

K-Ar Age of Muscovite from the Crystalline Schist of the Northern Ishigaki-shima, Ryukyu Islands

By

Ken SHIBATA*, Kenji KONISHI** & Tamotsu NOZAWA***

Abstract

K-Ar age of muscovite from muscovite-quartz schist of Tumuru formation, Ishigaki-shima is 174 m.y. It is correlated to early Jurassic.

Geologic setting

The metamorphic terrane in southwestern Ryukyu Islands (i. e. Sakishima Island Group) is represented by the crystalline schists of the Tumuru formation (FOSTER et al., 1960; FOSTER, 1965). The formation crops out at the northern part of Ishigaki-shima, northeastern coast of Iriomote-shima, and the satellite islet,

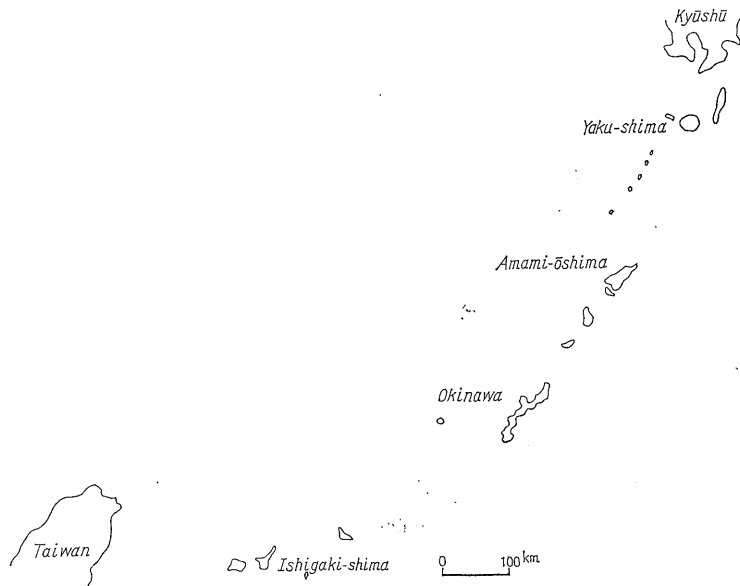


Fig. 1 Index to Ishigaki-shima

Obama-shima. The crystalline schists of the formation are characterized with glaucophane schists of the central Ryūkyu Islands (i. e. Okinawa-Amami Island Group) (KONISHI, 1963; FOSTER, 1965). In order to shed more light on the metamorphic history of the Ryūkyu Islands, therefore, it was designed to deter-

* Geochemistry & Technical Service Department
** Kanazawa University
*** Geology Department

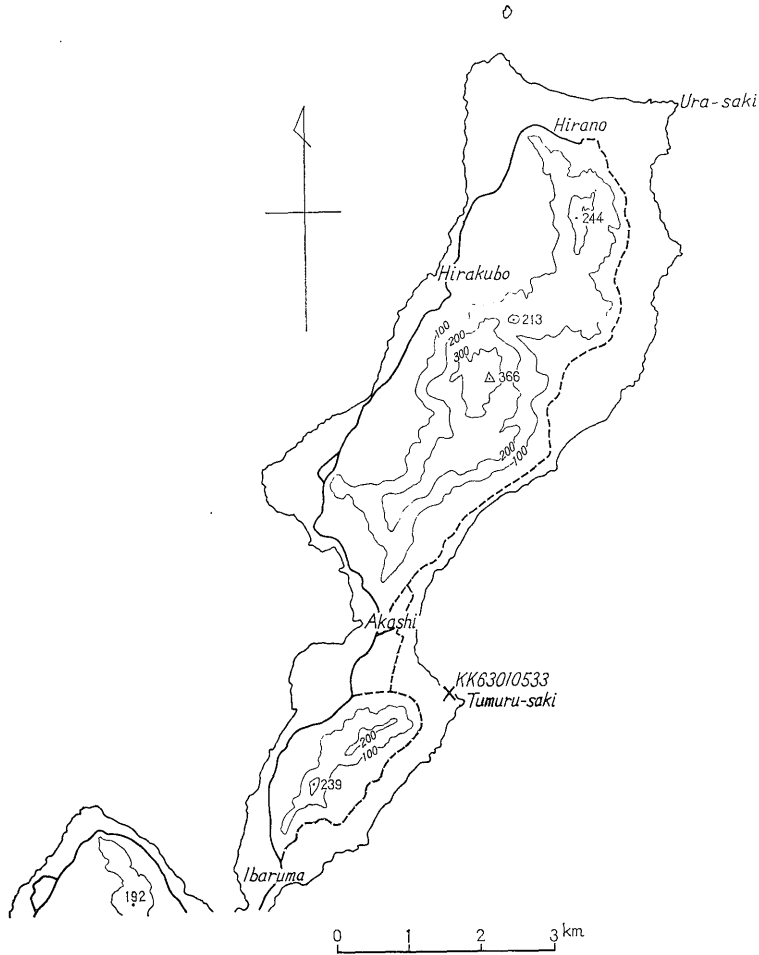


Fig. 2 Sample locality

mine radiometrically the time when metamorphism took place. The dated sample of garnet-chlorite-muscovite-quartz schist was taken from Tumuru-saki, about 1350 m southeast of Akashi, where the type section of the Tumuru Formation was designated by (ibid.). It was from the same stratigraphic interval described by FOSTER (ibid., p. 15) as light-gray quartz-mica schist of 91.5 m thick. A muscovite sample was separated from the schist and analyzed for K-Ar age determination in the laboratory of the Geological Survey of Japan.

