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22. K-Ar AGE DETERMINATIONS OF SAMPLES FROM LEG 134[1]

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INTRODUCTION

The K-Ar ages from the basaltic rocks of Leg 134 range from Miocene to Holocene (Table 1). Samples were selected in consultation with shipboard scientists; choice of the material from the forearc sites was very limited and confined to clasts. There was a wider choice of material from the sill at Site 833 in the North Aoba Basin.

ANALYTICAL PROCEDURES

Selected samples from Leg 134 cores were crushed and sieved. The 250–170 μm mesh fraction was collected normally for analysis but a wider range was taken if the amount of sample supplied was insufficient for analysis. The sieved fraction was washed in approximately 10% acetic acid to remove carbonate contamination. The acid was removed by washing the samples in distilled water before drying. Aliquots of this cleaned fraction were used for both potassium and argon determinations.

Three separate dissolutions of the sample were conducted for the potassium determinations. The concentrations were measured using a Corning-eel 480 flame photometer incorporating a lithium internal standard. The value quoted in Table 1 is the mean of the three dissolutions. International and laboratory standards are analyzed on a routine basis.

Argon was extracted in a glass vacuum system using a ^{38}Ar tracer from an aliquoting system. Special attention was given to the purity of the gas sample before it was analyzed. A two-stage clean-up procedure was used, with stage one incorporating a Ti-sponge furnace and a liquid nitrogen trap. Afterwards the purified gases were drawn into a second clean-up section on activated charcoal containing a Ti/Zr sponge furnace. A small aliquot of the gas was then tested on the mass spectrometer for purity before it was analyzed. Argon isotopes were measured on a modified AEI MS10 mass spectrometer fitted with computer-controlled peak switching, and the digital output was stored on disk before being processed. Errors were estimated by taking the percentage of difference among the replicate argon determinations on samples <20 Ma, plotted as a function of radiogenic ^{40}Ar, and the best curve through these data was used to estimate the errors in individual analyses. This method was developed by analyzing over 100 duplicate Ar measurements on volcanic rocks between 0.1 and 20 Ma, with varying amounts of atmospheric Ar contamination, and was found to give the most realistic error estimates. International standards were analyzed and atmospheric argon ratios were determined on a regular basis. Ages were calculated using the decay constants and branching ratio agreed on by the UGS Subcommission on geochronology (Steiger and Jäger, 1977).

COMMENTS

Petrographic observations and the generally low proportion of radiogenic Ar in most samples (except the Site 833 sill basalts) suggest that most dated rocks from Leg 134 are slightly altered, despite care being taken to select the best available material. Progressive alteration and Ar loss may result in ages that are too young, or if the rocks were glassy, incorporation of excess argon in the deep marine environment may yield ages that are too old. Interpretation of the ages of these samples must be made with caution and wherever possible with geological and paleontological checks and control.

REFERENCES*

Steiger, R.H., and Jäger, E., 1977. Subcommission on geochronology: convention on the use of decay constants in geo- and cosmochronology. *Earth Planet. Sci. Lett.*, 36:359–362.

* Abbreviations for names of organizations and publications in ODP reference lists follow the style given in *Chemical Abstracts Service Source Index* (published by American Chemical Society).

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Table 1. K-Ar age data from Leg 134.

Core, section	Rock type	K (%)	Vol ^{40}Ar rad (ccSTP × 10^{-5}/g)	^{40}Ar rad (%)	Age (Ma)	
134-						
828A-15N-1	Basaltic clast in volcanic breccia	0.253	0.0186	8.5	18.7 ± 2.0	1
			0.0184	7.9		
828A-15N-2	Basaltic clast D'Entre casteaux Ridge	0.379	0.0152	8.4	10.6 ± 1.0	2
			0.0162	6.0		
829A-59R-1	Diabase clast from breccia	0.055	0.0024	2.5	9.8 ± 3.0	3
			0.0015	1.6		
829A-061R-1	Diabase/micro-gabbro	0.065	0.0064	5.6	26.7 ± 2.0	4
			0.0096	5.4		
831B-73R-2	Andesite clast	0.557	0.0575	49.3	27.0 ± 1.0	5
			0.0604	43.9		
831B-84R-1	Andesite	0.620	0.0903	35.2	37.0 ± 1.1	6
			0.0899	32.8		
832B-55R-4	Basaltic clast	0.818	0.0084	4.6	2.8 ± 0.8	7
			0.0095	2.5		
832B-57R-2	Basaltic clast	0.782	No radiogenic argon	-	-	8
832B-100R-3	Basaltic clast	0.404	0.0082	6.0	5.66 ± 0.85	9
			0.0096	2.3		
833B-34R-2	Basaltic clast	0.269	No radiogenic argon	-	-	10
833B-36R-1	Basaltic clast	0.583	0.0004	0.6	0.4 ± 0.4	11
			0.0015	2.0		
833B-82R-4	Basalt sill	1.709	0.0245	14.0	3.30 ± 0.30	12
			0.0194	9.8		
833B-99R-5	Basalt sill	2.734	0.0393	37.5	3.65 ± 0.18	13
			0.0383	46.1		

Note: Full petrographic details of the analysed samples can be found in the "Igneous Petrology and Geochemistry" sections (this volume).