Japan Geoscience Union Meeting 2013
(May 19-24 2013 at Makuhari, Chiba, Japan)

SVC53-P04 Room:Convention Hall Time:May 21 18:15-19:30

The Oropirika pyroclastic flow deposit: Large-scale pyroclastic flow deposit from the Shirataki basin, Hokkaido

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The Shirataki basin and the Horokayubetsu sedimentary basin in Shirataki area are situated in the northeast end of the Taisetsu-Tokachi volcanic chain that consists of Plio-Pleistocene large-scale pyroclastic flow deposits and overlying stratovolcanoes. The Shirataki basin is 11km-wide topographic lowland buried by lacustrine deposit and volcanic products of Tengudake volcano. The Horokayubetsu sedimentary basin is 5km wide depression of basement rocks that is filled by lacustrine deposit and rhyolitic lavas. Welded pyroclastic flow deposits are widely distributed in surrounding mountains. These basins ware considered to collapsed caldera by large-scale explosive eruption(Yamagishi,1976;Yamamoto,2004), however detailed evidence is insufficient. Since this area is not fully covered by the younger-stage volcanics and hydrothermal alteration has not progressed, we regard as significant field in considering the geologic evolution of the Taisetsu-Tokachi volcanic chain that has been regarded as a volcanic-tectonic depression. In this time, we define for large-scale pyroclastic flow deposit erupted from this area.

The dacitic welded pyroclastic flow deposit distributed mainly in the outside of the Horokayubetsu and Shirataki basins is called the Oropirika pyroclastic flow deposit. The deposit has dacitic whole-rock compositions (SiO_2=65.5-71.5wt%, K_2O=2.1-3.5wt%) and contains about 30vol% phenocrysts. The phenocryst assemblage consists of plagioclase, quartz and orthopyroxene(R.I. gamma=1.735-1.737). The chemical compositions of volcanic glass shards in non-welded part is rhyolitic (SiO_2=77.3-78.5wt%, K_2O=4.3-5.0wt%).

Based on geochemical and petrographical correlation of welded tuff blocks, essential pumice and accidental obsidian fragments, the Oropirika pyroclastic flow erupted from the buried small-scale caldera (Shirataki caldera; Yahata *et al.*,2003) occurred beneath Tengudake volcano within the Shirataki basin. Since this pyroclastic flow deposit has remained as thick welded tuff in the area within 20-25 km from the vent, this would be a large-scale pyroclastic flow the erupted volume exceeds tens of cubic kilometers. The estimated eruption age is about 1.2 million years ago from the stratigraphic relationships with other volcanic edifices and the results of radiometric dating. This result corresponds roughly to the time of eruption style change of the Taisetsu-Tokachi volcanic chain from large felsic pyroclastic eruption to andesitic stratovolcano formation.

The Oropirika pyroclastic flow deposit can not be confirmed on the ground surface of Shirataki basin. On the other hand, older sediments and pyroclastic flow deposits outcropped within the basin. In order to know the timing for the formation of these basins will need to investigate the relationship between the other older large-scale pyroclastic flow deposits.

Keywords: eruptive history, tephra, caldera