36. ^{40}AR—^{39}AR GEOCHRONOLOGICAL STUDIES OF DRILLED BASALTS FROM LEG 51 AND LEG 52

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We have applied a ^{40}Ar$-^{39}$Ar stepwise degassing dating method to seven samples recovered during Legs 51 and 52. These are from Hole 417D, Cores 22, 29, 48, and 60, and from Hole 418A, Cores 46, 48, and 85. The samples have an extremely low K content (generally less than 0.05%) and, except for Core 417D-22, we could not get meaningful age information on these samples. Thus, we report here the results from Core 417D-22 only.

The sample studied is from Leg 51, Hole 417D, Core 22, Section 3, Interval 134-139 cm. The sample is very fresh. Petrological descriptions are given in the Appendix (this chapter), which were made by Dr. T. Ui, Kobe University.

The sample was cut into a cylindrical form (8 mm diameter, about 1 cm in length) put in a quartz tube (1 cm diameter, 10 cm in length) with K_2SO_4 and two standard samples and was subjected to fast neutron irradiation of about 10^{18}. The standard sample used is JG1 biotite (K =6.34%, t = 94.8 m.y.). Correction factors for K-induced Ar isotopes were determined on the K_2SO_4 and those for Ca-induced ones on CaF_2 which was irradiated in the same cycle but in a different quartz tube. Corrections for the interfering Ar isotopes were negligible in the age calculation. Experimental procedures are the same as those described previously (Saito and Ozima, 1977). Experimental data including the correction factors are given in Table 1.

Figure 1 shows the experimental results represented both in an apparent age spectrum and an isochron plot. As seen in the figure, the age spectrum is highly distorted. Also, the data are quite dispersed in the isochron diagram. However, if we discard the two fractions, i.e., the 700° and 1000°C fractions, the remaining five fractions lie approximately on a straight line, which is close to a 120-m.y. reference isochron. Since the sample was drilled from basaltic basement, which is overlain by early Aptian sediment (123 to 117 m.y., Armstrong and McDougal, 1974), the face value isochron age is perfectly consistent with the fossil age. It is surprising that the isochron plot still appears to retain vaguely the original age of the sample in spite of the evident geological disturbances on the ^{40}AR—^{39}AR systematics. The anomalously high apparent ages at 700° and 1000°C are then more likely to be due to some "strayed radiogenic ^{40}Ar" rather than reminiscent of the older age of the sample.

The face value isochron age is slightly older than the assumed age for the magnetic anomaly lineation M0 (109 m.y.), on which the sample was drilled. In view of the clear evidence of some geological disturbances on the ^{40}Ar$-^{39}$Ar systematics, however, it seems to be premature to suggest that the age difference is real. Here, we may only conclude that the ^{40}Ar$-^{39}$Ar systematics on Core 417D-22 is not inconsistent with the age of the oceanic crust at the site as concluded from the paleontological and magnetic anomaly studies.

REFERENCES

Armstrong, R.L. and McDougal, 1974. Proposed refinement of the phanerozoic time scale, Abstract, Int. Mtg. Geochron. Cosmochron. Isotope Geol., Paris.

Saito, K. and Ozima, M., 1977. ^{40}Ar$-^{39}$Ar geochronological studies on submarine rocks from the western Pacific area, *Earth Planet. Sci. Lett.*, v. 33, p. 353-369.

APPENDIX

Sample 417D-22-3, 134-139 cm

Plagioclase-phyric basalt with intersertal groundmass. Phenocryst: plagioclase, olivine, and clinopyroxene. Plagioclase phenocryst is euhedral to subhedral with glassy inclusions. Olivine phenocrysts occur only as pseudomorph. Clinopyroxene phenocryst is rare, anhedral rounded form. Groundmass consists of clinopyroxene, plagioclase, olivine, opaque minerals, and interstitial glass. All crystalline phases in groundmass show quench texture. Part of clinopyroxene, and all of olivine and glass replaced to brownish secondary minerals. Vesicles are filled with smectite or brownish secondary minerals and veinlets are filled with carbonates, greenish and brownish secondary minerals. Modal composition of the sample is as follows: plagioclase 6.9 per cent, clinopyroxene 0.5 per cent, olivine 0.9 per cent, groundmass 91.2 per cent, vesicle 0.2 per cent, and veinlet 0.3 per cent. (See Figure 2.)

