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## The geochronology of the Scoresby Sund region, central East Greenland

Progress report 7: Rb-Sr whole rock and U-Pb zircon ages

**B. T. Hansen and R. H. Steiger**

The recent age reconnaissance work carried out at the Eidgenössische Technische Hochschule, Zürich, has been mainly concerned with the complex age relationships of the supracrustal series in the western part of the Scoresby Sund region. This work has now come to an end and the results will be published in detail in the near future. In the eastern part of the area most isotopic work has been additional investigations on a plutonic body in the Stauning Alper and its implications are discussed in this report, as well as the age of discordant intrusions within the eastern Milne Land fault block.

### *Stauning Alper: U-Pb zircon ages*

In our first progress report (Hansen & Steiger, 1971) a biotite Rb-Sr age for a granodiorite sample GGU 107842 (Table 12) was presented. The mineral age of 1154 m.y. for this intrusion (located at 71°53'N, 27°17'W) was the first indication of the existence of pre-Caledonian intrusive bodies within the Stauning Alper.

Analyses of three zircon fractions from the same sample are plotted in fig. 42. The upper intersection of the best fit line with the concordia suggests an intrusion age of about 1720 m.y., but due to the extreme discordance of the data points an error of  $\pm 200$  m.y. must be

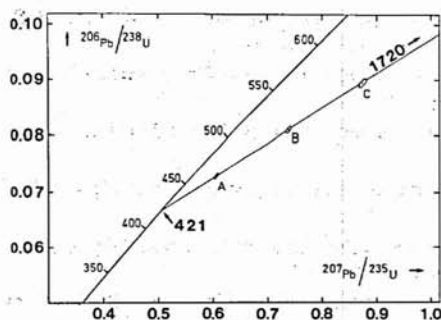


Fig. 42. Concordia-plot for three sieve fractions of zircons from granodiorite GGU sample 107842. Stauning Alper, central East Greenland.  $\lambda^{238}\text{U} = 1.5369 \times 10^{-10} \text{ y}^{-1}$ ,  $\lambda^{235}\text{U} = 9.7216 \times 10^{-10} \text{ y}^{-1}$ ,  $^{238}\text{U}/^{235}\text{U} = 137.7$ .

assumed. The lower intersection at  $421 \pm 15$  m.y. is better defined and reflects a Caledonian overprint.

The zircon age of *c.* 1720 m.y. for the granodiorite intrusion is the oldest so far obtained from the 90 km wide zone of migmatitic gneisses and associated plutonic rocks traceable for more than 200 km from south to north in the Scoresby Sund region.

Mineral ages ranging from *c.* 410 m.y. to *c.* 1150 m.y. have previously been obtained from granitic rocks from the Stauning Alper area (Hansen & Steiger, 1971; Hansen *et al.*, 1972, 1973b), while zircon and monazite analyses from the nearby Bjørneøer have provided evidence of an event somewhat prior to 1650 m.y. as well as Caledonian ages (Oberli & Steiger, 1973). It is evident that the zone of migmatitic gneisses and associated plutonic rocks has a complex composite nature, though it is difficult to assess the relative significance of the different orogenic events.

It seems probable that the metasedimentary relics widely represented in the migmatites cut by the granodiorite must represent part of a supracrustal sequence deposited prior to at least 1500 m.y. ago. These supracrustals are usually correlated with the Krummedal supracrustal sequence which is widespread in the western part of the Scoresby Sund region and which has given a Rb-Sr isochron of  $1162 \pm 85$  m.y. (Hansen *et al.*, 1973a) considered to represent the main metamorphic event. It is not clear at present whether the biotite age of 1154 m.y. from the granodiorite represents a mixed age or a true metamorphic event corresponding to that of the Krummedal supracrustal sequence.

#### *Eastern Milne Land: Rb-Sr whole rock ages*

Eastern Milne Land, east of a prominent fault, is largely made up of a variety of major intrusive bodies (Henriksen & Higgins, 1971). Two of these, a granodiorite and a quartz syenite, have given Rb-Sr mineral ages of 1490 and 1315 m.y. respectively which are regarded as minimum intrusive ages (Hansen *et al.*, 1972). These evidently pre-Caledonian plutons are cut by two types of granites, a major leucocratic biotite granite in the north, and two small pinkish fine- to medium-grained biotite granite plugs in the south.

