



## AIRBORNE GEOPHYSICAL PROJECTS IN GREENLAND

Stemp, R.W.<sup>[1]</sup>, Thorning, L.<sup>[1]</sup>, and Poulsen, L.H.<sup>[1]</sup>

1. Geological Survey of Denmark and Greenland (GEUS), Copenhagen, Denmark

### ABSTRACT

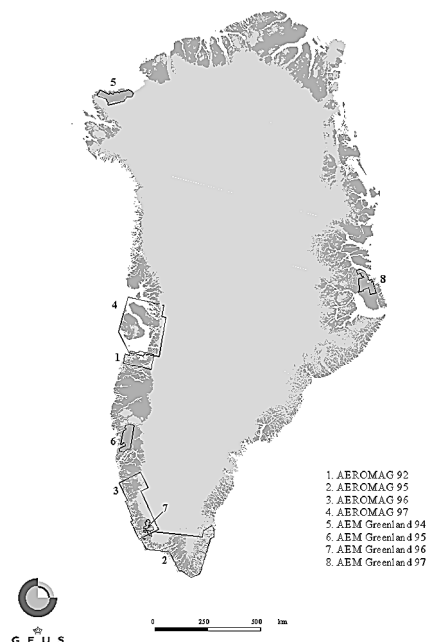
*Recent years have seen a remarkable increase in airborne geophysical survey activities in Greenland in relation to mineral exploration. Surveys have been carried out by both industry and the public. This poster describes the public projects financed by the Greenland Home Rule and the Danish State.*

Greenland is looking for new sources of income and the authorities are willing to spend money to improve the possibilities for new industry in Greenland. In the 1990s so far, six major airborne geophysical surveys have been carried out and two additional surveys will be added in 1997 (see Figure 1), all financed separately and/or jointly by the governments of Greenland and Denmark. Including the 1997 surveys, the total investment is in the order of 40 million DKK (corresponds to approx. CDN \$8 million) used to acquire a total of 295 000 line km of airborne geophysical data of various types. An additional 10 million DKK (CDN \$2 million) is expected to be available for surveys in 1998, and the acquisition of high quality airborne geophysical data will continue to be an important element in the public strategy for mineral exploration in the future.

Two types of geophysical surveys have been carried out with different objectives: a series of regional aeromagnetic surveys in 1992, 1995, 1996 and 1997 (line spacing 500 m), and another series of more local AEM surveys in 1994, 1995, 1996, 1997, and 1998 (planned) over selected types of geological environments (line spacings from 200 to 400 m). The primary objective of all the projects is to acquire high quality geophysical data and quickly make these available to researchers and industry. A secondary objective is to expand the public database of earth science data from Greenland, thus augmenting the understanding of the geology of Greenland. All the surveys are carried out by geophysical contractors under contract with GEUS. So far the following have been involved: Geoterrex Ltd., Sander Geophysics Ltd., and Aerodat Inc.

The poster discusses selected aspects of the different surveys. A very large number of maps in various scales have been produced as well as the digital data. The AEM surveys were of two types, fixed-wing transient electromagnetics (GEOTEM) supported by magnetics, and helicopter-borne multi-frequency electromagnetics supported by magnetics, radiometrics, and VLF. To give a general impression of the variety of geophysical data some examples are included in this summary. Figure 2 shows a regional aeromagnetic anomaly map of South Greenland produced from AEROMAG 95, illustrating major regional structures, some

of which run under the Inland Ice from coast to coast. In Figure 3, an apparent conductivity map of Inglefield Land, Northwest Greenland, shows a very good correlation with the known geology. This was calculated using both on-time and off-time GEOTEM data. Figure 4 is an example of helicopter-borne data from the Grænseland area of Southwest Greenland. The vertical magnetic gradient map illustrates the greater detail available with this survey technique, successfully mapping structures within both the Archean basement and the younger supracrustals.



