

Longitudinal downsizing of hummocks in Japanese volcanic debris avalanches, controlled by their fluidity and magnitude

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The catastrophic huge collapse of volcanic body and the accompanying debris avalanche cause severe disaster around the volcano. A special attention should be paid for data accumulation of physical properties of event to evaluate the damage of disaster, such as volume and fluidity of the debris avalanches. However, it is difficult for us to estimate them, when a large part of the landforms created by the collapse and debris avalanche has been markedly modified or disappeared. We thus focus on hummocky landforms which are presently preserved along the course of debris avalanche, indicating physical properties of the collapses. The present paper investigates the functional relation between size and distance for such hummocks of seven debris avalanches, which are typical cases of freely spreading debris avalanches in Japan, in order to find out the empirical relationship between the longitudinal pattern of hummock alignment and the debris avalanche properties. The results are;

- (1) Size of hummocks decreases with distance and can be expressed by an exponential function of distance for individual debris avalanches.
- (2) Concerning the function expressing the size-distance relation, intercept coefficients, which mathematically indicate the initial size of hummock at 0 km of distance, show a high correlation with volumes of collapsed masses. It indicates that the initial size of hummock at the source area is potentially determined by the volume of collapsed mass of volcanic body.
- (3) Slope coefficients, implying the rate of decreasing in size of hummock with distance, show a high correlation with the equivalent coefficients of friction. It indicates that the downsizing rate of flow mounds is controlled by the "fluidity" of debris avalanche.

In summary, the volume of collapsed mass and the travel distance of debris avalanche can be estimated with relatively high accuracy from the size-distance relation of hummocks obtained even for a part of debris avalanche with some extent.

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