One of the southern pinkish biotite granite plugs, about 1500 m in diameter contains near the centre a zone of basic rocks. Samples of both granite and the basic zone have been analysed for Rb and Sr isotopes (Table 12) and the data are plotted in fig. 43. The four points representing the granite samples give a Caledonian age of  $442 \pm 8$  m.y. The basic zone

Table 12. Location of dated samples from the East Greenland fold belt, Scoresby Sund region

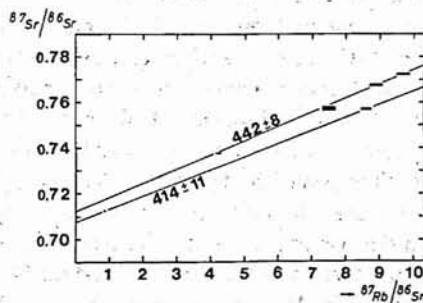
GGU sample no.	Location	Latitude - Longitude	Rock type
166839	East Milne Land	70°48'18"N/25°33'24"W	Pinkish biotite granite
166843	- - -	70°48'40"N/25°32'03"W	- - -
166844	- - -	70°48'38"N/25°32'22"W	- - -
166848	- - -	70°48'29"N/25°34'20"W	- - -
166845	- - -	70°48'18"N/25°32'42"W	Basic intrusion
166846	- - -	70°48'19"N/25°32'59"W	- - -
107842	Stauning Alper	71°53'N/27°17'W	Biotite granodiorite

represented by only two samples suggests a slightly younger age, which concurs with the presence of chilled margins at the contacts of the zone of basic rocks.

The numerous Caledonian mineral ages known from the inner Scoresby Sund area testify to the regional influence of Caledonian orogenesis. This is the first isochron age from the region confirming Caledonian granite emplacement, although a number of other post-kinematic granites are thought likely to be Caledonian. The age of 442 m.y. compares well with the isochron age of  $455 \pm 5$  m.y. recorded by Rex, Gledhill & Higgins (this report) from the Forsblads Fjord granite situated north of the Scoresby Sund region.

Fig. 43. Rb-Sr evolution diagram with whole rock data for the pinkish biotite granite (upper isochron) and the basic intrusion within the pinkish granite (lower isochron). Eastern Milne Land, central East Greenland.

$$\lambda^{87\text{Rb}} = 1.39 \times 10^{-11} \text{ y}^{-1}$$



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## C<sup>14</sup> dating of Survey material carried out in 1975

### General compilation by Anker Weidick

Sixty-six radiocarbon age determinations of shell samples (63) and gyttja (3) from North-West, West, North-East and East Greenland are summarised below. All the material was collected during GGU field work except shells Lu-930 from Store Koldewey, North-East Greenland which came from the Danmark Expedition of 1906–1908. Collections of Quaternary material from this expedition have been recently kindly donated to GGU by the Zoological Museum, University of Copenhagen.

The samples have been dated at Isotopes Inc., Westwood, New Jersey, U.S.A. by J. Buckley (marked I), at the Carbon-14 Dating Laboratory of the Geological Survey of Denmark and the National Museum, Copenhagen by H. Tauber (marked K), at the Radiocarbon Dating Laboratory, Department of Quaternary Geology, University of Lund, Sweden (marked Lu) and at the Carbon-14 Dating Laboratory of the University of Helsinki, Finland by H. Jungner (marked Hel). The Finnish and Swedish data have been published earlier by Donner & Jungner (1975) and Håkansson (1975) respectively.

The samples are located by coordinates taken from the Danish Geodetic Institute 1:250 000 map series.

### *Samples collected in the Thule district, North-West Greenland by Peter R. Dawes*

GGU 166125: I-8894. Olrik Fjord

**18 990 ± 280 B.P.**

Shells of *Chlamys islandica*, *Hiatella arctica* and *Mya truncata* collected in grey silt at c. 2.5 m above sea level. North side of Olrik Fjord, 77°09'N, 66°53'W.