., 1974: The origin and distribution of Methane in marine sediments; in Natural Gases in Marine Sediments; ed. I,R.Kaplan; Plenum Press, New York, p. 99-139.

Eldholm, O., Myhre, A.M., and Sundvor, E., 1981: The Jan Mayen Ridge: present status. Polar Res.

Eldholm, O., and Sundvor, E., 1980: The continental margins of the Norwegian-Greenland Sea: resent results and outstanding problems. Phil. Trans. R. Soc. Lond., A 294, 77-86.

Eldholm, O., and Windisch, C.C:, 1974: Sediment distribution in the Norwegian-Greenland Sea. Geol. Soc. Am. Bull., 85, 1661-1676.

Erdman, J.G. and Schorno, K.S., 1976: Geochemistry of carbon, DSDP leg 38. In: Talwani, M., Udintsev U., et al., (eds), 1976. Initial Reports of the Deep Sea Drilling Project, 38, U.S. Government Printing Office, Washington DC, 791-800.

Gairaud, H., Jacquart, G., Aubertin, F., and Beuzart, P., 1978: The Jan Mayen Ridge; synthesis of geological knowledge and new data. Oceanologica Acta, 1, 335-358.

Garde, S.S., 1978: Zur geologischen Entwicklung des Jan Mayen R#uckens nach geophysikalischen daten. Unpublished dissertion, University of Clausthal, 74p.

Geodekyan, A.A., Z.I. Verkhovskaya, A.V. Sudyin, V.Y. Trotsiuk, 1980: Volcanogenic and Mixed Sediments, their Distribution and Composition. In Iceland and the Mid-Oceanic Ridge. Chapter 10. Academy of the USSR, Soviet Geophysical Committee. Published in English by: The National Research Counsil. Reykjavík, October 1980.

Grönlie, G., Chapman, M., and Talwani, M., 1979: Jan Mayen Ridge and Iceland Plateau: origin and evolution. Norsk Polarinstitutt, Skr. 170, 25-47.

Grönlie, G. and Talwani, M., 1978: Geophysical Atlas of the Norwegian-Greenland Sea. Vema Research Series 4, Lamont-Doherty Geological Observatory, Palisades, N.Y.

Hamar GP and K Hjelle, 1984: Tectonic framework of the Möre Basin and the northern North Sea. In Spencer A.M. (ed.): Petroleum Geololgy of the North Europian Margin, 436 pp.

Hinz, K. and Schlüter, H.U., 1979: The North Atlantic - results of geophysical investigations by the Federal Institutt for Geosciences and Natural Resources on North Atlantic continental margins. Erdoel-Erdgas-Zeitschrift, 94, 271-280.

Johansen, B., O. Eldholm, M. Talwani, P.L. Stoffa and P. Buhl, in prep.?: Seismic experiments at the Jan Mayen microcontinent. In: B.Johansen, Dr. Scient. thesis, University of Oslo.

Johnson, G.L. og Heezen B.C., 1967. Morphology and evolution in the Norwegian-Greenland Sea. Deep-Sea Res., 14, 755-771.

Larsen, H. C., 1984: Geology of the East Greenland Shelf. In Spencer A.M. (ed.): Petroleum Geololgy of the North Europian Margin, 436 pp.

Larsen, L.M., W. Stuart Watt and M. Watt, 1989: Geology and petrology of the Lower Tertiary plateau basalts of the Scoresby Sund region, East Greenland. Grønlands Geologiske Undersøgelse, Bulletin No. 157.

Mutter, J.C., Talwani, M. and Stoffa, P.L., 1982: Origin of seaward-dipping reflectors in oceanic crust off the Norwegian margin by "subaerial sea-floor spreading". Geology, 10, 353-357.

Mutter J.C, K. Hinz, C.M. Zehnder, P. Buhl and J. Alsop, 1986 ?: Symmetric conjugation of continent-ocean boundary structures along the Norwegian and East Greenland margins. Nature ??

Myhre, A.M., Eldholm, O. and Sundvor, E., 1984: The Jan Mayen Ridge: present status. Polar Research, 2, 47-59.

Narvestad, T. and Jörgensen, F., 1979: Aeromagnetic investigations on the Jan Mayen Ridge: Norw. Petrol. Soc., NSS/9, 12 p.

Nielsen, T.F.D., and C.K. Brooks, 1981: The E-Greenland rifted continental margin: an examination of the coastal flexure. J. geol. Soc. London, 138, 559-568.

