

Temporal and spatial change of volcanism in Hokkaido during late Pleistocene and related tectonics

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Arc volcanism at Hokkaido, which locates at the junction of NE Japan and Kuril arcs, has continued since late Miocene. It seems that the temporal and spatial change of the volcanism has been related to tectonic movement at the junction. Since middle Pleistocene, three volcanic fields, southwestern (SW), central and eastern Hokkaido, have been constructed since 1.7 Ma. Although Rishiri volcano exists far from these volcanic fields, it could be included into the SW Hokkaido on the basis of geochemical features of the rocks of the volcano. In this paper, we reveal temporal and spatial change of volcanism including style of activity and geochemistry of the volcanic rocks during late Pleistocene.

Magma discharge rate has increased at the SW Hokkaido and eastern Hokkaido fields since 0.3 ? 0.2 Ma. The volcanism in the eastern Hokkaido is characterized by caldera volcanoes. Frequency and scale of caldera-forming eruption of Kutcharo volcano have increased since 0.21 Ma, followed by the activity of Mashu volcano since 0.03 Ma. In Shiretoko peninsula, andesitic stratovolcanoes and lava domes have been constructed since 0.3 ? 0.2 Ma. The discharge rate has changed from 0.23 to 1.1 DRE km³/1ky in the eastern Hokkaido. On the other hand, activity of caldera volcanoes has increased in SW Hokkaido since 0.11 Ma. Caldera-forming eruptions have moved from Toya in 0.11Ma, Kuttara in 0.08 Ma and Shikotsu in 0.06 Ma. In addition, new volcanoes have appeared along the eastern margin of Japan Sea since 0.3 ? 0.2 Ma, such as Oshima-Kojima, Oshima-Oshima, Katsuma (Okushiri) and Rishiri volcanoes. The discharge rate in the SW Hokkaido has increased from 0.33 to 2.2 DRE km³/1ky. On the other hand, activity of caldera volcanoes had terminated since 0.9 Ma in the central Hokkaido. Andesitic ? dacitic stratovolcanoes and lava domes have been active since then. The discharge rate has decreased from 0.38 to 0.11 DRE km³/1ky.

The increasing of activity of caldera volcanoes and appearance of new volcanoes must be related to temporal change of tectonic setting of Hokkaido. The possible tectonic change during late Pleistocene is the movement and/or fluctuation of the plate boundary between Eurasia and North America (or Okhotsk) plates from the central Hokkaido to the eastern margin of Japan Sea. The timing of the movement has been controversial. However, temporal and spatial change of volcanism suggests that the change of the tectonic setting of the plate boundary should occur around 0.3 ? 0.2 Ma.

Keywords: volcanic activity, caldera volcano, temporal and spatial change, magma chemistry, tectonic setting