have been revealed. It appears that with the present instruments, methods of constant barometric altitude are preferable. Methods attempting a constant average ground clearance are difficult to use for both theoretical and especially practical reasons, and their use should be limited to special cases. In some cases a closer spacing of the profiles would be desirable, but when using visual navigation in terrains like those of West Greenland, the lower limit seems to be at 1 km. Significant improvement of this demands some type of electronic navigational device that provides continuous feed-back of flight path information to the pilot. Finally, the most serious set-back to the work has been the numerous magnetic storms which occur in this part of the world. To overcome this obstacle, the use of a gradiometer system is being considered.

Airborne radiometric survey between 66° and 69°N, southern and central West Greenland

Karsten Secher

An airborne radiometric survey was initiated in central West Greenland in 1975 following completion of the aeroradiometric work in East Greenland (Nielsen, 1972; Nielsen & Larsen, 1974). During 1975 the region between Søndre Strømfjord and Jakobshavn Isfjord was covered, an area of *c.* 58 000 km². The programme was carried out as a collaboration between GGU and the Danish Atomic Energy Commission's Research Establishment, Risø. GGU and Risø each supplied three participants. The aircraft, a Britten-Norman Islander, were chartered through Greenlandair Charter A/S. Aeromagnetic measurements were carried out simultaneously (Thorning, this report). Field operations were carried out from Søndre Strømfjord Air Base.

It is planned to continue this radiometric survey during the next few years, including follow-up fieldwork on the ground.

Equipment and methods

The aeroradiometric work was carried out using a gamma-ray spectrometer, designed and constructed at Risø. It is a four-channel spectrometer equipped with six 6 × 4 inches NaI(Tl) detectors (total volume 11.1 litre). A radar altimeter and an automatic 35 mm camera were connected to the system. All data were recorded on punched tape, and in addition the count rate in the total count channel, the altitude and the magnetic data were registered on a strip chart recorder. The airspeed was almost constant at 120 km/h and the ground clearance was on average kept at 100 m.

The flight routes (about 18 000 km) followed topographical contours (rim flying) and because of this, they were controlled by distinct morphological features such as fjords, valleys and lakes. It was impossible everywhere to place the flight-lines in a grid-pattern and thus the coverage of the region is rather inhomogeneous.

All major geological formations were investigated, except for areas covered by Quaternary and younger deposits which make up about 20 per cent of the area.

The purpose of the investigation was to select favourable areas or specific geological formations for more detailed uranium exploration. Furthermore, it is expected that the radiation measurements may be of some aid in the geological mapping. Although the data collected have yet to be processed, it is obvious from the analogue records that several anomalies exist. Anomalies detected during the reconnaissance flights were later flown in detail, in different directions and at different altitudes.

Remarks on the radioactivity

Very little was previously known of the radioactivity in the survey area. From the present investigation some general trends concerning the radiation level of the rock units and the detected anomalies are briefly presented below. Rock units mentioned below follow the divisions made on the geological map Søndre Strømfjord–Nûgssuaq, scale 1:500 000 (GGU, 1971).

Pre-Nagssugtoqidian block

The rocks are mainly enderbitic gneisses and granites. Both rock types have a low radiation level and on present knowledge are impossible to distinguish by means of radioactivity. The gneisses south-west of Itivdleq near the mouth of Søndre Strømfjord have a lower level of radiation, in fact the lowest of the whole survey area. No anomalies were detected.

Ikertoq gneiss complex

This complex is dominated by granodioritic to quartz dioritic gneisses with several bands of amphibolite and mica schist. Generally the gneisses have a higher radiation level than the rocks of the pre-Nagssugtoqidian block. The levels in the amphibolites and mica schists are distinctly higher but it has not yet been possible to distinguish between them. Several single anomalies were detected, scattered over the area. Ground checks at one locality indicated a close connection between the anomaly and a high amount of allanite in the gneiss. At another locality, in the valley Arnangarnup kûa, where the Nagssugtoqidian deformation boundary cuts the valley, a cluster of anomalies were detected. Based on a short ground stop, these seem to be related to carbonatite-like rocks.

Isortoq gneiss complex

Enderbitic gneisses with low radioactivity predominate. Towards the west granodioritic to quartz dioritic gneisses and leucocratic gneisses (granulites *sensu stricto*) occur, both types having a radioactivity appreciably higher than the enderbitic gneisses. Bands of amphibolite and mica schists are common and again show relatively high radioactivity, while marble bands could not be discerned by means of their radiation. Granites of the Agto area show rather high radioactivity. Several anomalies were detected within the complex, most of them in clusters. One large group is located in the area between Nordre Strømfjord and the lake Nagssugtûtâta tasia, apparently related to layers of mica schist, leucocratic gneiss and

possibly skarn rocks. This is of interest since sand samples collected in the same area by Thomsen (1954) contained higher uranium contents than the rest of the complex. A second smaller group of anomalies was observed in the bottom of the valley Kûk, all situated along a border between the two main gneiss types.

Egedesminde gneiss complex

The main rock type is granodioritic gneiss, with bands of mica schist and amphibolite that both have higher radioactivity than the gneiss. Smaller areas are occupied by quartz diorite and granite. The quartz diorite around Arfersiorfik shows a varying, mostly low, radiation, while the granite generally has the highest radiation level of the complex. A few isolated anomalies were detected scattered over the area.

Concluding remarks

At this preliminary stage only a few general trends can be seen. It is obvious that within the survey area there are localities with enrichment of radioactive elements. Carbonatite-like rocks seem to be the explanation in one case, allanite concentration in gneiss in another case. The pre-Nagssugtoqidian block appears to possess the lowest radiation level, while rock units within the Nagssugtoqidian complex show higher radioactivity, highest in amphibolite-facies regions. However there are exceptions, as leucocratic gneisses (granulites *sensu stricto*) show the highest radiation level among the gneisses. Rocks mapped as granites are usually more radioctive than gneisses. There are no signs of anomalous enrichment of radioactivity along the major thrust zones. The clustering of detected anomalies in the area of Nordre Strømfjord is interesting, both with respect to their number and because they may imply some common features in the distribution of the radioactive elements. Otherwise, most of the anomalies of the region are isolated and all need closer inspection before any conclusions can be drawn.

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