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Eclogae geol. Helv.	Vol. 63/1	Page 299	With 1 table	Basle, April 1970

K/Ar and Rb/Sr Age Determinations on Minerals and Total Rocks of the Harz-Mountains/Germany

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SUMMARY

Age determinations were carried out on the Brocken intrusive complex, which consists of three separated massifs: Harzburger gabbro, Oker granite and Brocken granite. The complex is a post-orogenic intrusion. Stratigraphical maximum age is Lower Namurian, minimum age Upper cretaceous.

K/Ar age determinations on biotites and biotite/chlorite mixtures yielded apparent ages from 300 to 248 m.y. Plotting radiogenic argon versus potassium the data points for each massif lie on straight lines cutting the negative part of the argon axis. This gives evidence for argon loss of the system due to the admixed chlorite. Corrected ages were calculated by extrapolation to the radiogenic argon content of pure biotite and are given in the table.

Rb/Sr age determinations on pure biotites yielded apparent ages which are not significantly different from the K/Ar corrected ages, but tend to be somewhat lower. An age estimate of a Rb/Sr total rock isochrone yielded the same trend.

Petrographic zoning of an aplite dike (low Rb at the rim, high Rb in the centre) allowed Rb/Sr analyses for an isochrone plot. The isochrone age estimate is in discordance to an K/Ar apparent age of a pure biotite of this dike. The discordance may be explained either by argon excess of the biotite or radiogenic Sr loss of the K-feldspar. Further investigations have to prove either of these possibilities.

Table 1. Summarized results of Rb/Sr and K/Ar age determinations for the Brocken intrusive complex, Harz mountains, Germany.

Used constants for Rb $\lambda = 1.47 \times 10^{-11}/y$
for K^{40} $\lambda\beta = 4.72 \times 10^{-10}/y$
$\lambda e = 0{,}548 \times 10^{-10}/y$
$^{40}K/K = 1.19 \times 10^{-4}$ g/gK

	K/Ar biotite	Rb/Sr biotite	Rb/Sr total rock	$^{87}Sr/^{86}Sr$ (in)
Brocken granite	293 ± 2*)	288 ± 4	282 ± 9	0.714 ± 0.003
Oker granite	296 ± 2*)	296 ± 4		
Harzburger gabbro	292 ± 2*)	286 ± 5	–	–
Aplite dike	294 ± 5	–	252 ± 7	0.722 ± 0.003

*) corrected ages.