Nielsen, T.F.D., Soper o.fl. 1981: The prebasaltic sediments and the Lower Basalts at Kangerdlugssuaq...

Nunns, A.G., 1981: Marine geophysical investigations in the Norwegian-Greenland Sea between latitude of 62°N and 74°N. Ph. D. dissert., Durham, England, Univ. Durham, 185 p.

Nunns, A.G., 1983. Plate tectonic evolution of the Greenland-Scotland Ridge and surrounding regions. In: Bott, M.H.P., Saxov, S., Talwani, M. & Thiede, J. (eds). The Greenland-Scotland Ridge: new methods and concepts. Plenum, New York, pp. 11-30.

Nunns, A.G., 1983: The structure and evolution of the Jan Mayn Ridge and surrounding regions. In: Watkins, J.S. and Drake, C.L. (eds): Continental margin geology. Mem. Assoc. Petrol. Geol., 34, 193-208.

Ólafsson, I., 1983: The Jan Mayen Ridge and surrounding areas - a marine geophysical study. Unpublished Cand. Real. thesis, University of Bergen, 127 p.

Ólafsson, I., Sundvor, E., Eldholm, O. and Grue, K., 1992. Møre margin: crustal structure from analysis of Expanding Spread Profiles. Marine Geophysical Researches, 14, 137-162.

Pelton, C.D. 1985. Geophysical interpretation of the structure and evolution of the Jan Mayen Ridge. Institute of Oceanographic Sciences Report No. 205.

Skogseid, J., and O. Eldholm, 1987: Early Cenozoic crust at the Norwegian Continental Margin and the conjugate Jan Mayen Ridge. J. Geophys. Res., 92, 11471-11491.

Solheim, A. and F.R. Larsson, 1987: Seismic indications of shallow gas in the Northern Barents Sea. Norsk Polarinstitutt, nr. 36, Oslo 1987, 30p.

Sundvor, E., Gidskehaug, A., Myhre, A.M. and Eldholm, O., 1979: Marine geophysical survey on the northern Jan Mayen Ridge. Seismol. Obs. Univ. Bergen, Sci. rept. no 6, 17 p.

Surlyk, F., S. Piasecki, F. Rolle, 1986: Initiation of petroleum exploration in Jameson Land, East Greenland. Rapp. Grønlands geol. Unders., 128, 103-121.

Surlyk, F., S. Piasecki, F. Rolle, L. Sstemmerik, E. Thomsen and Wrang, 1984: The Permian Basin of East Greenland. In Spencer A.M. (ed.): Petroleum Geololgy of the North Europian Margin, 436 pp.

Talwani, M., Udintsev U., et al., (eds), 1976. Initial Reports of the Deep Sea Drilling Project, 38, U.S. Government Printing Office, Washington DC, 1256 pp.

Talwani, M., Udintsev, G. and Shirshov, P.R., 1976: Tectonic synthesis. In: Initial reports of the Deep Sea Drilling Project. Vol. 38, 1213-1242.

Talwani M. og Eldholm, O., 1977. Evolution of the Norwegian-Greenland Sea. Geol. Soc. Amer. Bull., 88, 969-999.

Talwani, M. and others 1980: The area between Jan Mayen and eastern Iceland; a geological report. Prepared at a workshop held at Lamont-Doherty Geological Observatory, Palisades, New York, USA, December 8 to 10, 1980.

Unternehr, P. 1982. Etude structurale et.. Thesis University of Bretagne, 227 p.

Vogt, P.R., Johnson, G.L. and Kristjánsson, L., 1980: Morphology and magnetic anomalies north of Iceland. J. Geophys., 47, 67-80.

Some other references:

