550.93 : 552.321(521.77) : 551.782.1

K-Ar Age of Ominesan Acid Rocks, Kishu, Japan

By

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Abstract

K-Ar age of biotite from a granodiorite of Mt. Sanjogatake which is a member of the Ominesan acid rocks is 14±2 m.y. and is correlated to late Miocene.

Geological setting

Near Mt. Sanjogatake, Kii peninsula, there is exposed a small mass of granitic rocks, which is a member of the Ominesan acid rocks. Most of the Ominesan acid rocks are made of rhyolitic rock and the Sanjogatake granitic rock represents their plutonic facies. The Sanjogatake granite comprises various facies, tonalite, granodiorite, adamellite and aplitic granite. Tourmaline aplite is conspicuous.

The Sanjogatake granite is intruded into sandstone formation of Hidaka group (Shimanto group), which is suggested to be of Jurassic or Triassic age after SHIIDA (1962). However, the southern extension of the Omine acid rocks is intruded into the Kumano group, Miocene. So, the Sanjogatake granite, is supposed to be of post Miocene age, probably of middle Miocene age.

Description of the determined samples

(1) Fine-grained porphyritic granodiorite (TN 66121108)

Kosedani, Tenkawa-mura, Yoshino-gun, Nara pref.

It is a relatively dark-colored, fine-grained, porphyritic granodiorite.

Under the microscope, phenocrysts are plagioclase and quartz and matrix is composed of biotite, plagioclase, quartz and potassium feldspar with subordinate amount of iron ore, apatite and zircon. Phenocrystic plagioclase is hypidiomorphic, 2~4 mm across, twinned, zoned and partly replaced by potassium feldspar. Phenocrystic quartz is hypidiomorphic, round-shaped, 1~2 mm across, with abundant cracks. Plagioclase in the matrix is elongated and hypidiomorphic, 0.2~0.5 mm long, twinned, indistinctly zoned and is about oligoclase in composition. Biotite is tabular, 0.1~0.3 mm across, a little altered, with pleochroism, X : nearly, colorless, Y, Z : brown. Quartz is granular, 0.5~1.0 mm across. Potassium feldspar is relatively small in amount, interstitial, but rarely porphyroblastic, round idiomorphic crystals are found.

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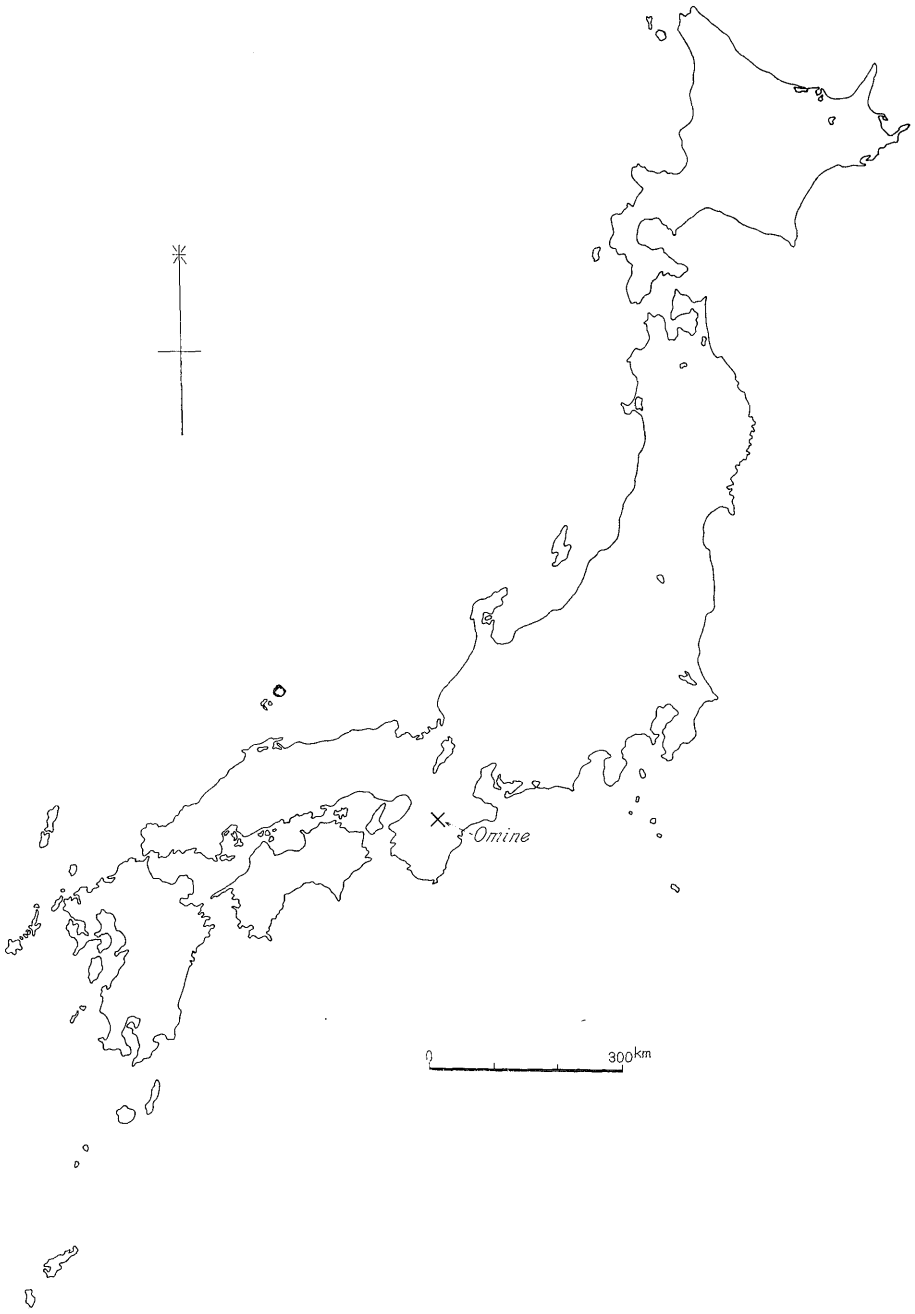

