

## Numerical Study of Clast Transport of 2014 Ontake Eruption, Japan

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We present an estimate of the ejection conditions and energy of clasts at the deposition points during the 2014 phreatic eruption of Ontake volcano, Japan. When Ontake volcano erupted around noon on September 27, a fine day of the high season of mountaineering, many people were up around the summit of the mountain. 57 people died and 6 people are still missing. 55 out of 57 people died from an injury of clast hitting. In our study, we searched ejection conditions and energy of clasts at the deposition point based on the distributions of clasts and numerical simulations. Multi-particle numerical model including particle-particle collision are used for simulating clast transport. We tried three types of transport conditions. First is a purely ballistic transport, second is a transport with plume, and third is a transport with blast. By considering results of simulations and video images of the eruption together, we found that the third condition is a reasonable estimate. We would like to discuss about the impact energy of clasts and a possible measure for its damage. This study contribute to the establish a standard to prepare for a damage by a clast release from the vent, for example, constructing shelters around vent or putting a restricted area when the seismicity increases.

**Keywords:** Numerical Model, Hazard mitigation, Volcanic clast, Ontake, Shelter