TABLE 1

Experimental Data and Correction Factors

Temperature (°C)	^{40}Ar/^{36}Ar	(% error)	^{39}Ar/^{36}Ar	(% error)	^{37}Ar/^{36}Ar	(% error)	^{39}Ar Fraction (%)	Apparent Age (m.y.)
600	325.5	(1.4)	4.23	(6.3)	2.43	(2.2)	14.8	98.6 ± 6.4
700	404.3	(7.1)	7.84	(2.6)	24.9	(2.3)	22.7	160.8 ± 3.1
800	410.7	(3.3)	12.30	(3.8)	222.3	(3.4)	28.4	121.9 ± 5.1
900	374.1	(3.6)	9.25	(5.7)	323.7	(3.9)	12.6	113.3 ± 6.8
1000	463.1	(3.9)	9.72	(5.5)	658.3	(3.9)	12.7	185.3 ± 6.7
1100	430.3	(3.1)	16.9	(4.2)	1741.0	(3.2)	6.6	108.1 ± 5.2
Fusion	441.4	(9.7)	15.67	(10.0)	4100.0	(10.2)	2.1	121.6 ± 13.9

Note: Total fusion age = 125.8 m.y. J = 0.087594 $(^{39}Ar/^{37}Ar)_{Ca} = 1.6 \times 10^{-3}$; $(^{36}Ar/^{37}Ar) = 3.8 \times 10^{-4}$; $(^{40}Ar/^{39}Ar)_K$ 6×10^{-2}; $\lambda = 5.543 \times 10^{-10}$ y^{-1}; $\lambda_e = 0.581 \times 10^{-10}$ y^{-1}; $^{40}K/K = 1.167 \times 10^{-4}$.

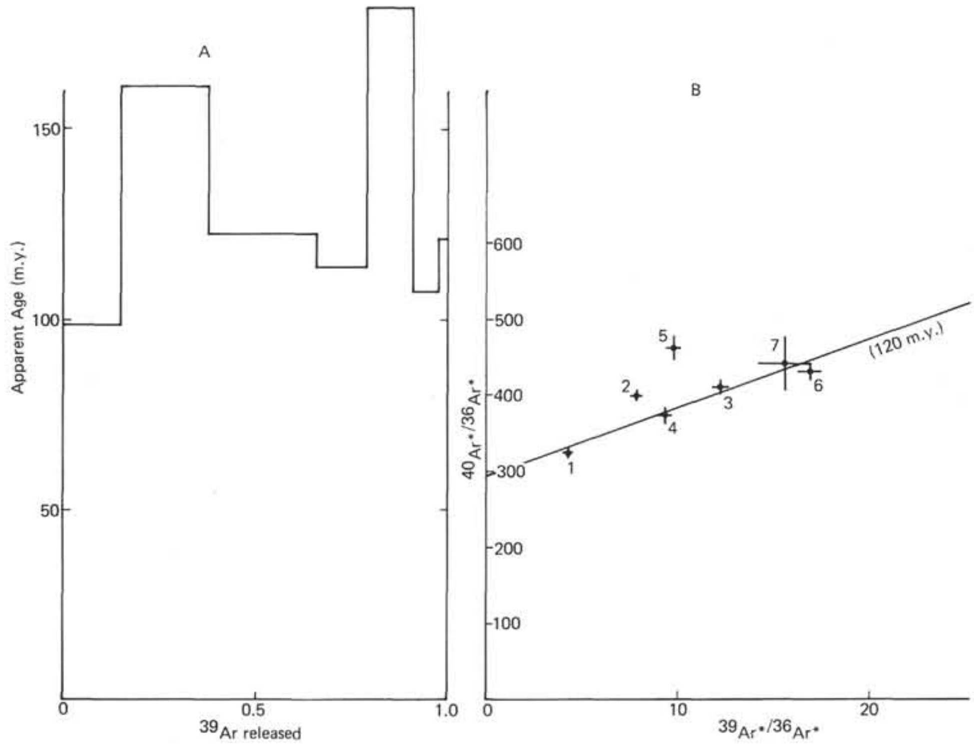

Figure 1. *Experimental results, representing (A) apparent age spectrum, and (B) isochron plot. Data obtained from Sample 417D-22-3, 134-139 cm.*

Figure 2. *Photomicrograph of the analyzed Sample 417D-22-3, 134-139 cm, under plane light. Horizontal dimension is 3.1 mm.*