磁気岩石学的解析による御嶽山2014年噴出物の堆積過程

Identification and emplacement mechanisms of the September 2014 eruptive products from Ontake volcano, Japan, inferred from magnetic petrology

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Phreatic eruption occurred at Ontake volcano on the 27th Sept. 2014, have produced wide variety of deposits around the volcano. The eruption column reached to about ten thousand meters high and resulted in thin ash fall deposits extended 100km to the east. Small pyroclastic flow deposits were emplaced at southern slope of the volcano edifice. Though steam emission without additional volcanic products have been observed after the initial intensive activity, heavy rain falls triggered a lahar which transported volcanic materials deposited at around the craters to the foot of the volcano. This study focuses on eruption processes and transport and emplacement mechanisms of the eruptive products. Preliminary results were reported in 2015 JpGU meeting. This time, we will report magnetic petrological features of the eruptive products of Ontake 2014 and discuss emplacement mechanisms of the materials.
Magnetic minerals in the eruptive products are characterized by abundant pyrite and small amount of titanomagnetites. Thermomagnetic analysis indicated that pyrite is stable under 380°C and changes to magnetite above 380°C, suggesting the eruptive materials did not suffer high temperature of more than 380°C just before and during the eruption. Magnetic hysteresis parameters of the materials ejected at the initial stage of the eruption were relatively concentrated around the bottom right corner of the total distribution at Day plot, whereas the other materials were scattered at the upper left. It is suggested that the materials by the initial stage of the eruption contain larger magnetic minerals. On the other hand, field observation and granulometric analysis of the deposits including magnetic minerals indicated that the materials derived from the initial stage are composed of well-sorted fine ash, inconsistent with magnetic hysteresis results. There is a possibility that heavy magnetic minerals bearing iron tend to fall rapidly, resulted in higher concentration of larger magnetic minerals in the materials ejected at the initial stage.
These rock magnetic characters can be used as a marker of the eruptive products. Thin fine ash layer found at the upstream of the Nigori-kawa River, about 3 km south from the vent area, showed similar rock magnetic features with those of the materials caused by the initial stage, whereas such deposits cannot be traced further downstream from the point. The deposit could be derived from ash cloud of pyroclastic flow or from ash fall itself by the initial stage. Approximately 2m thick lahar deposits containing sediments derived from the 2014 eruptions were found along the river, suggesting emplacement of the pyroclastic flow impacted upstream areas of the catchment. Turbidity of the river decreased significantly after a year of the eruption, but a certain amount of the 2014 materials were contained in the river water. This is suggestive of perennial transportation of volcanic materials sourced from the vent area even in the present time.

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