**Figure 1:** Location map of the geophysical survey areas from 1992–1997.

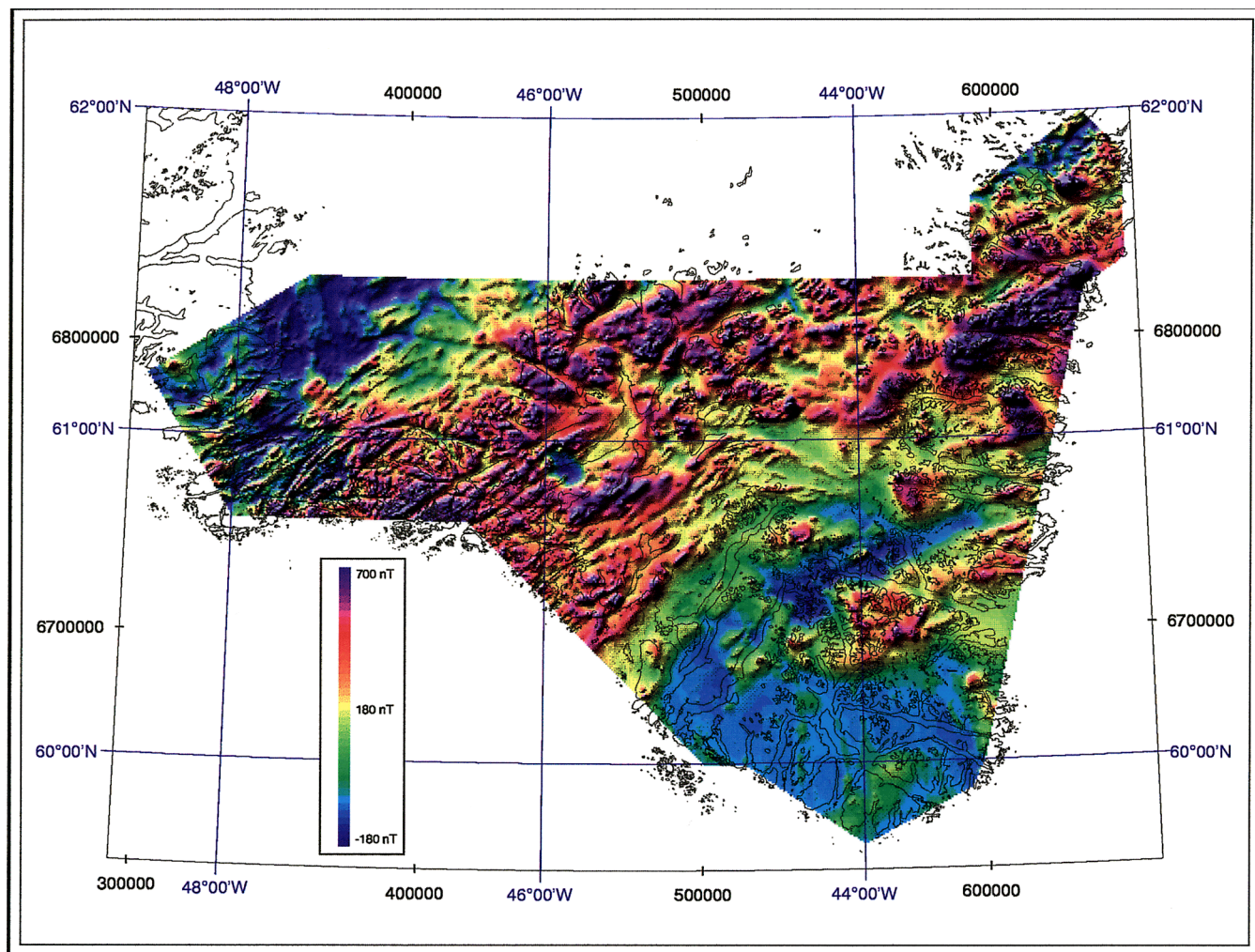


Figure 2: A regional aeromagnetic anomaly map of South Greenland produced from AEROMAG 95.

