

# Airborne geophysical surveys in Greenland

Geophysical data constitutes a major source of information on Greenland geology and are used as an integral part of mineral exploration activities and scientific projects. Significant contributions to the existing database with geophysical data come from commercial exploration activities and from Government funded activities.

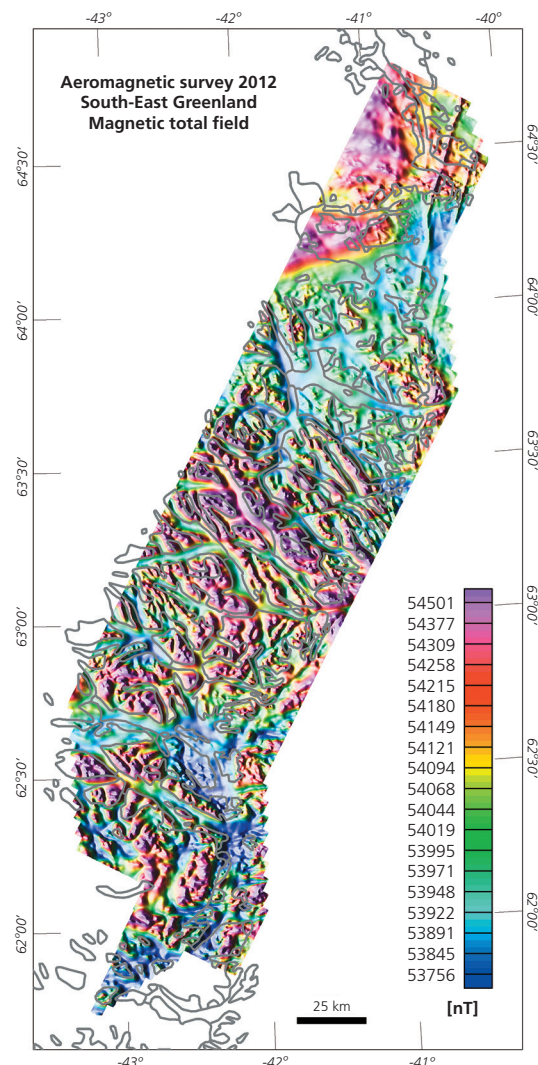
## Detailed electromagnetic and magnetic surveys

In the early 1990ties the Government of Greenland was seeking new ways to stimulate mineral exploration in Greenland. Among other initiatives, a five-year programme, AEM Greenland 1994–1998, of airborne combined electromagnetic and magnetic surveying was initiated. The survey areas were chosen on the basis of potential for the discovery of economic mineral deposits and to demonstrate the general applicability of detailed airborne methods in the various terrains in Greenland.

Electromagnetic surveys have been carried out on behalf of several exploration companies. In particular, combined electromagnetic and magnetic methods have been in use over large areas of West Greenland. Digital data and maps are stored in the National database and some of these survey data are now public domain data.

