

K-Ar whole rock dating of the metamorphic rocks in the Yorii-Ogawa area of the north-eastern part of the Kanto Mountains

ONO, Akira^{1*}

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Atokura Nappe is widely exposed in the Yorii-Ogawa area. It is mainly composed of Permian granitic rocks, Cretaceous Atokura Formation, Cretaceous pyroclastic rocks, Paleogene Yorii Formation and Paleogene Kiroko greenstone melange (Figure 1). Mid-Cretaceous metamorphic and granitic rocks are also distributed as small tectonic blocks. Kiroko greenstone melange mainly consists of high-pressure-type metamorphic rocks (Kiroko metamorphic rocks), meta-gabbro, meta-tonalite, serpentinite, epidote amphibolite and amphibolite. The Atokura Nappe tectonically overlies on the Mikabu greenstones and Chichibu Complex.

K-Ar whole rock ages of the Kiroko metamorphic rocks were determined on three slates and one mafic rock. The results for the slates are 127Ma, 117Ma and 115Ma. Whereas the K-Ar whole rock age of the mafic rock is 57.4Ma. The older ages of the slates are due to the presence of detrital white mica [1]. Based on the results of the K-Ar ages, the Kiroko metamorphic rocks are regarded as members of Sanbagawa metamorphic rocks. This conclusion reveals that nappe tectonics took place even in the region where Sanbagawa metamorphic rocks were exhumed.

The nappe tectonics occurred at many times in Cretaceous and Paleogene forearcs of Southwest Japan. In the northeastern part of the Kanto Mountains weakly metamorphosed Chichibu complex lie on the Mikabu greenstones by thrust faults [2, 3]. The existence of unconsolidated fault gouges suggests the formation of the thrust faults in a surface part of the crust. The thrust faults were formed by Cretaceous nappe tectonics before the formation of the Atokura Nappe.

Radiometric dating of the metamorphic rocks of the Chichibu and Mikabu belts is lack in the surveyed area. Hence, K-Ar whole rock dating was performed on a muscovite-chlorite schist from the Mikabu belt and a slate from the Chichibu belt. The results are presented on the left side of Figure 1. Locations of the samples are described below and are shown by star signs in the geological map.

The sample Yorii-Mikabu is a pelitic schist of the Mikabu belt exposed near the River Arakawa, Yorii town. The sample Sekisonzan is a weakly metamorphosed slate of the Chichibu belt which was exposed near Mt. Sekisonzan, Ogawa town. The sample Suguro-P2 is a black slate rich in carbonaceous materials and fine white mica. The location of the slate is loc. d of Ref. [1]. It is a member of the Kiroko metamorphic rocks.

Particle sizes of white micas vary considerably for each slate specimen studied. This is an evidence for insufficient recrystallization of white mica during regional metamorphism. Therefore, K-Ar whole rock ages of all the studied slates are older than the assumed metamorphic ages.

[1] A.Ono, 2013, Abs. Japan Geosci. Union Meeting, SMP43-P16.

[2] K.Sudo and K.Matsumaru, 1973, Bull. Chichibu Mus. Nat. History, 17, p.13-24.

[3] T. Kimura, 1977, Abs. Geol. Soc. Japan Meeting, p.104.

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New K-Ar whole rock ages of metamorphic rocks from the Yorii-Ogawa area

Sample	Age (Ma)	^{40}Ar rad (scc/g $\times 10^{-5}$)	^{40}Ar rad (%)	K (%)
Yorii-Mikabu	89.4 \pm 2.2	1.34	95.9	3.76
		1.34	95.1	3.76
Sekisonzan	146 \pm 4.0	1.60	95.2	2.75
		1.66	95.4	2.76
Suguro-P2	115 \pm 3.0	1.86	97.4	4.01
		1.84	97.9	4.01

$\lambda_{\beta} = 4.962 \times 10^{-10} \text{ yr}^{-1}$, $\lambda_{\epsilon} = 0.581 \times 10^{-10} \text{ yr}^{-1}$
 $^{40}\text{K}/\text{K} = 0.01167 \text{ atom\%}$ Geospace Science CO.,LTD

