The Nature of Volcanic Ash Erupted from Owakudani Fumarolic Area of Hakone Volcano on June 30, 2015

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Volcanic ash erupted from crater bring us information about the types and mechanisms of eruptions from underground. In 2015, at the vicinity of the Owakudani fumarolic area of Hakone volcano, shallow volcanic earthquake increased significantly on April 26, and volcanic ash fall was recognized on June 29 and 30. We collected the volcanic ash on June 30 and analyzed its constituent minerals, chemical compositions, and water soluble components. Based on the analytical result, the origin of the volcanic ash was estimated.

Smectite, pyrite, tridymite, cristobalite, gypsum, anhydrite, plagioclase and quartz were detected in the volcanic ash. This mineral assemblage appears to be due to relatively low-temperature hydrothermal alteration and is similar to that of hydrothermally altered rocks collected from shallow depth of steam well in the Owakudani fumarolic area [1]. The volcanic ash contains relatively lower concentrations of some elements such as Na, K, Ca and Mg than andesitic lava in the Owakudani area [2], supporting that the volcanic ash was influenced by hydrothermal alteration. Water soluble components seemed to be derived from thermal water because the high amount of Cl^- and SO_4^{2-} (12.2 and 6.6g/kg, respectively) and Cl/S ratio of 5 were detected. The Cl/S ratio of thermal waters at the surface of Owakudani fumarolic area is very small, on the other hand, there are thermal waters which have Cl/S ratio of about 2 at depth around 29-36m [3] and that of 7-18 at depths around 500m [4]. Considering all these facts, the volcanic ash erupted from Owakudani fumarolic area on June 30 was estimated to be derived from depths of around 500m below the surface, or more shallow depth.

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