# Transition of eruption sequence and magma plumbing system at the 1.4 ka Nakamachineshiri eruption of Me-Akandake volcano, eastern Hokkaido, Japan.

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Me-Akandake volcano ,which was formed on the southwest wall of the Akan caldera, is a stratovolcano group composed of 8 volcanoes (Katsui, 1951). Nakamachineshiri is the volcanic body that occured the most explosive eruption in the Me-Akandake volcano and is an active volcano with continues fumarolic activity. Among its activities, especially the eruption approximately 14,000 years ago, was called the Nakamachineshiri Crater Activity Period 1 (NC - 1), and widely distributed pyroclastic flow and pyroclastic fall deposit from foot of the volcano to a distance.
However, detailed geological studies have not been carried out sufficiently and the details of the eruption sequence are still unclear. In addition, the petrological study of magma plumbing system associated with transition of eruption style has not been carried out sufficiently. We performed a detailed geological survey in order to clarify the eruption sequence and style of NC-1. In addition, we performed petrological study and component analysis of the volcanic deposit in order to investigate the developmental process of the conduit during eruption and magma plumbing system. As a result, detailed eruption transition of NC-1 and transition of mafic magma became clear.
NC-1 eruptive deposits can divide into 4 unit (unit 1-4) by the result of geological survey. Unit 1 compose of pyroclastic surge deposit at the vicinity of the crater and compose of closs layer of pyroclastic flow deposit and pyroclastic surge deposit contained accretionary lapilli above the silty volcanic tuff layer at the foot of the volcano. The characteristics of Unit 1 are that volcanic deposit have suffered alteration and contain a large amount of rock fragments. Unit 2 consists of pyroclastic surge deposits and pyroclastic flow deposits, which are distributed from the vicinity of the crater to the foot of the volcano and far away, but pyroclastic flow deposits dominate at the foot of the mountain. The pyroclastic flow sediment characteristically contains fresh andesite lava fragments. As a result of observation of thin sections, these lava fragments were found to be welded pyroclastic rocks. Unit 3 is mainly pyroclastic fall deposit composed of pumice and scoria. In the vicinity of the crater, it thickness thickly and the pyroclastic surge sediment is sandwiched between the pyroclastic fall deposit. This unit is the NaPS pyroclastic fall deposit described by Wada et al. (1988). Unit 4 is distributed only in the vicinity of the crater, it is composed of pyroclastic surge deposits and the composition is characterized by many scoria and rock fragments. An erosion gap was observed between Unit 1 and Unit 2, and it is considered that there was a time gap.
The rocks of the ejecta of NC-1 are basaltic andesite to dacite. These rocks contain plagioclase, clinopyroxene, orthopyroxene and Ti-magnetite as phenocrysts, associated with minor amounts of olivine in some rocks. The whole-rock $SiO_2$ contents range from 62.5-64.7 wt.% for pumice and from 55.0-58.1 wt.% for scoria. Pumice and scoria tend to show different trends in many elements on the Harker diagram. Pumice exhibits little variation in petrological features through all the unit. In contrast, scoria is distinguishable according to unit by Sr and $P_2O_5$ contents.
From these results, based on the time gap, the volcanic activity can be divided into 2 stages. The transition of the eruption is as follows.
In stage 1 (: Unit 1) which is the first activity, magma rose and phreatomagmatic explosion occurred by the magma-aquifer interactions, and the crater was expanded by repeating the explosive eruption.

 

After the time gap, the mafic magma rose again and stage 2 (: Unit 2,3,4) activity began. The first activity of stage 2 is predominantly pyroclastic surge due to phreatomagmatic explosion, welded pyroclastic rock formed in or near the crater in Stage 1 were destroyed by explosive eruption. Moreover, several pyroclastic surge which flowed down the foot of the volcano became pyroclastic flow. When eruption rate rapidly increased in middle of stage 2, eruption style became sub-Plinian eruption and eruption column was formed by declining interaction of magma-water. After that, the eruption rate decreased and eruption style changed to phreatomagmatic explosion.
In NC-1 eruption, it is thought that eruption style was dominated by interaction of magma-water because aquifer was developed in volcano body. Hence, it is assumed that Nakamachineshiri edifice is a tuff cone or maar formed by repeated phreatomagmatic explosion.

Keywords: Me-Akandake volcano, Nakamachineshiri, phreatomagmatic explosion, eruption sequence

 