Method for estimation of debris flow runout in the volcanic area

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Debris flows often occur even with a small amount of rainfall after a volcanic eruption. For disaster prevention and mitigation of debris flows in the volcanic mountainous areas, hazard maps and warning - evacuation systems are necessary. As basic information for such disaster prevention and mitigation, it is important to predict timings and areas of flood and sediment provided by debris flows in the volcanic areas after the eruptions.
Regarding debris flows associated with rainfalls after the volcanic eruptions, the authors assume that volcanic ash decreases the hydraulic conductivity of the topsoil layer of the basin slopes. Then surface flow occurs and volcanic ash deposited on the river channel easily becomes saturated by water. The saturated volcanic deposits result in flowing as debris flows because the deposits lose their stability by saturation. In order to analyze these, we observe rainfall events, soil moisture, surface flow, and ground surface conditions on a slope of two square meters in Arimura River basin in Sakurajima Island. Also, at the Arimura River No. 3 dam, the depth, surface velocity and load of the debris flow are continuously measured. In this presentation, we analyze these observation results and report the occurrence mechanism of surface flow and the flow mechanism of debris flows.
As a result of verifying the momentum conservation law of debris flows based on the measurements of the water depth, surface flow velocity and load data in Arimura River No. 3 dam, it seems appropriate. Although conditions for simulation such as spatial distribution of the depth of volcanic deposit, grain size distribution, runout path were determined by trial and errors, the results of simulation of the flow processes of the debris flows showed that simulated temporal changes in depth and velocity were closed to measured ones. As a future task, it is still necessary to obtain the information for spatial distribution of the depth of volcanic deposit, grain size distribution, runout path of the debris flows.

Keywords: volcanic area, debris flow