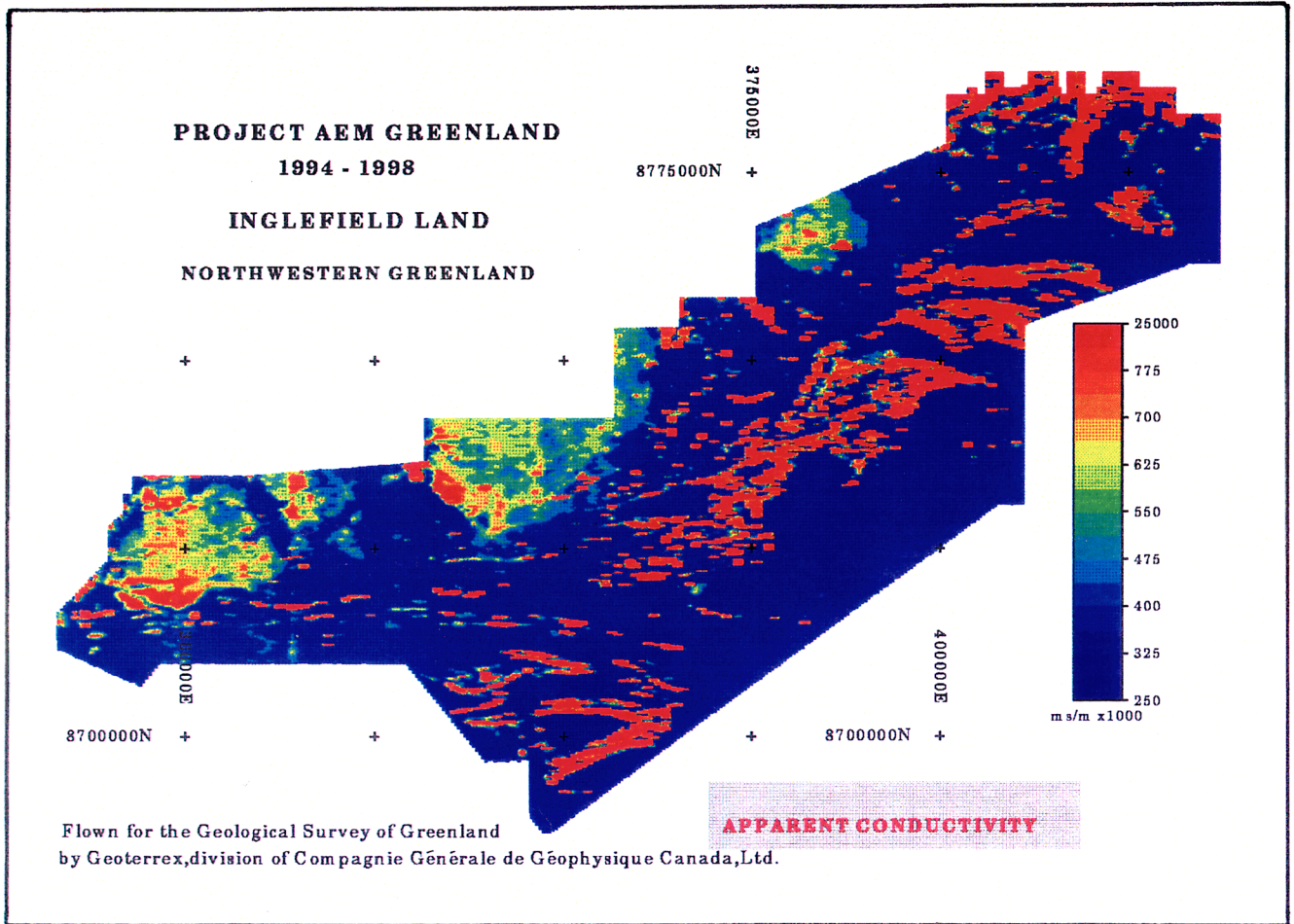


Figure 3: An apparent conductivity map of Inglefield Land, North-West Greenland.

