

**K-Ar Ages of Acid Rocks of Noma-misaki and  
Hioki Mountains, Kyushu, Japan**

By

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**Abstract**

K-Ar age of a granophyre of Noma-misaki is  $12 \pm 2$  m. y. by the whole rock method. K-Ar age of biotite from granite at Mukaeyama in the Hioki mountains is also  $12 \pm 2$  m. y. Both are correlated to early Pliocene.

**Geological setting**

In peninsula of Noma-misaki, there is exposed a rhyolitic rock associated with Mesozoic sediments. Both rhyolite and Mesozoic sediments are covered by Quaternary sediments and volcanics. The Noma-misaki rhyolite is intruded into Kozakiyama formation (HASHIMOTO, 1962), which is supposed to be of Cretaceous age and a member of Shimanto group. The Noma-misaki rhyolite is composed of various facies of rhyolitic rocks, such as light-colored rhyolite, grey-colored granophyre, fine-grained granitic rock and quartz porphyry (Fig. 2-a, Fig. 3-a).

About 20 km northeast of Noma peninsula, there are exposed a number of small masses of rhyolite and granite scattered in a area about 15 km across. They are all alike, intruded into sediments of Shimanto group. One of them, the largest one, is exposed in Hioki mountains. In Mukaeyama of Hioki mountains, an association of rhyolite and granitic rocks is found. Both are intruded into a formation of sandstone and shale, giving contact metamorphism. (Fig. 2-b, Fig. 3-b)

**Description of the determined samples**

(1) Granophyre (TN 67022103)

Akogi, Kasasa-cho, Kawabe-gun, Kagoshima pref.

It is a greenish grey-colored granophyre with conspicuous phenocryst of feldspar. It is strongly altered.

Under the microscope, it is composed of quartz, plagioclase, and biotite as phenocryst and its matrix is made of fine-grained aggregation of quartz and potassium feldspar, about 0.02 mm across. Phenocrystic quartz is round-shaped hypidiomorphic, 2~3 mm across. Plagioclase is idiomorphic, 10~12 mm across, twinned and zoned and is about basic oligoclase in composition. Biotite is entirely chloritized, 2~4 mm across. In matrix, often spherulite is formed.

(2) Fine-grained porphyritic granite (TN 67022203)

Somi, Hiyoshi-cho, Hioki-gun, Kagoshima pref.

