

SVC063-15

Room: 201B

Time: May 24 14:15-14:30

Magma related to the eruptive activity of Sakurajima volcano since 2006

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Eruptive activity of Sakurajima volcano restarted at Showa crater in June 2006, and explosive eruption has intermittently repeated at both Showa and Minami-dake summit craters until now. Amount of ash emission is estimated to be 400,000 ? 470,000 ton per year from 2006 to 2008, and has increased to be >600,000 ton per month since October 2009. Although major ash deposits have been collected since 2006, juvenile materials related to the recent activity and its features have not been clearly recognized. We investigated ash deposits during eruptions, May 31 and June 6 in 2007, February 3 in 2008, and May 5, August 4, September 21, October 1 and 3, and November 17 in 2009. Although almost all the samples are ash, andesitic rocks with lapilli size were also collected in November 17, 2009 (2009-11-17). We carried out microscopic observation of these samples. In addition, whole-rock chemical compositions and mineral chemistry of phenocrystic minerals of the samples of November 17, 2009 (2009/11/17) are determined. These samples are provided by Tokyo Institute of Technology, and Disaster Prevention Research Institute Kyoto University.

The eruptive ash before eruptions in October 2009 are mainly composed of altered andesitic rock fragments and crystals. The degree of alteration of these fragments is various, whereas the ratio of fragments showing weak alteration has increased in 2009/9/21 and 2009/10/1. Coarse ash deposits of 2009/10/3 eruption contain considerable amount of andesite fragments, which have non-altered brown matrix glass. The similar fragments have been recognized as a lapilli fall deposit during 2009/11/17 eruption. These are (olivine-bearing) clinopyroxene-orthopyroxene andesite with glassy groundmass, and are possibly juvenile materials. Whole-rock major element chemistry of 2009/11/17 eruptive materials show similar features to those of recent juvenile materials since 1914, and are plotted on the trends on Harker diagrams of these 20th centuries eruptives. However, the 2009/11/17 eruptives are most mafic compared with recent eruptive materials since 1957. Although compositional distribution of core of phenocrysts of the 2009/11/17 eruptives, such as plagioclase, clinopyroxene, orthopyroxene, and Ti-magnetite, are also similar to those of the recent eruptives, the distribution has slightly shifted. These suggest that the 2009/11/17 materials can be distinguished from the recent juvenile materials. Thus, it can be concluded that the 2009/11/17 eruptives are juvenile material, which has been related to the eruptive activity since 2006. According to temporal change of eruptive ash, similar juvenile materials have been obviously recognized since 2009/10/3 eruption. This is consistent with monitoring indicating level of eruptive activity has increased since October 3, 2009.

Keywords: Sakurajima volcano, eruption, magma, juvenile material