Japan Geoscience Union Meeting 2010
(May 23-28 2010 at Makuhari, Chiba, Japan)

SVC062-P16 Room: Convention Hall Time: May 23 17:15-18:45

Magma plumbing system in the Ata caldera area, Kyushu, Japan

Tomoko Sawai[1*], Setsuya Nakada[1], Fukashi Maeno[1]

[1]ERI, Univ. Tokyo

Caldera-forming silicic eruptions tend to be repeated in the same volcanic area, as Kakuto, Aira, Ata, and Kikai calderas in Kagoshima tectonic graben (e.g. Nagaoka, 1988). The Ata caldera experienced two large caldera-forming eruptions, which produced the Torihama pyroclastic flow (240 ka) and the Ata pyroclastic flow (110 ka). Following the 110 ka eruption, several volcanic activities took place inside the caldera (Ibusuki, Ikeda, and Kaimondake volcanoes). In 5.6 ka, a small caldera-forming eruption was occurred in Ikeda volcano.
Although it is important to know the characteristic and evolution of magma after the 110 ka eruption in the Ata caldera area in order to predict future volcanic activities, detailed petrological studies have not been carried out till now. Therefore we discuss how the magma plumbing system has evolved since the Ata caldera formation based on petrological analysis of erupted materials systematically sampled.
Bulk rock chemical compositions of the ejecta of Ata, Ibusuki, and Ikeda volcanoes show a single trend in variation diagrams. The ejecta of Ikeda volcano are silicic (70.0-72.6 wt% in SiO_2) and mafic (53 wt% in SiO_2) in composition, and those of Ibusuki volcano are intermediate between the two. The ejecta of Ata volcano are slightly poorer in SiO_2than those of Ikeda volcano. Silicic components of Ata and Ikeda volcanoes have similar phenocryst assemblage (pl, opx, cpx, opq, and hb), and quartz phenocryst is only present in the ejecta of Ikeda volcano. The size of plagioclase phenocryst in felsic rocks from Ikeda volcano tends to be larger than that in Ata volcano.
The ejecta of Kaimondake volcano are divided into mafic (50.6-53.9 wt% in SiO_2; pl, opx, cpx, opq, ol) and andesitic (57.5-60.4 wt% in SiO_2; pl, opx, cpx, opq) components. The andesitic one has no olivine phenocryst and minor amounts of opx and cpx. Though the chemical characteristics of mafic rocks of Kaimondake volcano are similar to those of Ikeda volcano, the compositional trend of Kaimondake volcano is different from the trend created by Ata, Ibusuki, and Ikeda volcanoes. There are no relationship between the sequence of eruptions and chemical compositions in Kaimondake volcano, and sometimes mafic and andesitic magmas erupted in the same event.
The activities of Ata, Ibusuki, and Ikeda volcanoes can be characterized by two end member magmas (mafic and silicic), which are comparable to the magmas erupted from Ikeda volcano. Magmas of Ata and Ibusuki volcanoes are thought to be the products from mixing of the end member magmas. Based on microscopic features, it is considered that crystallization of the silicic end member magma would have proceeded with time.
Kaimondake volcano is characterized by basaltic and olivine-free andesitic magmas, the latter of which may have been created by a crystal differentiation independent from the plumbing system of Ata, Ibusuki, and Ikeda volcanoes.