Figure 1 Index to Ominesan area

Experimental procedure

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

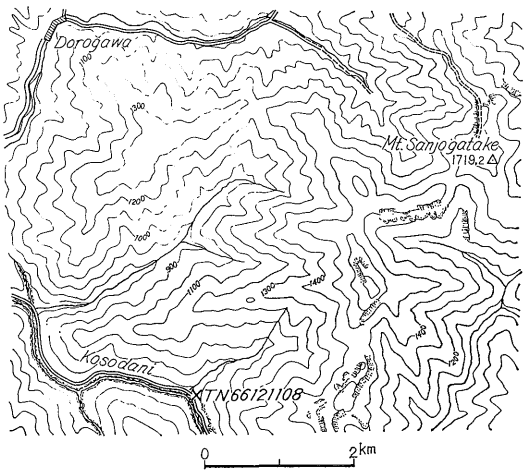

Figure 2 Sample locality on the 1/50,000 topographic map (Sanjōgatake)

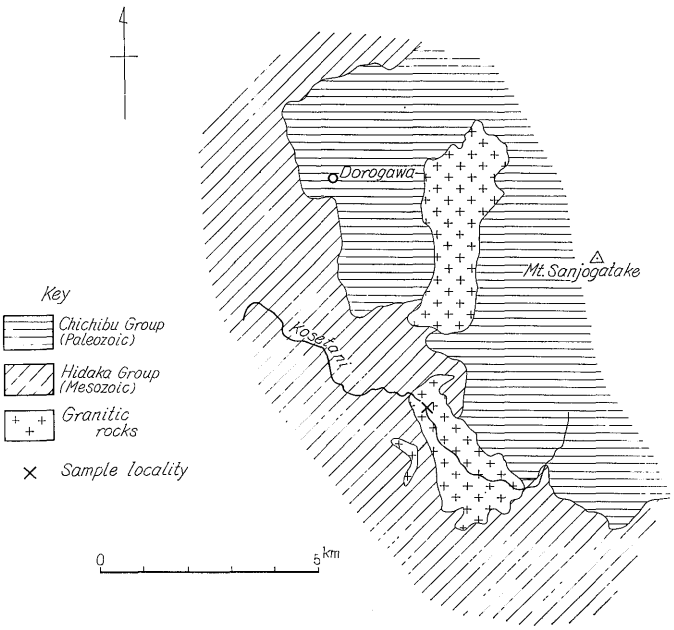

Figure 3 Geological map of the Sanjōgatake area (after SHIIDA, 1962)

was fused in a molybdenum crucible at about 1300°C for 30 minutes with an induction heater. The Ar^{38} 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-315 G 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 hydro-

chloric acid, diluted to a tsandard volume, and the potassium content of the solution was measured with the Hitachi EPU-2 flame photometer.

The constants used in the calculations are : $\lambda_\beta = 4.72 \times 10^{-10}$ yr^{-1}, $\lambda_e = 0.548 \times 10^{-10}$ yr^{-1}, and $k^{40}/K = 0.0119\%$.

The result of the determination is given in the following table.

Table K-Ar age of Sanjogatake granodiorite

Sample No.	Mineral	K_2O	Atmospheric contamination	Age and error
TN 66121108	biotite	7.75%	62.3%	14±2 m. y.

Geological meaning of the results

The age, 14 m. y. is correlated to late Miocene. It is not inconsistent with any geological evidences and is in good coincidence with the isotopic age of the Kumano acidic rocks and granitic rocks of the Outer Zone of Southwest Japan.

In Kii peninsula, there are exposed two acid rocks of similar character and age, Miocene. One is the Ominesan rock series which runs in north to south direction and the other is the Kumano rock series which runs in northeast to southwest direction. After SHIIDA (1962), tectonic direction in this region runs in two directions, north to south and northeast to southwest, which are in nearly coincidence with the intrusion direction of the Miocene acid igneous activities. Though these two tectonic directions are supposed to be formed in different chronological stage, igneous activities influenced by their direction are nearly of one isotopic age.

Literature

SHIIDA, I. (1962) : Stratigrapical and geotectonic studies of the Paleozoic Chichibu and the Mesozoic Hitaka (Shimanto) terrains in the central part of the Kii Mountainland, Southern Kinki, Japan. Research Bulletin, no. 5, Separate Volume (1), Dept. General Education, Nagoya Univ.

紀州大峰山酸性岩の K-Ar 年令

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要 旨

山上岳の花崗閃緑岩の黒雲母による K-Ar 年令は 14±2 m. y. で，ほぼ中新世末期に相当する。