Rb-Sr whole-rock dates from Senja, North Norway

ALLAN G. KRILL & EIGILL FARETH

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Allan G. Krill, Norges geologiske undersøkelse, Postboks 3006, N-7001 Trondheim.
Eigill Fareth, Fiskindustriens Landsforening, Postboks 576, N-9001 Tromsø.

The island of Senja has been recently mapped and studied (Fareth 1977, 1983a, 1983b, 1983c, Fareth & Johannessen 1983) for compilation of the new geological map of Norway (Sigmond et al. 1984) and the preliminary map of Tromsø- 1:250,000 (Fareth 1981). Although a detailed description of the bedrock may not be available for several years, the Rb-Sr dating results are presented now for general reference.

The central southern parts of Senja are dominated by granite and quartz diorite. They are surrounded by migmatite, and are themselves partly migmatitic near their margins. However, large parts of the plutons are homogeneous and only weakly deformed, and they are considered late-tectonic with regard to the main migmatite event.

Quartz diorite

Five samples of quartz diorite from the southwestern tip of Senja (rock no. 196, Sigmond et al. 1984) yielded a Rb-Sr whole-rock isochron with a date of 1746 ± 93 Ma (Fig. 1). The date is interpreted as the intrusive age of the rock, because of the igneous mineralogy and texture, and the low initial Sr ratio (.7033 ± 2).

Granite

Nine samples of coarse-grained granite from the central southern coast of Senja (rock no. 187, Sigmond et al. 1984) yielded an errorchron with a date of 1768 ± 49 Ma (Fig. 2). The rocks were collected from two different areas within the same mapped pluton, and dates calculated independently from each area are similar (Fig. 2). The date of 1768 ± 49 Ma is interpreted as the intrusive age of the pluton, and the initial Sr ratio was .705. A single sample from a medium-grained granite pluton several kilometers to the north (sample C-3) falls on the same regression line, suggesting that this granite has the same age and initial Sr ratio as the coarse-grained granite.

Migmatite

Samples were also analyzed from two homogeneous outcrops in the migmatite of northern Senja. Together the 11 samples gave a Rb-Sr whole-rock date of 1773 ± 167 Ma, but because of very poor fit to the regression line (MSWD = 40) and uncertainty about the origin of the rocks, the date is unreliable and the data are not presented.

Conclusion

Intrusion of the large quartz diorite and granite plutons on southern Senja occurred at 1746 ± 93 Ma and 1768 ± 49 Ma respectively. The plutons are considered late-tectonic and the age of the migmatization on the island is interpreted as Svecofennian and/or older.

Analytical techniques

Rb-Sr ratios of the granite samples were determined directly by X-ray fluorescence at the Mineralogisk-Geologisk Museum, Oslo (Pankhurst & O'Nions 1973). Rb and Sr contents of the quartz diorite samples were determined by isotope dilution using a mixed $^{87}Rb/^{84}Sr$ spike. Variable mass discrimination in $^{87}Sr/^{86}Sr$ was corrected by normalizing $^{88}Sr/^{86}Sr$ to 8.3752. Mass spectrometry was performed on a Micromass MS30. The ^{87}Rb decay constant used was 1.42×10^{-11} yr^{-1}, and the data were regressed by the method of York (1969). In assigning errors, the coeffi-

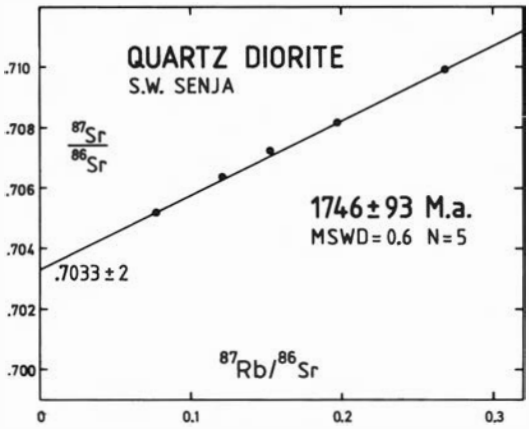

Fig. 1. Rb-Sr whole-rock isochron diagram.