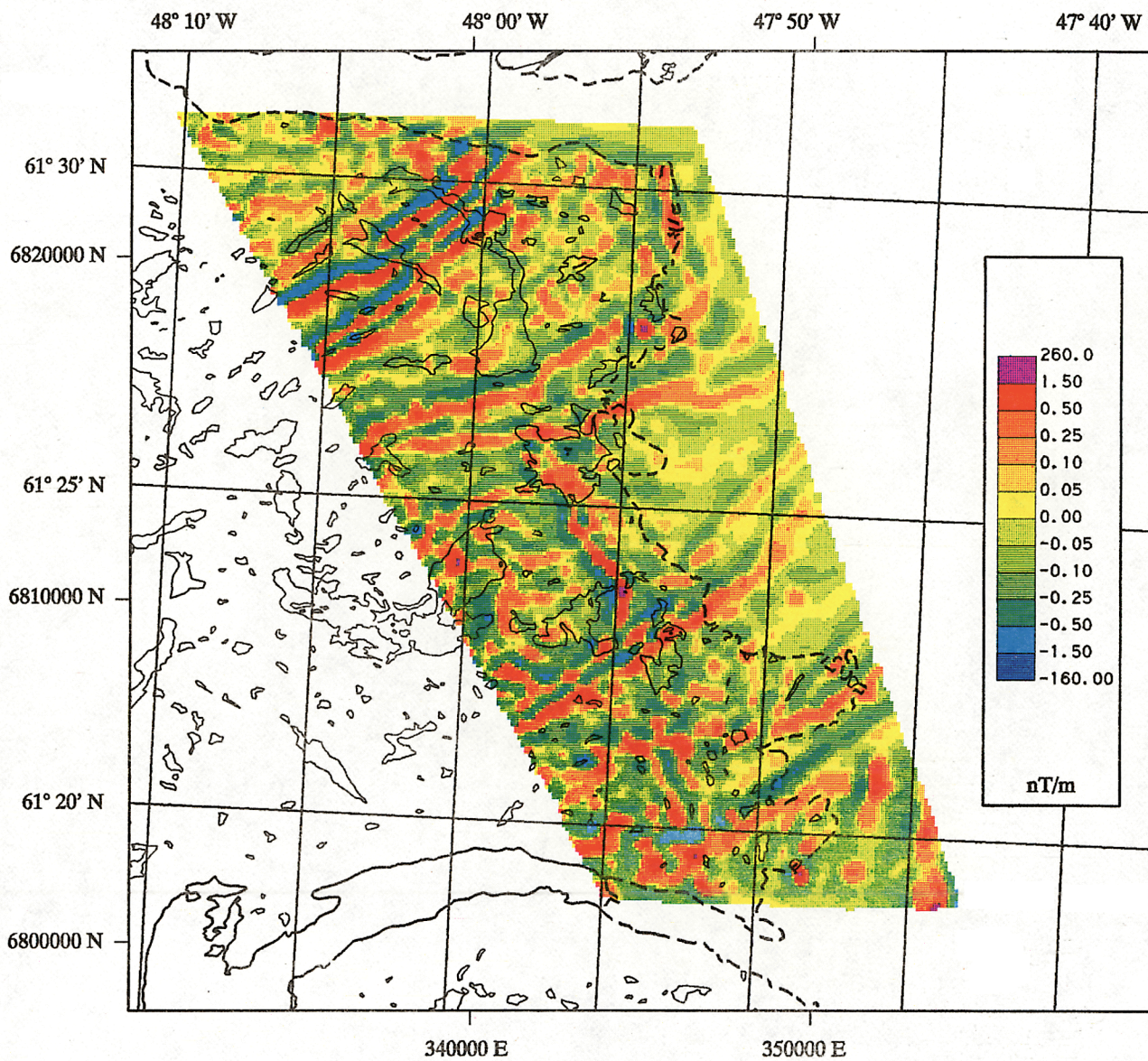


Figure 4: Helicopterborne data from Grønseland area of South-West Greenland.