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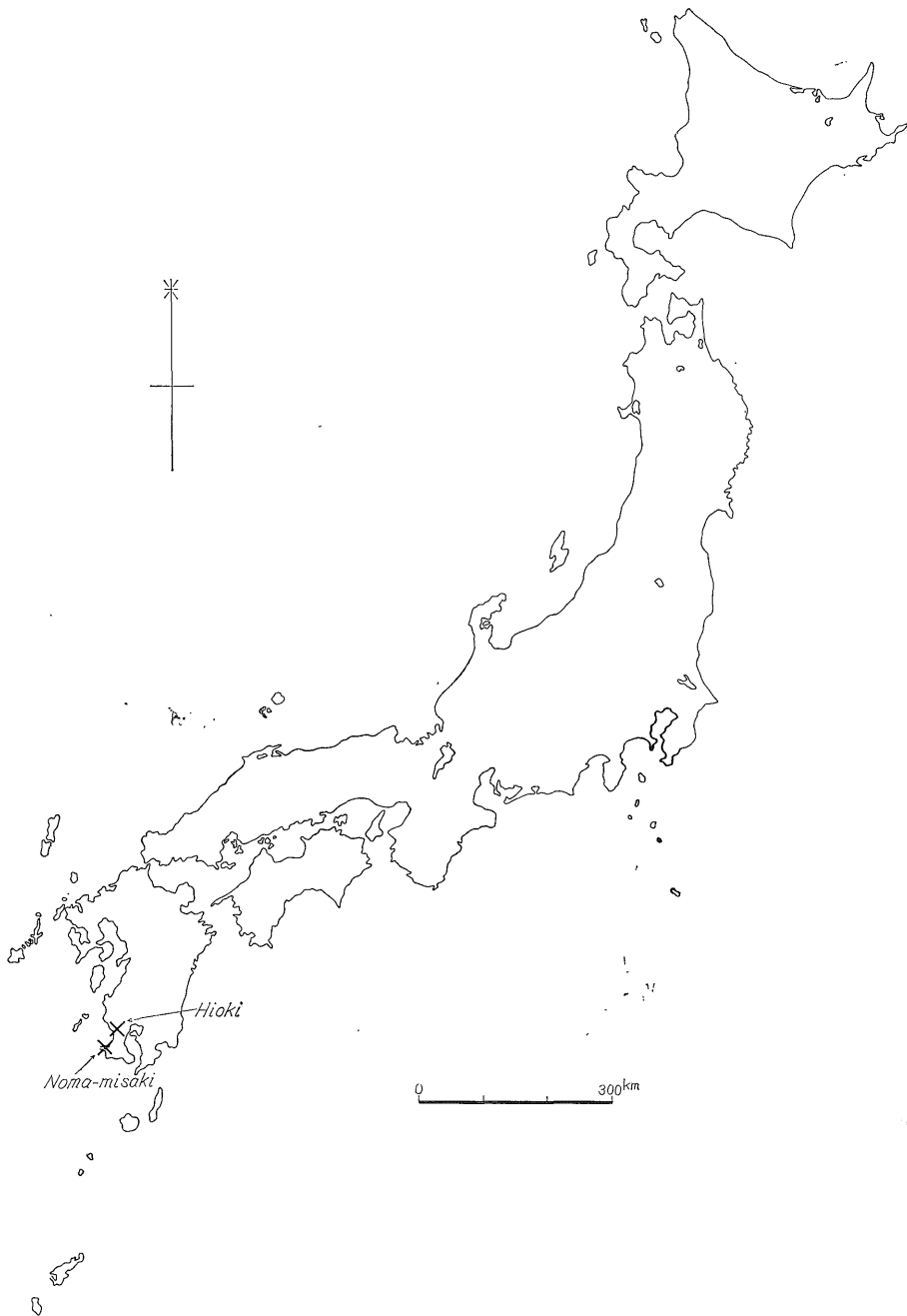


Figure 1 Index to Hioki and Noma-misaki areas

It is a light-colored, fine-grained porphyritic granite, homogeneous, poor in inclusion. Under the microscope, its phenocryst is plagioclase, quartz and biotite. Plagioclase

is idiomorphic, 10~15 mm across, twinned and zoned, and its composition is nearly basic oligoclase. Quartz is hypidiomorphic, 3~5 mm across, often corroded. Biotite is flaky, 1~2 mm across, a little altered, with pleochroism, X : nearly colorless, Y, Z : brown. Matrix is holocrystalline and is composed of fine-grained aggregate of granular quartz, about 0.5 mm across, hypidiomorphic plagioclase, about 1 mm across, and interstitial potassium feldspar, 0.5~1.0 mm across.

### Experimental procedure

The determination of the granophyre of Noma-misaki was made by the whole rock method and that of the rhyolite of Mukaeyama 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 Ar<sup>38</sup> 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 :  $\lambda_{\beta} = 4.72 \times 10^{-10} \text{ yr}^{-1}$ ,  $\lambda_{\gamma} = 0.584 \times 10^{-10} \text{ yr}^{-1}$ , and  $K^{40}/K = 0.0119\%$ .

