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Evaluation of Holocene eruptive activity in South Kurile, inferred from Age, Source, and Distribution of tephra

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Kurile arc is one of the most active volcanic zones in the world, composed of many islands locating from eastern Hokkaido to Kamchatka peninsula. Despite such high-level activity, its eruption history is still unknown. Recently, the systematic geological investigations have been carried out in Hokkaido (Kishimoto et al., 2009; Hasegawa et al., 2009) and in Central and North Kurile Islands (Nakagawa et al., 2009), to reveal the history of volcanic activity. In order to understand the evolution of volcanic activity in Kurile arc as a whole, it is essential to clarify the eruption history in South Kurile Islands. We had precious opportunities to investigate in South Kurile Islands (in Habomai, Shikotan and Kunashir islands). In this study, we reconstruct the stratigraphy of Holocene tephra in South Kurile Islands using the petrological features of volcanic ashes and 14C ages of beneath or above tephra layers.

We identified 22 Holocene tephra layers in South Kurile Islands. Only 5 ash layers from the volcanoes in South Kurile Islands can be recognized: Mendeleev (ca. 2.5 ka), Tyatya volcanoes (1420 cal. yBP and AD 1973), and two local tephra layers (source is unknown, but probably from the volcano in Kunashir island: 9230 and 11190 cal. yBP). These tephra almost distribute locally. Main parts of Holocene tephra are generated from the volcanoes in Hokkaido: Mashu and Rausudake volcanoes in eastern Hokkaido; and Tarumai and Hokkaido-Komagatake volcanoes in southwestern Hokkaido (belonging to NE Japan arc). These results suggest that Holocene volcanic activity in South Kurile Islands is relatively lower than those in eastern Hokkaido. Focusing on eruptive scale and eruption age, the large caldera-forming eruptions occurred at Mashu volcano in eastern Hokkaido about 12-8 cal. ka. It is also reported the caldera-forming eruption of Lvinaya Past volcano in Iturup Island (10630 cal. yBP: Braitseva et al, 1995). This implies that the period of 12-8 cal. ka is characterized by powerful volcanic activity in the southern area of Kurile arc. After that, however, eruptive scale became smaller. In eastern Hokkaido, the silicic explosive eruptions had occurred several times with interval of a thousand year approximately. On the other hand, a small scale of silicic eruption occurred only three times in South Kurile Islands (Kunashir Island). Considering that Tyatya volcano had continued the effusive eruptions at the summit until AD 1812 (Nakagawa et al., 2002), it is interpreted that the eruptive activity in South Kurile Islands has been gentle accompanied with mafic magma since 8 ka.

Keywords: tephrostratigraphy, South Kurile Islands, Holocene eruptive activity, eastern Hokkaido