

Stratigraphy and FT age on Pliocene-early Pleistocene tephra in the Horonobe area, northern Hokkaido

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Pliocene - early Pleistocene marine sediments and non-marine - marine sediments distribute in the Horonobe area, northern Hokkaido. The sediments intercalate tephra. Because the tephra in marine sediments do not receive an influence of erosion after depositing, the majority of tephra are preserved in the sediments of the area. On the other hand, because the volcanic region around the area does not exist in this age, it is thought that the tephra are effusive materials from the outside volcanic region of the area, like the volcanic region in the center part in Hokkaido. Therefore, it is important for understanding the Pliocene - early Pleistocene volcanic history in the wide region around this area to reveal the tephra stratigraphy in the area.

We identified the tephra at 47 points in the area. The tephra in the 47 points can be correlated with the 21 tephra beds from horizon, glass shape, mineral composition, glass refractive index, mineral refractive index, glass chemical composition, bulk chemical composition, and zircon FT age of tephra. We named the tephra HR-1 to HR-21 in descending order. In this report, we discuss the petrological features and the source of tephra, and report stratigraphy in the entire area at other opportunity.

The tephra are composed mainly of colorless volcanic glasses of bubble wall type and of pumice type, and colored minerals are hardly included. HR-7 and 14 consist almost only of the bubble wall type. As for the colored minerals thought to be essential, a small amount of orthopyroxene and hornblende are observed only in HR-1-5 that are in the non-marine - marine deposits. Based on the refractive index and the SiO₂ and K₂O contents of the glass, the tephra in the area are divided into 5 groups as A group(nd: 1.514-1.524; SiO₂: 70-75 wt.%; K₂O: 0-1.5 Wt.%), B group(nd: 1.507-1.520; SiO₂: 70-75 wt.%; K₂O: 3.5-5.5 wt.%), C group(nd: 1.501-1.505; SiO₂: 76-79 wt.%; K₂O: 0-1.5 Wt.%), D group(nd: 1.501-1.507; SiO₂: 76-79 wt.%; K₂O: 1.5-3.5 wt.%), and E group(nd: 1.498-1.504; SiO₂: 76-79 wt.%; K₂O: 3.5-5.5 wt.%) (nd: mode value; content: 100% re-calculation value). A group is correspond to HR-2, B group to HR-4, C group to HR-12 and 17, D group to HR-1, 3, 6, 8, 9, 13, 16, and 18, and E group to HR-5, 7, 10, 11, 14, 15, 19, 20, and 21 respectively. The FT ages of the tephra show 1.5±0.1 Ma on HR-3, 2.0±0.3 Ma on HR-5, 2.1±0.2 Ma on HR-10, 2.2±0.1 Ma and 2.3±0.1 Ma on HR-11, 2.9±0.1 and 3.4±0.1 Ma on HR-14, 3.3±0.3 and 3.6±0.3 Ma on HR-19, 3.9±0.3 Ma on HR-20, and 4.6±0.5 Ma on HR-21, and the ages concordant with the stratigraphy. E group to which HR-7 and 14 that remarkably contains the glass of the bubble wall type belong, shows high K₂O content, and the age of E group concentrates about 2 Ma and 3-4 Ma.

Based on the characteristics of the glass shapes and the SiO₂ content of glass, the tephra in the area is thought to be the effusive materials of the large-scale felsic eruption. The eruption similar to the previous occurs at the center part and the southwest part in Hokkaido, and so on, in Pliocene - early Pleistocene (Moriya, 1983; etc). In addition, the glass shape, the K₂O content, and the FT age of E group similar to the feature of the volcanism in the center part in Hokkaido (Ikeda, 1991; etc), suggest that the source of E group may be the center part of Hokkaido. In that case, the mineral composition of the tephra is not correspond to the feature of effusive materials from the center part in Hokkaido (biotite and hornblende are included) (Ikeda, 1991; etc). The reason is that the colored minerals have separated from the tephra by hydraulic elutriation through falling in the sea.

Reference

Ikeda, 1991, *J. Geol. Soc. Japan*, 97, 645-666.

Moriya, 1983, *Volcanic topography in Japan*. University of Tokyo Press, 135p.