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

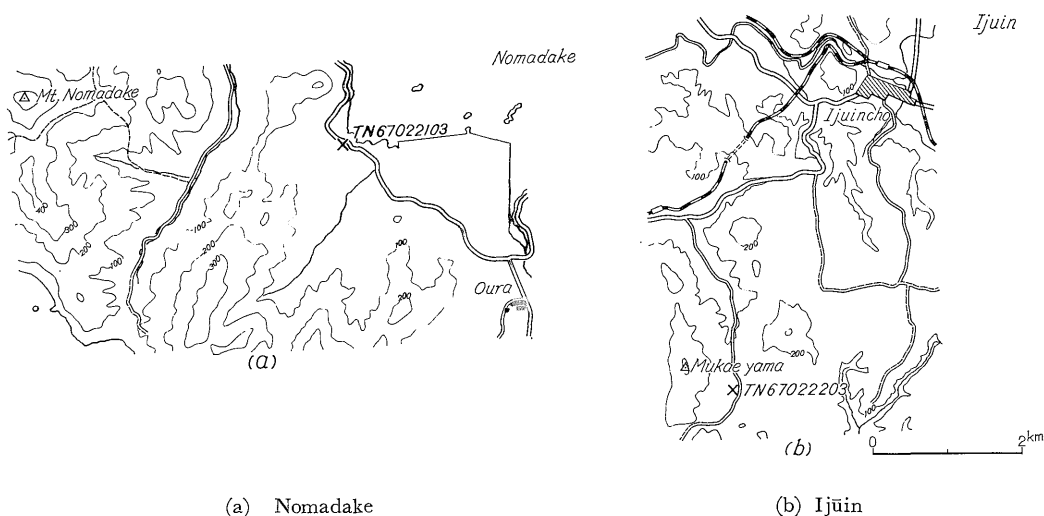


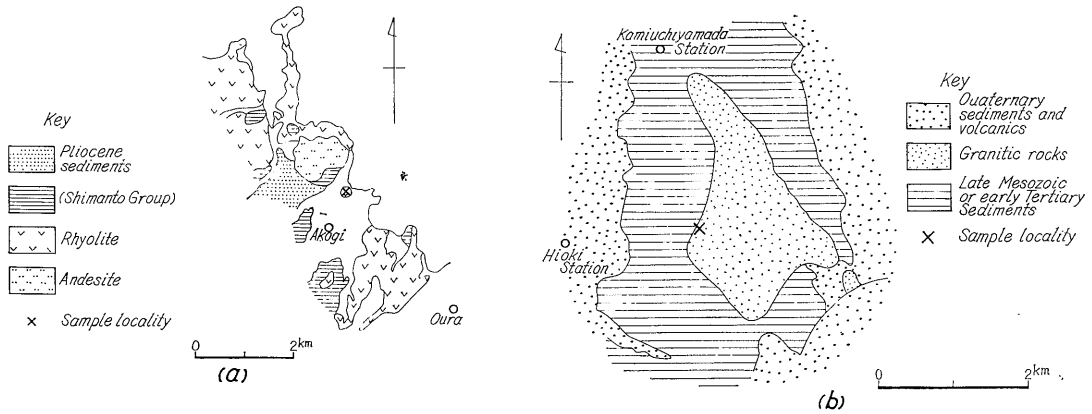
Figure 2 Sample localities on the 1/50,000 topographic map

Table K-Ar ages of granophyre of Noma-misaki and granite of Hioki

Sample No.	Mass	Mineral	K <sub>2</sub> O	Atmospheric contamination	Age and error
(1) TN 67022103	Noma-misaki	(whole rock)	4.46%	40.4%	12±2 m.y.
(2) TN 67022203	Hioki	biotite	2.92	76.0	12±2

Geological meaning of the results

The age, 12 m. y. is correlated to early Pliocene. No geological evidence is contradictory to the result in both cases, Noma-misaki granophyre and Mukaeyama granite. There are two groups of acid igneous activity in the Outer Zone of Southwest Japan, discriminated by isotopic chronology, one about 20 m. y. and the other about 14 m. y. The igneous activities of Noma-misaki rhyolite and Mukaeyama granite seem to belong to the younger group.



(a) Noma-misaki area (after IHARA, 1934) (b) Mukaeyama area (after NANGO, 1962)

Figure 3 Geological map

Literature

HASHIMOTO, I. (1962) : Geological succession and structure of the Mesozoic strata in the neighbourhood of Noma-ike, Kagoshima prefecture. *Rept. Earth Science, Dept. General Education, Kyushu Univ.*, vol. 8, p. 63~70.  
 IHARA, K. (1934) : *Geological map of Japan, 1/75,000, Kaseda, and its explanatory text*. Geol. Surv. Japan (in Japanese with English abstract).  
 NANGO, H. (1962) : Geology of Hioki mountains. Kagoshima-chigaku-kaishi (in Japanese).

九州、野間岬と日置山地の酸性岩の K-Ar 年令

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要 旨

野間岬の文象斑岩の全岩試料による K-Ar 年令は12±2 m. y. で、日置山地の花崗岩の黒雲母も、12±2 m. y. である。いずれも、鮮新世初期に相当する。