## Regional aeromagnetic surveys

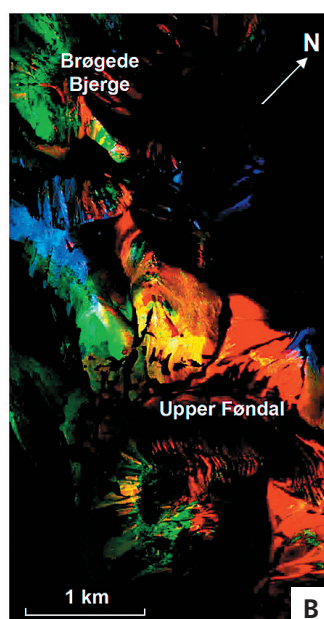
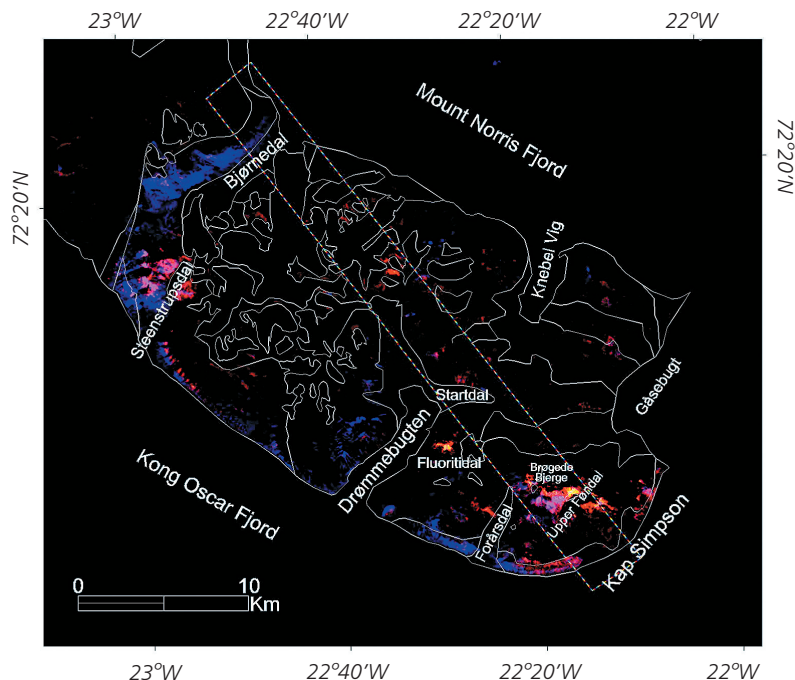
Simultaneously with the AEM Greenland 1994–1998 programme with detailed surveying of selected areas, another airborne project, Aeromag, was soon after started and financed by the authorities, with the aim of producing a regional coverage of high-quality aeromagnetic data. The Aeromag surveys are carried out by flying with fixed-wing aircraft along a gently draped surface above the ground and sea level. Rough topography in many areas places some limitations with respect to satisfying a general wish to minimise terrain clearance. Survey lines are with a separation of 500 m. Regional magnetic data are now available for the total ice-free area of West and South Greenland from the southern tip of Greenland to Svartenhuk Peninsula, covering an area of approximately 300 000 km<sup>2</sup>. Surveying along the east coast started in 2012 and covers the southern part of the North Atlantic craton, which stretches from north of Kangeq (61°45'N) and further northward to Umiivik (64°30'N). A continuation northwards is planned for 2013.



Magnetic total field data from the regional aeromagnetic survey in 2012 of the southern part of the North Atlantic craton in South-East Greenland.

## Hyperspectral surveys

Airborne imaging spectrometer data were acquired for the first time over Greenland during the Hyperspectral 2000–2002 project. Data acquisition was based on the HyMap™ hyperspectral imaging spectrometer, which collected data from 126 bands across the reflective solar wavelength region of 450–2500 nm. The campaign was carried out in East Greenland with focus on environmental aspects of the former lead-zinc mine at Mestersvig, and known mineral occurrences at various locations in the region. The Hyperspectral 2000–2002 project did also involve mapping of kimberlites and mineral occurrences associated with hydrothermal alterations in West Greenland.



Mineral alteration mapping in East Greenland based on ASTER VNIR-SWIR bands (upper panel) and HyMAP data (lower panel).

In the summer of 2012 a survey (HyperEast 2012) was flown by The NERC Airborne Research & Survey Facility over Central East Greenland using a Dornier 228-101 research aircraft equipped with both Specim AISA Eagle and Hawk sensors, a Leica ALS50-II LiDAR and a Leica RCD105 39 mega-pixel camera. The hyperspectral data from AISA Eagle and Hawk have a 2 meter spatial resolution and covers 486 spectral bands from 400 up to 2500 nm, with bandwidths 3 and 6 nm, respectively.

### Reconnaissance surveys

Parts of Greenland are so far only covered by reconnaissance surveys. In particular large areas of northern and eastern Greenland have only been covered with reconnaissance lines with magnetic recordings. Radiometric data are available from reconnaissance surveying of West Greenland performed in the years from 1975-1981.

### Key references

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