

Evaluation of Holocene eruptive activity of Kuril Islands inferred from tephrostratigraphy

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Kuril Islands extends for 1200 km in length from Kamchatka to Hokkaido, and is composed of many active volcanoes, 32 of which have erupted during the last 200 years. However, organized volcanological research of the islands except for several volcanoes has not been carried out since 1970s. In 2000 and 2007, the international (Japan, Russian and US) scientific cruises were carried out. We focused on the evaluation of volcanic eruption during Holocene by using tephrochronology. The project was supported by JSPS and NSF funds. We also appreciate Russian Academy of Science, Far Eastern Branch.

Kuril Islands can be divided into three segments, southern, central and northern Kuril. We landed 15 islands from Urup in southern Kuril to Shumshu in northern Kuril to investigate tephrostratigraphy at 49 sites. We identified 274 tephra units sandwiched between soil layers. Using thickness, grain size, mineral assemblage and chemical compositions of glass shards of each unit, we could recognize 155 eruption units. Combined with these data, we determined 19 source volcanoes for the 155 units. During these analysis, we also found 13 marker tephra layers, 12 of which are newly recognized. Although these tephra layers are distributed at several neighbor islands far from each source volcano, three layers are wide-spread tephra recognized at distal islands more than 300 km far from its source. These are KO tephra (Kuril Lake tephra: 7.6 ka) from southern Kamchatka, Zv-Su tephra (Zavaritskii - Shumshu tephra: 8.0 ka) from Zavaritskii caldera in central Kuril, and CKr tephra (Central Kuril tephra: 2.4ka) possibly from Medvehii caldera in southern Kuril. We also determined carbon 14 ages of 39 samples, and estimated eruption age of other units by using thickness of soil layers. Based on these data, we reveal eruption history of major volcanoes in Kuril Islands during Holocene. Although a dormant period longer than 500 years could not be obviously recognized in Kuril, it seems that the intensity and/or frequency of eruptive activity has fluctuated during Holocene. Most remarkable period was from 10 to 7 ka, in which explosive and large eruptions had occurred from Hokkaido to Kamchatka, resulting in the formation of 6 calderas, Mashu in Hokkaido, Lvinaya Past in southern Kuril, Zavaritskii in central Kuril, Tao-Rusyr in northern Kuril, and Kuril Lake and Karimsky in Kamchatka. In addition, considerable large scale plinian eruptions had occurred in several volcanoes from Hokkaido to Kamchatka during from 3 to 1 ka. The activity during these two periods might be influenced by regional tectonic events. Based on newly established tephrostratigraphy, we will investigate spatial and temporal variations in petrological features of volcanic rocks in Kuril Islands.