



Snow avalanche hazard map taking into account the uncertainties of the model input parameters

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Snow avalanche gives substantial effects on the residents who live in the cold snowy region. It causes numerous casualties and destroys houses, roads, railway and various structures. Therefore, efficient installation of the protective structures and accurate evaluation of hazardous area are very important. However, angle of elevation (Takahashi, 1960), which was obtained empirically, has been still used to estimate the dangerous area in Japan. Quantitative estimates of snow avalanche flow speed, run out distance and debris height, based on physics, have not been carried out and no avalanche hazard map exists.

Based on above background, we have done the snow avalanche simulation with applying the mass flow model TITAN2D (Patra et al, 2005) that was developed to describe the lava flow and land slide. The bed friction angle used for the calculation was estimated based on the previous work by Izumi (1985), and the internal friction angle was evaluated by debris observation. Then, we tried to draw the snow avalanche hazard map in the study area with taking into account the uncertainty of the model input parameters: volume, bed friction angle and the position of the release. We introduced the Polynomial Chaos Quadrature method (PCQ) and probability of the avalanche arrival was evaluated.