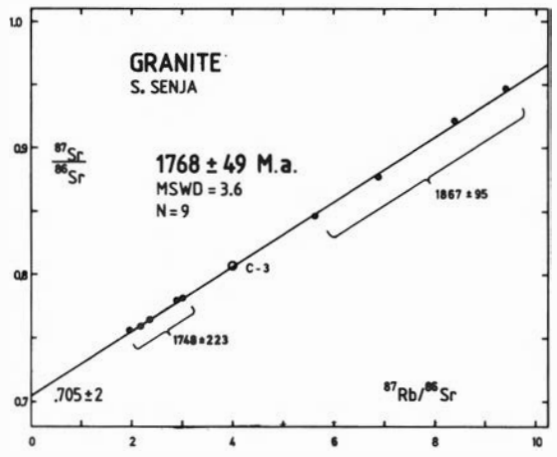

Fig. 2. Rb-Sr whole-rock isochron diagram.

Table 1. Rock locations and analytical results

	Map	UTM Coord.	Sample	Rb	Sr	$^{87}Rb/^{86}Sr$	$^{87}Sr/^{86}Sr$	SE
Quartz diorite	1333III	722632	2-XII	70.7	768	.2665	.70993	10
	1333III	721618	3-Y	37.6	903	.1204	.70639	10
	1333II	738618	4-Z	57.2	840	.1969	.70822	10
	1333II	756619	5-V	53.6	1014	.1530	.70723	9
	1333II	759620	6-W	32.5	1228	.0765	.70517	7
Coarse-grained granite	1433III	007746	F-7	197	293	1.948	.75589	9
	1433III	008745	F-8	220	294	2.177	.75886	6
	1433III	010745	F-9	218	221	2.876	.77896	10
	1433III	012744	F-10	217	210	3.013	.78092	9
	1433III	016744	F-11	204	253	2.342	.76396	7
	1433II	941723	B-1	324	114	8.387	.93038	9
	1433II	942724	B-2	333	105	9.386	.94711	10
	1433II	944726	B-3	295	154	5.630	.84659	8
	1433II	945730	B-4	297	127	6.881	.87665	9
Medium-grained granite	1333I	947865	C-3	242	176	4.032	.80859	8

cient of variation was taken as 1% for $^{87}Rb/^{86}Sr$. The errors for the $^{87}Sr/^{86}Sr$ measurements are listed in Table 1. Age and intercept errors are quoted at the 2-sigma confidence level.

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References

Fareth, E. 1977: Tranøy, berggrunnskart 1:50 000, foreløpig utgave. *Nor. geol. unders.*

Fareth, E. 1981: Tromsø, berggrunnskart 1: 250 000, foreløpig utgave. *Nor. geol. unders.*

Fareth, E. 1983a: Mefjordbotn, berggrunnskart 1:50 000, foreløpig utgave. *Nor. geol. unders.*

Fareth, E. 1983b: Hekkingen, berggrunnskart 1:50 000, foreløpig utgave. *Nor. geol. unders.*

Fareth, E. 1983c: *Senja bedrock geological map 1:100 000.* Unpubl.

Fareth, E. & Johannessen, G. A. 1983: Stonglandet, berggrunnskart 1:50 000, foreløpig utgave. *Nor. geol. unders.*

Sigmond, E. M. O., Gustavson, M. & Roberts, D. 1984: Berggrunnskart over Norge 1:1 000 000. *Nor. geol. unders.*

Pankhurst, R. J. & O'Nions, R. K. 1973: Determination of Rb/Sr and $^{87}Sr/^{86}Sr$ ratios of some standard rocks and evaluation of X-ray fluorescence spectrometry in Rb-Sr geochemistry. *Chem. Geol. 12,* 127.

York, D. 1969: Least squares fitting of a straight line with correlated errors. *Earth Planet. Sci. Lett. 5,* 320–324.