

K-Ar Ages of Osuzuyama Acid Rocks, Kyushu, Japan

By

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Abstract

K-Ar age of a rhyolite of the Osuzuyama acid rocks is 15 ± 2 m.y. by the whole rock method. K-Ar age of biotite from Kijo granite which is exposed close to the Osuzuyama acid rocks is 13 ± 2 m.y. Both ages are correlated to late Miocene.

Geological setting

There is a vast exposure of rhyolitic rock in Mt. Osuzuyama and its neighbourhood. It is composed of various facies, such as rhyolite and granophyre, light- and dark-colored, porphyritic and non-porphyritic. It is lavas and welded tuffs, containing abundant inclusions partly. It is in some part, intruded into conglomerate of Iorigawa formation of middle Miocene and in another part it is covered by the same formation. So, the relation of the Osuzuyama rhyolite and Iorigawa formation is complicated and is supposed to be nearly coeval.

Outside of the Osuzuyama rhyolite mass, there are exposed small granite masses in form of stock or dike. They are relatively homogeneous granodiorite or granite, poor in inclusion. They are intruded into sandstone or shale of Nichinan group, giving contact metamorphism. Their distribution is just surrounding the Osuzuyama rhyolitic mass and suggests a close genetical relation each other. One of them is typically exposed in Kijo.

Description of the determined samples

(1) Rhyolite (TN 53031307)

Tanoharu, Mimitsu-cho Koyu-gun, Kagoshima pref.

It is light-colored, heterogeneous rhyolite, with green-colored clots sporadically.

Under the microscope, it is porphyritic with phenocryst of plagioclase, quartz and chloritized biotite. Plagioclase is long prismatic, 2~4 mm, and is twinned and zoned and is nearly oligoclase in composition. Quartz is idiomorphic, 1~3 mm across, often corroded. Matrix is composed of feldspar and quartz and makes irregularly valved alternation of coarse- and fine-grained bands. In coarse-grained band, graphic structure is common and fine-grained band is composed of fine-grains, under 0.01 mm across.

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(2) Biotite granodiorite (TN 53030902)

Kijo, Takanabe-cho, Koyu-gun, Miyazaki pref.

It is a light-colored, medium-grained granodiorite and is relatively uniform with rare inclusion.

Under the microscope, it is mainly composed of biotite, plagioclase, quartz and potassium feldspar with small amount of iron ore, apatite, sphene and zircon. Biotite is nearly fresh with altered rim partly. Biotite is round, 1 mm across, giving pleochroism, X : nearly colorless, Y, Z : reddish brown. Plagioclase is hypidiomorphic, 2~3 mm across, and is twinned and zoned and is about oligoclase in composition. Potassium feldspar, irregular in shape, commonly 1~2 mm across, often shows graphic intergrowth with quartz. Quartz is allotriomorphic, 2~3 mm across. Rarely muscovite forms small aggregates, sporadically.

Experimental procedure

The determination of the Osuzuyama rhyolite was made by the whole rock method, and that of the Kijo granite was made on biotite. Biotite was isolated with an isodynamic separator after crushing and sieving of the rock sample.

Argon was extracted and purified in the pyrex high vacuum system. Each sample was fused in a molybdenum crucible at about 1300°C for 30 minutes with an induction heater. The Ar³⁸ spike was added during fusion, and argon was purified from other gases with hot titanium sponge. Isotopic ratios of argon were measured by the static operation on the Mitsubishi MS-315G mass spectrometer, which is Reynolds-type with 15 cm-radius 60°-sector analyzer.

Potassium was determined by flame photometry. Each sample was digested with hydrofluoric acid and hydrochloric acid, and then the residue was dissolved in hydrochloric acid diluted to a standard volume, and the potassium content of the solution was measured with the Hitachi EPU-2 flame photometer. The constants used in the calculations are : $\lambda_{\beta} = 4.72 \times 10^{-10} \text{yr}^{-1}$, $\lambda_{\alpha} = 0.584 \times 10^{-10} \text{yr}^{-1}$, and $\text{K}^{40}/\text{K} = 0.0119\%$.

The results of the determination are given in the following table.

