

Rock magnetic properties of the September 2014 eruptive products from Ontake volcano, Japan

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Ontake volcano, Japan, erupted unexpectedly on September 27, 2014. Though the eruption was phreatic eruption, which is a relatively small explosion unaccompanied by fresh magma, more than 50 tourists became victims and the eruption is the Japan's deadliest volcanic disaster in more than a century. We start to study eruption process of September 27 eruption and transport and emplacement mechanisms of the eruptive products. This study focuses on magnetic minerals in the eruptive products and carried out rock magnetic measurements.

Thermomagnetic measurements conducted in air showed irreversible curves. Induced magnetization increased remarkably above 400 °C and reached about five times of initial values around 470 °C. Magnetization decayed to almost zero up to 600 °C. During cooling, only one T_c of about 580 °C was obtained. Magnetization after the measurements is less than two times of initial values. Microscopic observation revealed abundant pyrite crystals were contained in the eruptive products. Our thermomagnetic results indicated magnetite was formed during the experiments by the oxidation of pyrite above 400 °C. This implies that the volcanic materials of this eruption were not heated to about 400 °C. In addition, thermomagnetic signal of sharp peak around 470 °C is observed characteristically in the eruptive products. It can be used as a marker of the eruptive products and we can evaluate how long and how far the eruptive products deposited around the summit of the volcano will transport to the base area.

Keywords: Ontake, phreatic eruption, pyrite, rock magnetism