

Gravity anomalies, the differences between measured data and a theoretical model (a rotating homogeneous ellipsoid), are produced by lateral variations of mass in the Earth. These anomalies are attributed to: 1) variability in rock densities due to lithological changes, 2) rapid changes in topography (or bathymetry), and 3) isostatic compensation of mass loading (or mass deficit) on a regional or local scale. Variations at shallow depths are better resolved than deep sources. Gravity measurements at sea are at the same vertical elevation (sea level) and anomaly values referred to as free air gravity. Onshore, anomaly values are further adjusted to account for the extra mass between sea level and the elevation at which data are measured. This is referred to as Bouguer gravity.

Onshore, negative Bouguer gravity values correspond to a thick continental crust and therefore a greater depth to higher density mantle rocks. Although there are several Precambrian divisions of southeastern Baffin Island (Hoffman, 1989), there is little correlation with the neutral to slightly negative gravity zones. Gravity lows observed in Hudson Strait, Frobisher Bay and Cumberland Sound are thought to be related to rifting during the formation of the Labrador Sea (Klose et al., 1982). Gravity values over most of Greenland are particularly low (<100 mGal) due to crustal depression under the thick ice sheet, however, north of 67° higher values corresponds with the region of reworked Archean rocks.

A prominent feature associated with the shelf region is a large positive free air anomaly that follows the shelf break (~500 m). This anomaly is predominantly caused by the combined effect of a thick continental crust adjacent to thin oceanic crust and the large bathymetric gradient associated with the slope region (Keen et al., 1990). On the Greenland margin, the shelf edge anomaly increases in width from south to north (20 km to 80 km). It is unclear how much of this effect is due to prograded sedimentary sequences or a peripheral lithospheric bulge caused by the ice loading on Greenland. On the southeastern Baffin shelf, a narrow, low amplitude positive gravity anomaly extends northward from the Labrador coast. This feature has been interpreted as a shelf edge anomaly (Keen et al., 1990). Further offshore of Hudson Strait at 61° W, a 100 km wide positive gravity anomaly (+10 mGal) corresponds to a thick wedge of prograded sedimentary rocks (Grant, 1975). A double peaked positive gravity anomaly (80 to 100 mGal) extends from the mouth of Cumberland Sound southwest to Cape Dyer. This feature is closely associated with volcanic rocks intruded during strike slip motion in the Davis Strait (Srivastava et al., 1981).

Gravity anomalies in the northern Labrador Sea are lower in amplitude than on the continents or margins. The most significant feature is the linear northwest trending negative low (-40 mGal) in the centre of the Labrador Sea attributed to an extinct spreading centre (Woodcock and Verhoef, 1985). Parallel to this gravity low are several positive and negative features (+/-40 mGal) that have been related to variable relief of the oceanic crust now buried by sedimentary rocks. The region landward of anomaly 27 to the slope has been interpreted as oceanic crust by Srivastava and Roest (1999) and as continental by Chalmers et al. (1993).