Table K-Ar ages of Osuzuyama rhyolite and Kijo granite

Sample No.	Mass	Mineral	K ₂ O	Atmospheric contamination	Age and error
(1) TN53031307	Osuzuyama	(whole rock)	4.02%	59.8%	15±2 m.y.
(2) TN53030902	Kijo	biotite	5.07	37.1	13±2

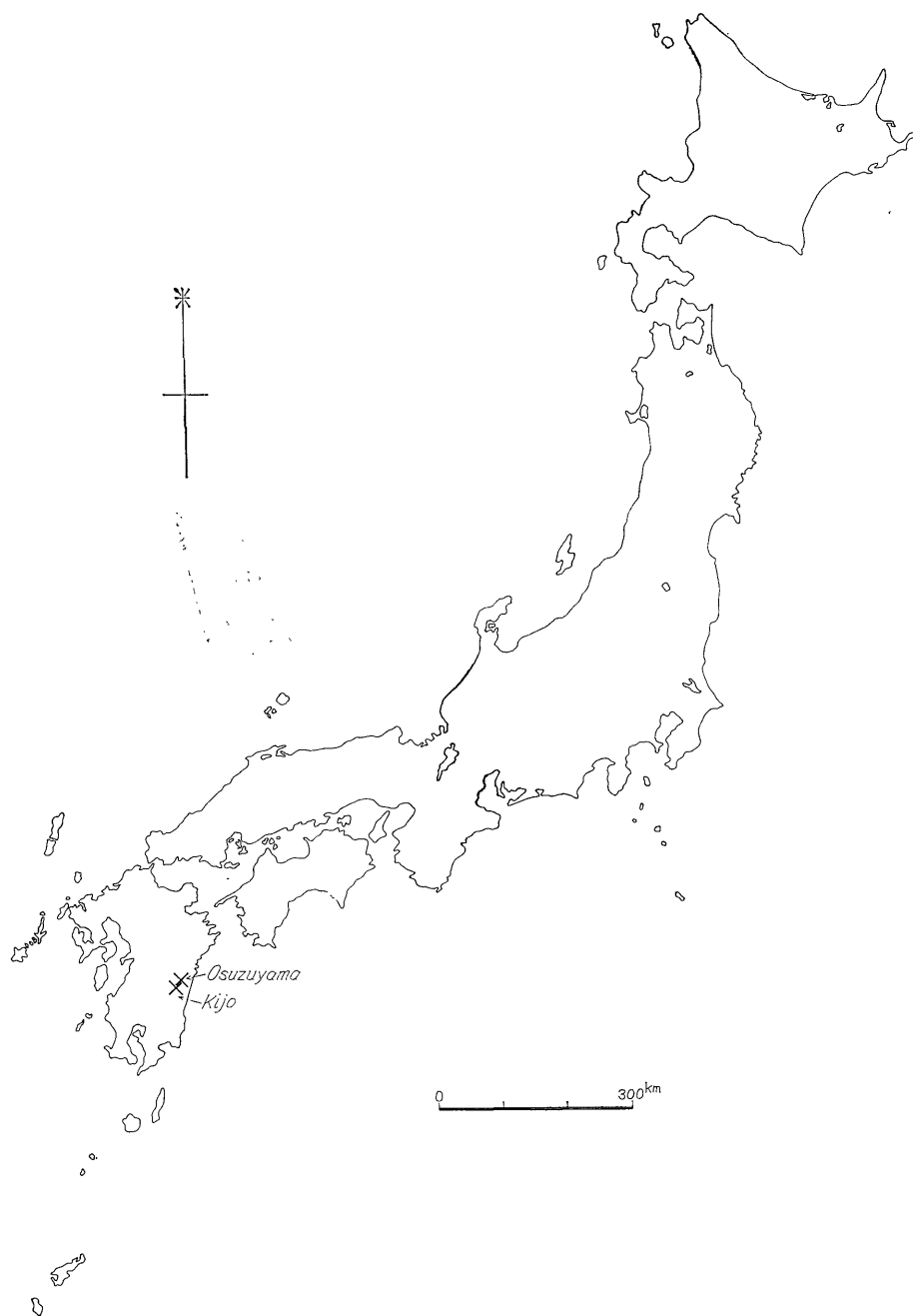


Figure 1 Index to Osuzuyama and Kijo area

Geological meaning of the results

The ages, 15 and 13 m. y. of the rhyolite and granite mean nearly coeval relation and both are correlated to late Miocene. No geological evidence is contradictory

