

National Report on Gravimetry in Denmark, Faeroe Islands and Greenland,
1987-90

by

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1. Introduction

Kort- og Matrikelstyrelsen (KMS) (National Survey and Cadastra) is the agency responsible for gravity data collection in Denmark, the Faeroe Islands, and Greenland. The agency was created in 1989 by a merger of the Geodetic Institute, the cadastral survey, and the hydrographic mapping agency. In the period 1987-90 the main gravity activities of KMS have taken place in Greenland, with more limited survey activities in Denmark and the Faeroe Islands. Absolute gravity measurements have been carried out in cooperation with Institut für Erdmessung, University of Hannover, in Denmark and the Faeroe Islands 1987, and in Greenland (and Iceland) 1988. KMS maintains comprehensive gravity data bases for the Nordic Area, the North Atlantic Region, and the Greenland region. The gravity data bases currently holds roughly 1/2 mill gravity points.

KMS also use satellite altimetry for gravity field mapping, and significant activities have taken place in this field in cooperation with the Geophysical Institute, University of Copenhagen, in part sponsored by private industry (Knudsen, 1990), (Tscherning and Christoffersen, 1990), (Knudsen et al., 1988), (Arabelos and Tscherning, 1988). KMS and the University of Copenhagen are also active in studying satellite missions for gravity field determination, see Tscherning et al. (1990) and Arabelos and Tscherning (1990).

2. Gravity survey activities 1987-90

Denmark

The gravimetric survey of Denmark was completed in the 1980's. A new first order reference network was surveyed 1977-84, and additional ties have been surveyed in the present period. The network data have been submitted for the joint European network adjustment. A publication of the Danish reference network is currently in preparation. Computations show that a high network, quality has been obtained, with a variance of a single gravity observation estimated at 13 μ gal. Absolute measurements have been carried out at Copenhagen and at stations on the Scandinavian 56⁰-line for detecting secular gravity changes. Detailed gravimetric surveys in support of water ressource management have recently been initiated in Southern Jutland (Thomsen, 1990).

Faeroe Islands and Greenland

A reference gravity network in the Faeroe Islands and Greenland, with numerous ties to Iceland and Denmark have been virtually completed in the period. Precise gravity reference points now exists in most airports and major cities

and harbours, as well as in some natural airstrip sites in the unpopulated areas. Fig.1 shows the main reference gravity network ties. Absolute gravity measurements were performed May 1988 in Thule, Ilulissat and Nuuk, in addition to relative gravimeter ties between East and West Greenland. Table 1 shows a comparison of the network gravity values based on the IfE absolute measurements at the IGSN stations.

Table 1 Comparison between IGSN values and new absolute values at some selected sites

IGB no.	IfE-no	GI-no	Site	New gravity value (mgal)	absolute minus IGSN71
25968J	3395	3395	Thule J	982913.64	-0.11
25968 K	3396	3396	- K	982914.18	-0.11
-	8201	58201	Ilulissat, church	982485.34	-0.05
22270 J	6203	68203	Søndre Strømfj. J	982370.04	-0.07
-	8206	78206	Nuuk, airport	982172.64	-0.04
-	7502	71502	Kulusuk, sat.stat.	982337.57	-0.04
-	1062	863	Reykjavik AA	982264.78	0.00

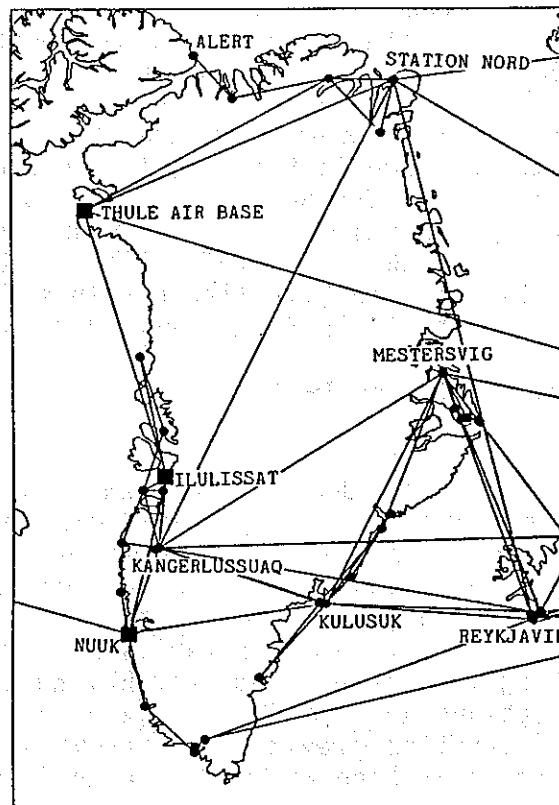


Fig. 1 Main gravity reference connections in Greenland as of 1989

Regional gravity survey activities have been carried out in the ice-free regions of central East Greenland (1986), Southern East Greenland (1987), and Northern East Greenland (1988).