Description of the determined sample

Garnet-chlorite-muscovite-quartz schist (KK63010533)

Turumu-saki, Ohama-cho, Ishigaki-shima, Ryukyu.

It is a pale green-colored schist with irregular quartzose lamellae. Under the microscope, it is composed of frequent alternation of quartzose band and muscovite-rich band. Quartzose band is made up of mozaic quartz, $0.1 \pm \text{mm}$ a-

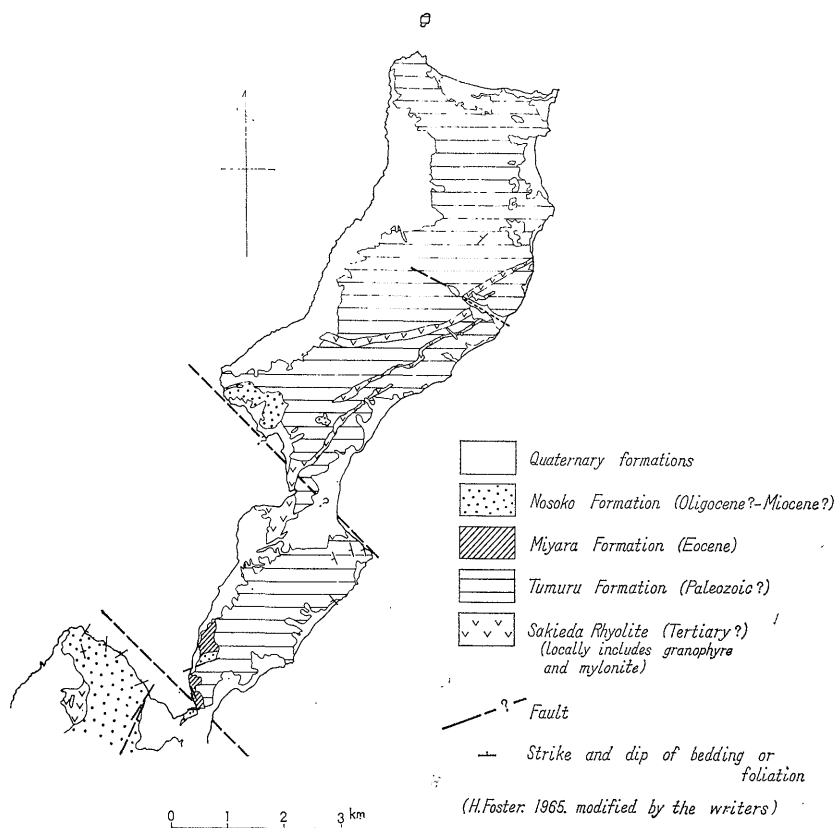


Fig. 3 Geologic map of northern Ishigaki-shima

cross, with subordinate amount of muscovite flakes sporadically. Muscovite-rich band is composed of muscovite, garnet and quartz. And small amounts of leucoxene and hematite are contained, too. Chlorite is rarely found along cracks or in veins. Garnet is round-shaped or hypidiomorphic, $0.05 \pm$ mm across, with abundant cracks.

Experimental procedure

Muscovite 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^{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-315G mass spectrometer, which is a Reynolds-type with 15cm-radius 60° -sector analyzer.

Potassium was determined by flame photometry. Each sample was digested with hydrofluoric acid and hydrochloric acid, 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: $\lambda\rho=4.72\times 10^{-10}\text{ yr}^{-1}$, $\lambda e=0.584\times 10^{-10}\text{ yr}^{-1}$, and $K^{40}/K=0.0119\%$. The result of K-Ar age determination is given in Table 1.

Table 1 K-Ar age of schist from Ishigaki-shima

Sample No.	Mineral	K ₂ O (%)	Volume of radiogenic Ar (mm ³ /g)	Atmospheric contamination (%)	Age (million years)
Y-33 (KK63010533)	muscovite	4.19	0.0253	20.8	174±9

Discussions

If the calculated age can be accepted as the reliable one and compared with the isotopic age determinations so far published on the Japanese crystalline schists, the Tumuru schist of Ishigaki-shima may be characterized with its radiometric age older than those of the Sanbagawa crystalline schists in Southwest Japan (BANNO, 1964). The fact may impose a speculation that some formation with a metamorphic history correlative with the Tumuru schist might be represented within either Sangun or Hida Metamorphic Belt of Southwest Japan. Until more dates on Tumuru schist are measured, no further commitment would be warrantable to the temporal relationship of metamorphic terranes between the Ryukyu Islands and Southwest Japan.

References

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石垣島北部の結晶片岩の K-Ar 年令

柴田 賢・野沢 保・小西 健二

要 旨

石垣島、つむる層の白雲母石英片岩の白雲母の K-Ar 年令は 174 m. y. であった。これはジュラ紀初頭にあたる。