1. O. Eldholm og M. Talwani, "Structure and development of the Jan Mayen Ridge," *Eos*, 54:324, 1973.
2. A.M. Myhre og O. Eldholm, "Sedimentary and Crustal Velocities in the Norwegian-Greenland Sea," *J. Geophys. Res.*, 86:5012-5022, 1981.
3. M. Talwani, G. Udinstev, E. Mirlin, A. F. Beresnev, V. F. Kanayer, M. Chapman, G. Grønlie og O. Eldholm, "Survey at sites 346, 347, 348,349 and 350. The area of the Jan Mayen Ridge and the Icelandic Plateau," in: *Initial Reports of the Deep Sea Drilling Project, 38 (supplem.)*, M. Talwani, G. Udintsev og et al., ed., p. 465-488, U. S. Governm. Pr. Office, Washington, 1976.
4. Olav Eldholm, Jakob Skogseid, Eirik Sundvor og Annik Myhre, "The Norwegian-Greenland Sea," in: *The Arctic Ocean region*, Arthur Grantz, L. Johnson og J. F. Sweeney, ed., p. 351-364, Menlo Park, U. S. Geol. Surv., 1990.
5. K. Hinz og H.U. Schlüter, "Continental Margin off East Greenland," *Proceedings of the Tenth World Petroleum Congrass, Bucharest, 1979, volume2-Exploation Supply and Demand*, Heyden, London, 1980.
6. K. Hinz og H. U. Schlüter, "The North Atlantic - Results of geophysical investigations by Federal Institute for Geosciences and Natural Resources on North Atlantic continental margins," *OIl GAS, European Magazine*, 5:31-38, 1979b.
7. F. Dittmer, J. Campsie og S. Fine, "The structural evolution of Iceland Plateau," *Eos*, 56:450, 1975.
8. J. R. Evans og I. S. Sacks, "Deep structure of the Iceland plateau," *Journal of Geophysical Research*, 84:6859-6866, 1979.
9. K. Hinz, "Results of geophysical surveys in the area of the Aegirridge, the Iceland Plateau and the Kolbeinsey Ridge," *Norges geol. Unders.*, 316:1975.
10. H. P. Sjerup, J. Sjöholm, H. Furnes, I. Beyer, L. Eide, E. Jansen og J. Mangerud, "Quaternary tephra-chronology on the Iceland Plateau, North of Iceland," *Journal of Quaternary Science*, 4:109-114, 1989.
11. G.L. Johnson, J.R. Southall, P.W. Young og P.R. Vogt, "The Origin and Structure of the Iceland Plaeau and Kolbeinsey Ridge," *J. Geophys. Res.*, 77:5688-5696, 1972.
12. G. Pálmason, "Comments on 'Origin and structure of the Iceland Plateau and Kolbeinsey Ridge' by Johnson, G. L., Southall, J. R., Young, P. W. & Vogt, P. R," *Journal of Geophysical Research*, 78:7019, 1973.
13. K. Lackschewitz og Adams Wallrabe, "Composition and origin of sediments on the mid-oceanic Kolbeinsey Ridge, north of Iceland," in: *Cenozoic geology of the Northwest European continental margin and adjacent deep-sea areas*, Tore O. Vorren, Hans Petter Sejrup og Joern Thiede, ed., p. 71-82, Marine-Geology. 101. (1-4), 1991.
14. A. G. Nunns, M. Talwani, G. R. Lorentzen, P. R. Vogt, T. Sigurgeirsson, L. Kristjánsson, H. C. Larsen og D. Voppel, *Magnetic Anomalies Over Iceland and Surrounding Seas (chart)*, Plenum, New York, 1982.
15. A. G. Nunns, M. Talwani, G. R. Lorentzen, P. R. Vogt, T. Sigurgeirsson, L. Kristjánsson, H. C. Larsen og D. Voppel, "Magnetic Anomalies Over Iceland and Surrounding Seas," in: *Structure and Development of the Greenland-Scotland Ridge, New Methods and Concepts*, M. H. P. Bott, S. Saxov, M. Talwani og J. Thiede, ed., p. 661-678, Plenum (in cooperation with the NATO

Scientific Affairs Div, New York and London, 1983.

16. P. R. Vogt og B. E. Tucholke, ed., “The Present Accreting Plate Boundary West of the North America Plate,” *The Western North Atlantic Region, Vol M, Decade of North American Geology (DNAG) Series*, Geological Society of America, Boulder, 1986.
17. P. R. Vogt, G. L. Johnson og L. Kristjánsson, “Morphology and magnetic anomalies north of Iceland,” *Journal of Geophysics*, 47:67-80, 1980.
18. P. R. Vogt, N. A. Ostenso og G. L. Johnson, “Magnetic and bathymetric data bearing on sea-floor spreading north of Iceland,” *Journal of Geophysical Research*, 75:903-920, 1970.
19. P. R. Vogt, R. K. Perry, R. H. Feden, H. S. Fleming og N. Z. Cherkis, in: *The Greenland-Norwegian sea and Iceland environment: Geology and geophysics*, Nairn og et al., ed., 493-598, 1981.