

## Holocene eruptive history of Yotei volcano, south west Hokkaido, Japan: Finding the tephra erupted in ~4,000 years ago

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The last eruption of Yotei volcano is recognized as K-ps tephra in 5,930±180yBP (Kashiwabara et al., 1976). Although Yotei volcano recognized as an active volcano for this eruption, recently new age data were reported older than 10,000 years ago (Hoshizumi, 2004; Hirose et al., 2007). So the Holocene activity of Yotei volcano has not cleared. Then, we investigated around the summit, and constructed Holocene eruptive history of Yotei volcano.

Yotei volcano has erupted at least ~50,000 years ago, and the activity divided as older and Younger volcano with a long dormancy. Andesite to dasite lavas distribute from east to southwest side slope of oldest Summit crater (SM-C: new name). On the west side of the summit crater, there are Basaltic andesite to andesite covered by Kitayama craters and cones (Katsui, 1956). Kitayama craters have at least triple structure, named Kitayama 1st crater (KT-1C), Kitayama 2nd crater (KT-2C), and Kitayama 3rd crater (KT-3C) from outside to inside (new names). There exist the Takamine crater (TK-C : new name) at northwest side of K1 and K2 pyroclastic cones eroded by TK-C, and Hirafu crater chain named HF-1C and HF-2C from east to west (new names) at west side of KT-1C pyroclastic cone eroded by HF-1C.

Deposits on the summit can be divided into 5 units such as Unit S-1 to S-5 in descending order on the basis of field occurrence. Unit S-1 is covered by B-Tm and covers Unit S-2 overlying volcanic soil. This is a massive agglutinate deposit erupted from KT-3C. SiO<sub>2</sub> contents range of these rocks are narrow (59.0 to 59.9 wt.%), and relatively P<sub>2</sub>O<sub>5</sub> rich, MgO poor Cpx-Opx andesite. Unit S-2 covers Unit S-3 overlying volcanic soil. Unit S-2 distributes around the summit and along with Hirafu route. Its thickness and maximum grain size are thicker and larger coming near to the TK-C. Unit S-2 is the tephra composed of white pumices, which are remarkably weathered, and scoriae. The age of charcoal taken from the tephra deposit is 4,010±30 cal.yBP. Scoriae of Unit S-2 contain SiO<sub>2</sub> ranging from 57.6 to 58.3 wt.% and are relatively P<sub>2</sub>O<sub>5</sub> rich, MgO poor Cpx-Opx andesite. Comparing major element of bulk rock chemistry between Unit S-2 and proximal deposit of each crater, TK-C agglutinates (SiO<sub>2</sub> = 57.8 - 63.3 wt.%) conform to Unit S-2 in mafic chemical variation. Unit S-3 covers Unit S-4 directly. This deposit distributes on the southwest to west side of summit crater, and is 1m thick phreatomagmatic deposit which is composed of fine gravels and gravels ranging from 20 to 50 cm in diameter. This deposit also can be observed on the outer KT-1C and KT-2C crater wall. SiO<sub>2</sub> contents of these rocks range from 56.0 to 57.9 wt%, and are relatively P<sub>2</sub>O<sub>5</sub> rich and MgO poor Cpx-Opx andesite. Unit S-4 covers Unit S-5 unconformably. Unit S-4 is ~10m thick pyroclastic deposit which consists of scoriae and dense rocks ranging from 20 to 50 cm in diameter overlying Unit S-3 on the outer KT-1C, KT-2C crater wall. SiO<sub>2</sub> contents of these rocks range from 56.2 to 57.5 wt%, and are relatively P<sub>2</sub>O<sub>5</sub> rich and MgO poor Cpx-Opx andesite. Unit S-5 is an agglutinate and distributes on the summit from east to southwest side of crater rim. The maximum thickness of Unit F is ~100 m. SiO<sub>2</sub> contents of these rocks range from 56.0 to 57.9 wt.%, and rocks are relatively P<sub>2</sub>O<sub>5</sub> poor and MgO rich Cpx-Opx andesite.

It is revealed that Unit S-2 (~4,000 yBP) erupted from TK C., and KT-3C (Unit S-1) is the last eruption based on the field occurrence and petrological analysis. Thus, Yotei volcano erupted twice during 3,000 years from 4000yBP to AD936. Furthermore, KT-3C forming eruption might

occur about 2,000 years ago because of almost the same thickness of soils between KT-3C ejecta and B-Tm and upper soil of B-Tm.

Keywords: Yotei volcano, Holocene, eruptive history