

Along-arc variations of K-Ar ages for the submarine volcanic rocks in the Kurile Islands

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Seventeen K-Ar ages of submarine volcanic rocks from Urup to Paramushir Islands, south to north Kurile Islands, are measured in order to reveal the evolution of the Kurile arc. These islands construct a volcanic active arc (Greater Kurile Ridge) that formed from vigorous submarine volcanic activity beginning in the Miocene (Nemoto and Sasa, 1960; Gorshkov, 1970; Sergeyev and Krasny, 1987). We described submarine volcanic rocks consisting of hyaloclastites and dykes with minor amount of pillow lavas at the coastal cliffs at each islands.

Sampled hyaloclastites are meter-sized breccias that have polyhedron with radial cooling joints and matrix of very fine to fine sand size's ash. Dykes have cooling joints with several centimeters. They are composed of basalt to andesite having 49-59% SiO₂ in whole-rock chemistries. K-Ar ages of selected unalternated to weekly alternated rocks are measured in Geological Survey of Japan, AIST, by isotope dilution method. The ages of the islands based on K-Ar ages as follows.

(a) South Kurile: 8.36 Ma, 5.82 Ma and 4.21 Ma (Urup Island)

(b) Central Kurile: 3.13 Ma, 2.13 Ma, 1.78 Ma and 1.45 Ma (Simushir Island),

1.17 Ma (Ushishir Island)

1.15 Ma, 1.06 Ma and 0.79 Ma (Rasshua Island)

1.61 Ma (Matua Island.)

0.97 Ma, 0.62 Ma (Shiashkotan Island)

(c) North Kuril: 1.29 Ma (Makanrushi Island)

7.04 Ma and 3.49 Ma (Paramushir Island)

These results show that the submarine volcanic rocks on Urup and Paramushir Islands are old in Late Miocene to Early Pliocene. On the contrast, the rocks on Ushishir, Rasshua, Matua, Shiashkotan, and Makanrushi Islands are young in Quaternary. This shows that the ages of submarine volcanic rocks shift from old in the south, young in the central to old in the north. In addition, the ages of submarine volcanic rocks have the gap between Urup and Simushir Islands that are separated by the deepest strait (Boussole Strait) in the Kurile arc. This gap of ages for submarine volcanic rocks might be harmonized with the tectonic setting and crustal thickness beneath the Kurile arc.