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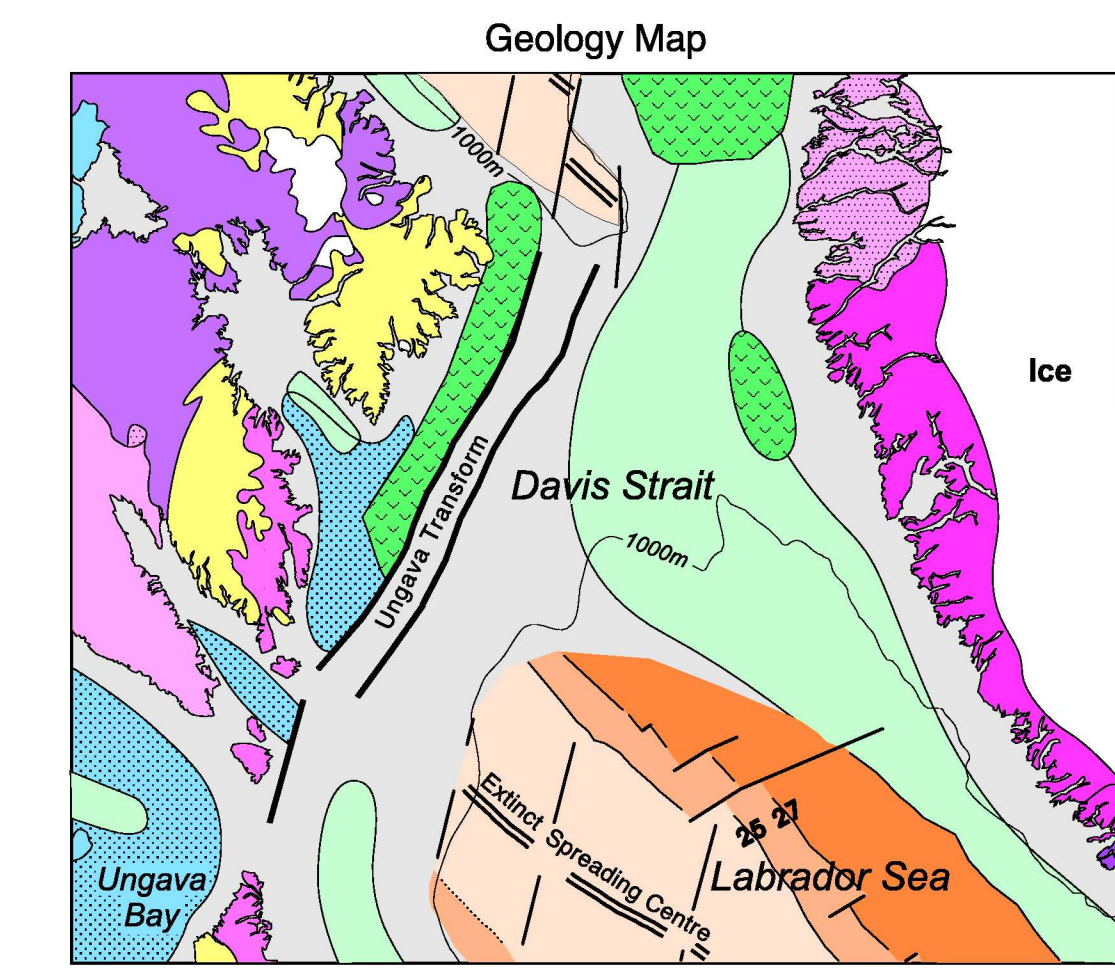
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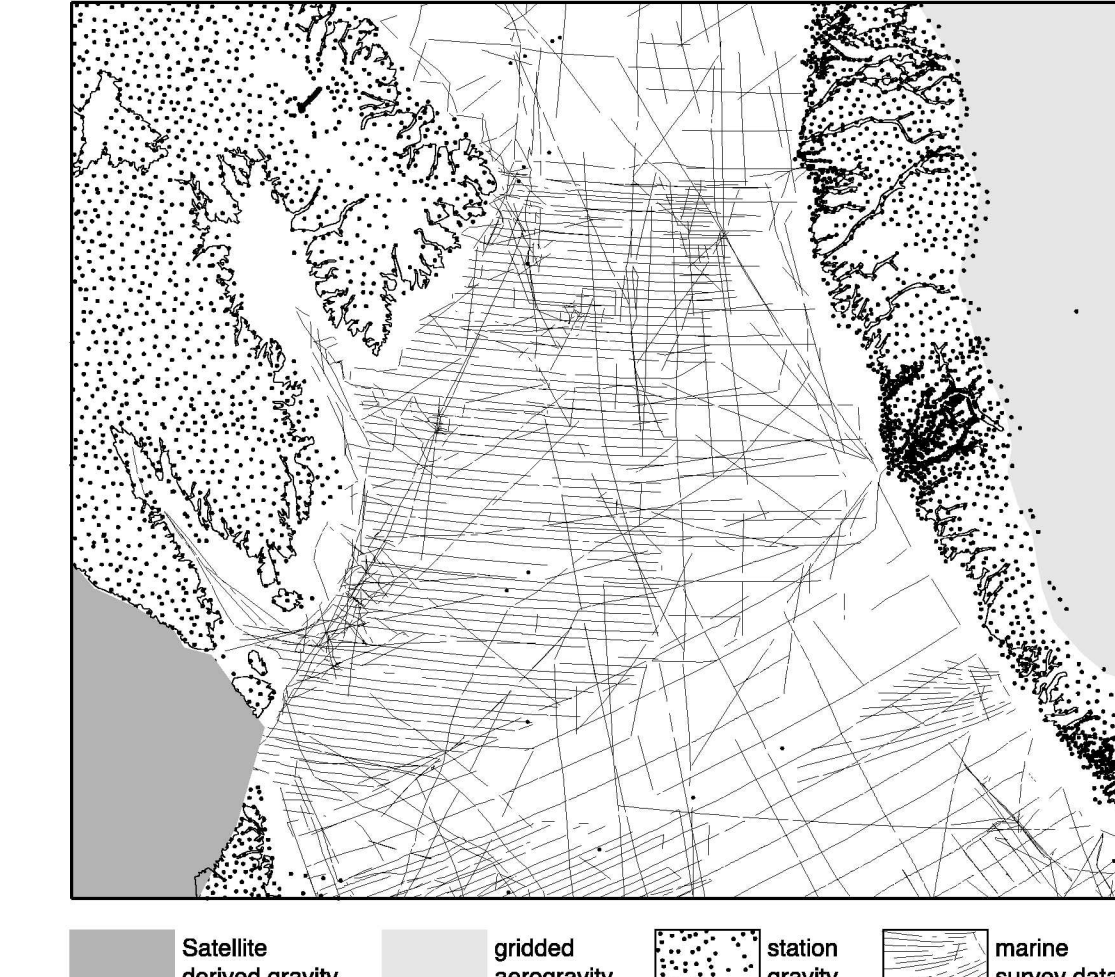
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15-25 magnetic chon	Continental crust	Archean provinces
25-27 magnetic chon	Early Proterozoic orogens	Rae
Transition crust	Paleogene basalt	Burwell
Mesozoic Basins	plutonic rocks (1.9-1.8 Ga)	Nain
Oroclivian Basins	supracrustal rocks	
	reworked Archean	