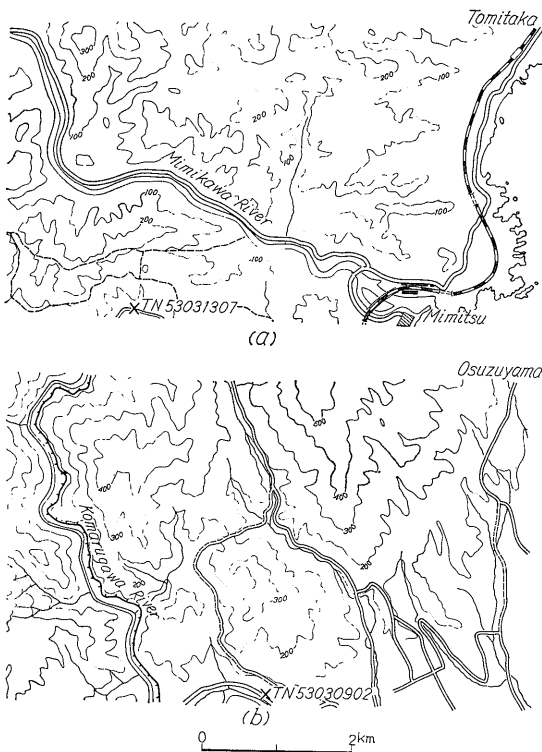


Figure 2 Sample localities on the 1/50,000 topographic map
(a) Osuzuyama area (b) Kijo area

九州，尾鈴山酸性岩の K-Ar 年令

柴田 賢・野沢 保

要 旨

尾鈴山酸性岩中の流紋岩を全岩試料で測定すると、K-Ar 法で 15 ± 2 m. y. になり、付近の木城の花崗岩の黒雲母は、 13 ± 2 m. y. になる。いずれも、中新世末期に相当する。

to the results. There are two groups of granitic rocks in the Outer Zone of Southwest Japan from the standpoint of isotope geochronology, one about 14 m. y. and the other about 20 m. y. The Osuzuyama rhyolite and Kijo granite seem to belong to the younger group.

Literature

Miyazakiken(1963) : Geology and underground resources of Miyazaki prefecture. Miyazaki prefecture (in Japanese).

NOZAWA, T. and KINO, Y. (1956) : *Geological map of Japan, 1/50,000, Tomitaka, and its explanatory text.* Geol. Surv. Japan (in Japanese with English abstract).

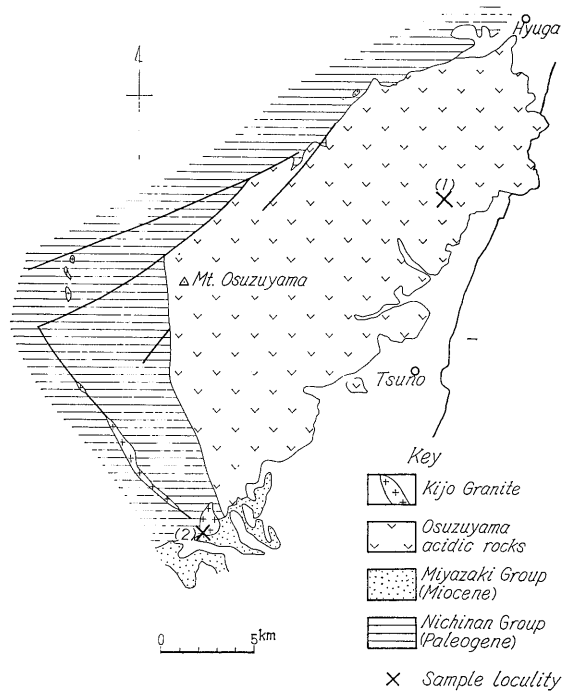


Figure 3 Geological map of the Osuzuyama and Kijo area (after Miyazakiken, 1963)