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Fission track dating of lower Tertiary rhyolitic glass rocks from Disko

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Geology and stratigraphy

The Tertiary igneous activity in West Greenland has not been dated in detail. Sediments contemporaneous with, or slightly older than, the early volcanic rocks are assigned a middle Paleocene age from palaeontological evidence (Henderson *et al.*, 1981), and palaeomagnetic work by Athavale & Sharma (1975) indicates that the Vaigat Formation picrites and the lower 500 m or so of the overlying Maligât Formation (Hald & Pedersen, 1975) were erupted in the time span represented by geomagnetic anomaly 25 together with the long reversal period between anomalies 25 and 24. The age estimated for this period is 56 to 52 Ma (Butler & Coney, 1981). The late Stage lamprophyre magmatism on Ubekendt Ejland appears to be much younger, about 30 to 40 Ma (Parrott & Reynolds, 1975). No reliable radiometric age determinations have been published from the Disko–Nûgssuaq area.

In order to date the younger part of the basalt succession on Disko, zircons were separated from three blocks of garnet-bearing peraluminous rhyolite glass from a conglomerate

Table 1. Fission track ages for zircons from rhyolitic glass rocks from Disko

Sample no.	no. of crystals	$\varrho_s(N_s)$ ($X10^7$)	$\varrho_i(N_i)$ ($X10^7$)	Age Ma 1 sigma errors
156558	6	0.7776(425)	0.3659(200)	43.6 ± 3.9
156518	4	0.3378(140)	0.1665(69)	41.6 ± 6.2
156516	10	0.7263(554)	0.3212(245)	46.4 ± 3.7
All samples	20	0.6492(1119)	0.2982(514)	44.6 ± 2.6

ϱ_s is the track density for spontaneous tracks, N_s the total number of spontaneous tracks counted, ϱ_i the track density for induced tracks and N_i the total number of induced tracks counted. The error is calculated from the statistical counting error and the standard error of the mean for the calibration constants. Location: 156558: 70°04′70″N, 54°44′30″W; 156518 and 156516: 70°07′40″N, 54°46′40″W.

horizon in the Nordfjord Member of the upper Maligât Formation (Pedersen, 1975, 1977) in north-west Disko. The localities from which the glass blocks were selected show evidence of only low zeolite facies metarmophism.

The fission track dating method

Separated zircons were mounted and etched according to the suggestions of Gleadow *et al.* (1976). The mounts were covered with a muscovite sheet as an external detector (Gleadow & Lovering, 1978) and irradiated in the J1 facility of the Herald reactor, Aldermaston, U.K. The Fish Canyon zircon was used as an age standard for the calibration (Hurford & Green 1983). Annealing temperatures for zircons are not well established, but new investigations show that zircons are likely to anneal only at temperatures above 200°C (*c.* 225°C) for geological time spans (Hurford, 1984). This is far above the temperatures that the glass blocks and their associated tuff sediments have experienced, and fission tracks should hence date the initial cooling of the volcanic host rocks. Three age determinations are reported in Table 1. Since the ages cannot be separated statistically, an overall age has been calculated as 44.6 ± 2.6 Ma, which corresponds to the lower Eocene.

Implications

The fact that the age of the rhyolitic rocks from the Nordfjord Member in the upper part of the basalt pile is about 45 Ma, compared with the much oder ages (56–52 Ma) for the lower part of the basalts, indicates that the volcanism in the Disko–Nûgssuaq area did not occur as a single major volcanic cycle. Widespread small conglomerate horizons occur in the Nordfjord Member, and it can be demonstrated that hundreds of metres of plateau basalts have been eroded away locally. This points to a significant and prolonged decline in the magmatic activity with time. A consequence of the reported Eocene age is that volcanic rocks which could record parts of the magnetic anomalies 24 to 20 (Butler & Coney, 1981) may be present in the upper part of the Maligât Formation on Disko which has not yet been measured palaeomagnetically.

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Ordovician(?) gastropods from cherts in Cretaceous sandstones, south-east Disko, central West Greenland

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Field work by AKP during 1984 on south-east Disko included a brief re-investigation of an unusual assemblage of clasts found in the Upper Cretaceous sandstones of the Atane Formation. These clasts were first found by Giesecke in 1807 (Giesecke, 1910) and subsequently briefly characterised by Schiener (1974, p. 25) as "a characteristic marker assemblage of ex-