The fundamental research in flow dynamics of pyroclastic surge

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Pyroclastic flow deposits exhibit extremely wide ranges in depositional volume, outflow distance and in depositional structures. To understand the flow dynamics, generally, the field survey on the depositional structure has been used. However, these complication unable us to understand the flow dynamics easily. In recent years, we have had some experience of observation of the lateral blast and pyroclastic surge. These flows, however, did not always leave clear deposit. This means that the field study does not yield full information enough to discuss the flow dynamics. In order to cover this defect of field study, numerical simulation and analogue experiment have been employed. Recently, numerical simulations of pyroclastic flow produced by explosive eruption suggested that the outflow distance was governed by mass flax, eruption rate, vent radius and pyroclast diameter.

This study carried out the analogue experiment with granular flow to understand the relation among the range of pyroclastic density currents reached and the parameters suggested by the numerical simulation. The experiment intended to simulate the pyroclastic surge generated by the column collapse. We assumed that the main parameters that control the range are total volume of sample powder, falling height, orifice diameter and grain diameter.

In the experiment, we observed granular flow and measured area of the range by personal computer. Following characteristic features were obtained by the experiment. The range increased with increasing falling height and the orifice diameter. It seemed that there was no effect of the powder volume and grain diameter on the range. This suggests that the potential energy and the particle concentration influence mainly on the range when granular flow is formed.