**Data Sources**

The data sets used to produce this map include land station and marine surface measurements. Data distribution and coverage are shown on the insert map. The average spacing of the regional observations is from 5-10 km for the land and between 2-20 km for the ship tracks. Station data for Canada and its margins were provided by the Geophysical Data Centre, Continental Geoscience Division, GSC Ottawa. Marine survey data were collected by the Atlantic Geoscience Centre (now GSC Atlantic) and merged into the National Gravity Data Base (Earth Physics Branch, 1995). Station data and gridded Bouguer data for Greenland and its margins were provided by the National Survey and Cadastre Denmark. Satellite derived gravity data for Ungava Bay were provided by Sandwell and Smith (1990). All data were gridded and interpolated using a minimum curvature method (Smith and Wessel, 1990) with a final resolution of 5 km.

The rock density used for the Bouguer correction was 2670 kg/m<sup>3</sup>. Where gravity was measured on a lake or glacier, densities of 1000 kg/m<sup>3</sup> and 900 kg/m<sup>3</sup> were used for water and ice respectively. The Bouguer gravity often has an additional terrain correction applied to minimize the effect of rugged topography. This correction was only applied in a few coastal regions where measurements were made adjacent to fjords. All Bouguer corrections were made by the contributing organizations.

Copies of this map can be obtained from the Geological Survey of Canada (Atlantic) PO Box 1200, Dartmouth, Nova Scotia, Canada, B5Y 4A2 email: gsc@geoscan.slu.ns.ca web: http://geoscan.slu.ns.ca

**CANADIAN - GREENLAND MARGINS THEMATIC MAP SERIES**

PHYSIOGRAPHY, GRAVITY and MAGNETICS

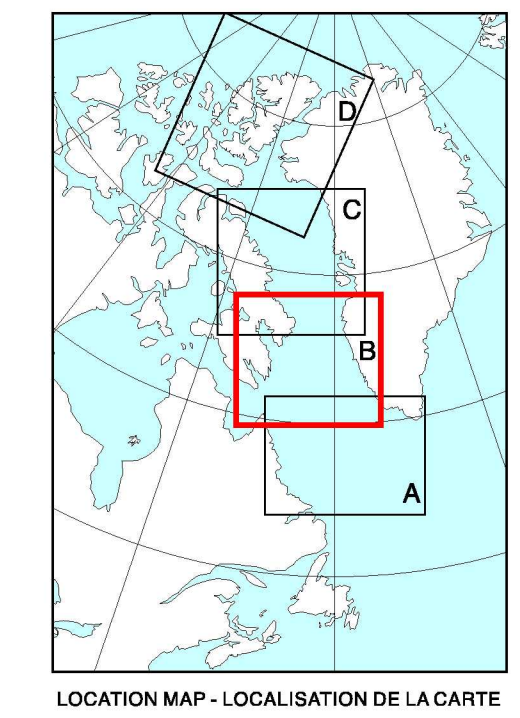
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OPEN FILE 3934B  
**GRAVITY ANOMALY MAP BOUGUER ON LAND, FREE AIR AT SEA**  
**DAVIS STRAIT REGION**  
CANADIAN AND GREENLAND ARCTIC

Scale 1:1 500 000 - Échelle 1/1 500 000

Kilometres 25 0 50 100 150 200 Kilomètres

Lambert Conformal Conic Projection  
Standard Parallels 69° N and 75° N. GM = 65° W  
New Meridian the Queen in Right of Canada, 2000



OPEN FILE DOSSIER PUBLIC  
**3934B**  
GEOLOGICAL SURVEY OF CANADA / COMMISSION GÉOLOGIQUE DU CANADA  
OTTAWA  
02/2001

This map is one of a set of four (GSC Open file 3934A-D) covering the gravity anomaly of the Canadian and Greenland Arctic.  
Open File 3934A: Gravity Anomaly Map, Labrador Sea Region  
Open File 3934B: Gravity Anomaly Map, Davis Strait Region  
Open File 3934C: Gravity Anomaly Map, Baffin Bay Region  
Open File 3934D: Gravity Anomaly Map, Inuitation Region

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Gravity Anomaly Map of the Davis Strait Region  
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