The surveys have taken place as part of general geodetic surveying, with heights determined by Doppler, GPS and supplemental barometric levelling. In 1986/87 measurements were also carried out in profiles on the ice cap, using a combination of GPS and OMEGA for helicopter navigation and positioning. Fig. 2 shows the current gravity data coverage of Greenland in the KMS data base. Gravity surveys by other agencies or companies in Greenland include limited exploration surveys in Jameson Land (East Greenland) and Nugssuaq (West Greenland), measurements in the Godthåb Fjord area by University of Wyoming, and detailed gravity surveys in Ata, central West Greenland, by the Greenland Geological survey. A major offshore geophysical exploration survey programme ("KANUMAS") is currently in preparation, and this project will provide new gravity data for much of the shelf, especially of NE Greenland. For the Faeroe Island a major offshore survey, covering all of the coastal near seas, have been carried out by Statens Kartverk, Norway, on behalf of DMA, USA.

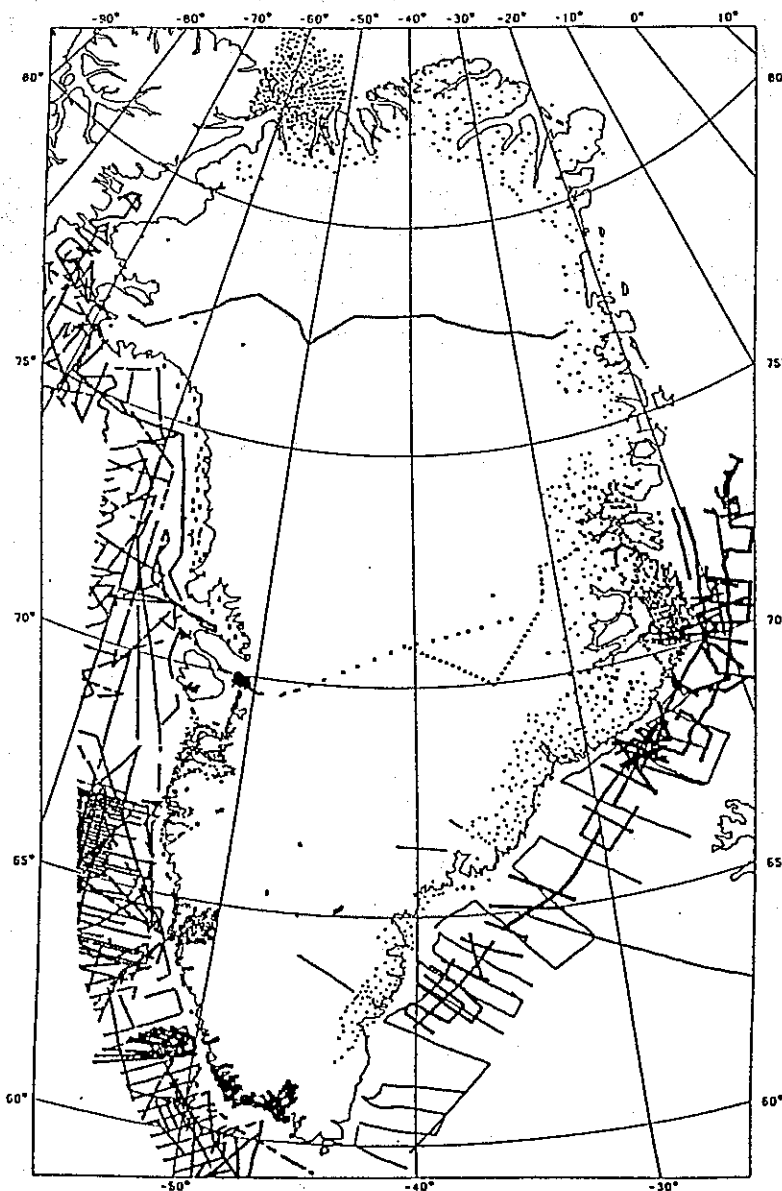


Fig. 2 Location of gravity observations in the KMS data base, 1989

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