Precise age for the Ammassalik Intrusive Complex

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An age of 1886 ± 2 Ma has been obtained on zircons from a diorite sample of the Ammassalik Intrusive Complex.

Introduction

The Ammassalik Intrusive Complex (Friend & Nutman, this volume, and references cited therein) is a late kinematic, polyphase pluton in the centre of the Ammassalik mobile belt of South-East Greenland (Chadwick *et al.*, this volume). It consists mainly of medium- to coarse-grained diorite. Fresh and undeformed samples of the rock were collected at the Ammassalik town quarry (65° 36.5′N, 37° 38′W). They consist of variable proportions of andesine, hypersthene, augite, hornblende and biotite with quartz in some of the samples, and with accessory apatite, opaque minerals and zircon. Rutile and carbonate are present in a few samples. Darker diorites (*c.* 50% mafic minerals) are cut by diffuse veins of more leucocratic rock (*c.* 20% mafics). The sample used for zircon separation (GGU 337205, *c.* 30 kg) represents the main (dark) diorite.

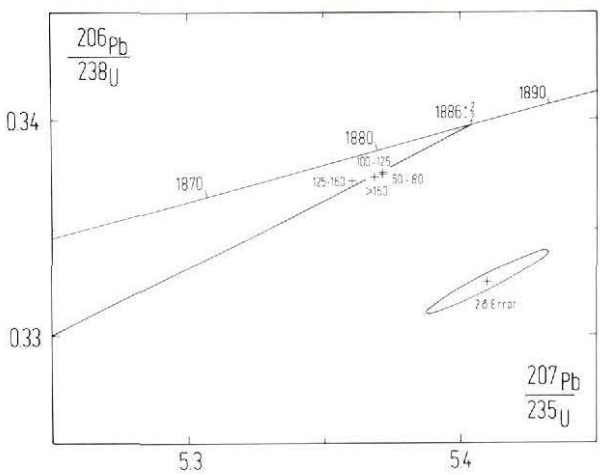

Fig. 1. Concordia diagram for four zircon fractions from GGU 337205 of the Ammassalik Intrusive Complex. The confidence ellipses were calculated according to the method of Ludvig (1980).

Zircon U-Pb data

About 0.5 g of zircon was separated from the rock. The investigated zircons have a light rose colour and an average length–width ratio of *c.* 3, decreasing with increasing grain size. Nearly all grains show rounded terminations. They are elongate prismatic often with slightly pitted surfaces.

Four size fractions of the zircon were analysed at the Zentrallaboratorium für Geochronologie at the Uni-

Table 1. U-Pb analytical data on zircons from the Ammassalik Intrusive Complex (GGU 337205)

sieve fraction (μm)	analysed weight (mg)	Observed atomic ratios $\frac{^{206}Pb}{^{204}Pb}$	$\frac{^{207}Pb}{^{206}Pb}$	$\frac{^{208}Pb}{^{206}Pb}$	U (ppm)	Pb_{tot} (ppm)	Pb_{rad} (ppm)	$^{206}Pb_{rad}$ n mol/g	Atomic ratios corrected for blank and common Pb* $\frac{^{206}Pb}{^{238}U}$	$\frac{^{207}Pb}{^{235}U}$	$\frac{^{207}Pb}{^{206}Pb}$	Apparent age (Ma) $\frac{^{207}Pb}{^{206}Pb}$
60– 80	4.5	2351	0.12114	0.34207	126.3	54.0	53.0	177.6	0.33755	5.371	0.11541	1886
100–125	4.8	1759	0.12305	0.36708	101.6	43.7	43.3	143.0	0.33762	5.371	0.11539	1886
125–160	8	5175	0.11788	0.41254	106.2	47.3	47.0	149.4	0.33725	5.360	0.11528	1884
>160	12	4892	0.11815	0.40198	106.9	47.4	47.0	150.4	0.33742	5.368	0.11539	1886

*Composition of the lead used for blank correction: $^{206}Pb/^{204}Pb$ = 18.7, $^{207}Pb/^{204}Pb$ = 15.63, and $^{208}Pb/^{204}Pb$ = 38.63. The composition of common lead was calculated using the lead-evolution model of Stacey & Kramers (1975).

versity of Münster, West Germany. Descriptions of the analytical procedures used are given in Persson *et al.* (1983); precisions were calculated according to Ludvig (1980). The results are given in Table 1 and shown diagrammatically on fig. 1. The zircon fractions are nearly concordant and yield a precise upper intercept age of 1886 ± 2 Ma.

Discussion

Because the diorite sample in question is a well-preserved igneous rock we interpret the age of 1886 ± 2 Ma as the age of intrusion. The morphology of the zircons is consistent with this interpretation. The high degree of concordance of the zircons shows that (1) the zircons form a homogeneous population, i.e. there is no evidence of inherited zircons, and (2) later disturbance resulting in loss of Pb was very restricted.

According to the field evidence, emplacement of the Ammassalik Intrusive Complex took place late in the tectonic evolution of the mobile belt (Friend & Nutman, this volume), and it is regarded as postdating the main phase of regional metamorphism (Nutman & Friend, this volume). This would place the peak of metamorphism in the Ammassalik belt before *c.* 1885 Ma. However, Sm-Nd data for mineral and whole-rock samples from an 'eclogitic' dyke outside the Ammassalik Intrusive Complex have yielded a date of 1817 ± 22 Ma, presumably reflecting the age of the metamorphism of this rock (Kalsbeek & Taylor, this volume). Further, a Pb/Pb whole-rock isochron obtained for marble samples collected in the northern part of the Ammassalik region has given a date of 1773 ± 22 Ma, which is also considered to represent the age of a metamorphic recrystallisation (Kalsbeek & Taylor, this volume). It is not clear how these seemingly conflicting data should be reconciled.