P-060

Adaption of Evaluation Index on the Magnitude of Debris Flow Occurrence in the South Korea

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1. Introduction

Debris flow scale is difficult to clearly define, because form of debris flow is erosion and deposit in runoff process. The definition of the scale of debris flow according to the point of view. It is generally defined as the sediment discharge of the debris flow through a specific point, the sediment discharge of the debris flow, or impact force of the debris flow. But this definition has limitations that sediment discharge of movement energy and impact forces of debris flow is difficult to reflect the various variable conditions. Especially, the magnitude is one of the ways of expressing the easily as a global unification index of earthquake. Therefore, a comprehensive indicator of disasters is very important in carrying out disaster response activities. In South Korea, the debris flow combine risk has been developed by using the concept of the amount of slope failu re on source area and the altitude difference of the source area and deposit area suggested by Uchida et al.(2005). This hazard risk used magnitude of collapse 1 and 2 grade sites of landslide hazard in the catchment and the social vulnerability in the downstream. However, the magnitude of the debris flow is an extreme, which may be different form the actual magnitude of debris flow. Therefore, the study applied the methodology of Uchida et al.(2005) for suggest the magnitude of debris flows in the South Korea..

2. METHODS AND MATEROALS

2.1 Estimation of debris flow magnitude

In this study, we proposed the magnitude of debris flow using the magnitude of the debris flow suggested by Uchida et al.(2005). It is impossible to understanding the magnitude of the debris flow by the individual physical. So this concept is that the potential energy is proportional to the height and the volume. In this case, M = magnitude, V = volume of source area(m^3), and H = relative elevation(m).

2.2 Collection of spatial database

In this study, a helicopter aerial photograph was taken for investigate the location and scale of the debris flow. Debris flow area were extracted by visual detection using orthoimage image, and debris flow area zoned using GIS technique. Finally, Based on the constructed basic data, the volume of source area and the relative elevation was extracted using the soil map(1:25,000) and digital elevation model(1:5,000) .

3. RSULTS AND DISCUSSION

3.1 Occurred characteristic of debris flow

The analysis of the characteristics of 721 debris flow area in the South Korea showed that the source area was less than 1,000m^2, and the average was 2,878.6m^2(Fig. 1). The average soil depth of the source area was 0.5m. Calculating the volume of source area using the area of the source area and soil depth, most of volume of source area were lower 1,000m^3, and average was 1,603.0m^3. The source area was distributed to 100-600m, and the deposit area was distributed to 0-500m. The relative elevation between the source area and the deposit area was the largest distributed at less than 100m, and the volume of source area were not difference large in under 100m. In the case of the relative elevation of more than 100m, the volume of source area were increased. Because the source area were increased as the catchment area increased. On the other hand, the coefficient of determination was 0.18, which is presumed to be influenced by various factors such as slope length and slope angle. As a result of analyzed the debris flow magnitude and damage of life and houses, all of them showed a linear relationship. However, this is closely related to the existence of houses in the downstream. So In this study, additional analysis is needed because there are few samples.

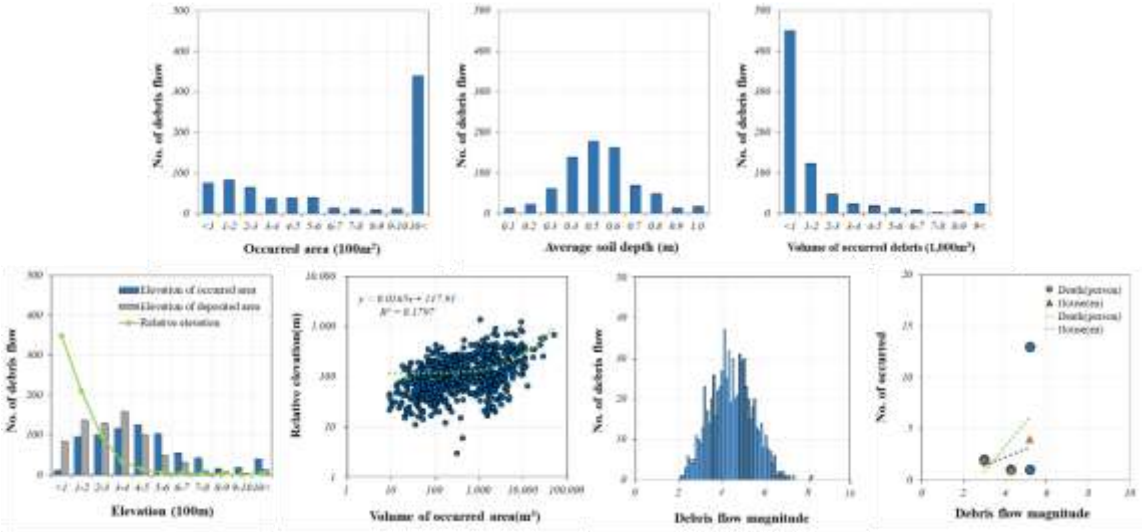

Fig. 1. General characteristic of debris flow in the South Korea.

3.2 Magnitude of debris flow

Calculation of the magnitude of the debris flow showed a range of 2.3-8.3, with an average of 4.6(Fig. 2). The magnitude of the sediment-related disaster in the Japan was smaller than 11 that of the Uchida et al.(2005). Especially, the distribution of the relative elevation was similar. But it is assumed to be due to a small volume of the source area.

The data of 163 catchment overlapped with the predicted magnitude of debris flow are compared. As a result, the surveyed value and the predicted value of the related elevation were similar. But there was a large difference in the sediment discharge of source area. This is considered to be an overestimation, because it was assumed that both the grade 1 and 2 sites in the catchment area would collapse. The measured and predicted magnitude of debris flow were about 2 (100 times) different. Finally, we suggested relational equation to adjust the magnitude of the debris flow for predicted magnitude of debris flow by Woo et al.(2014).

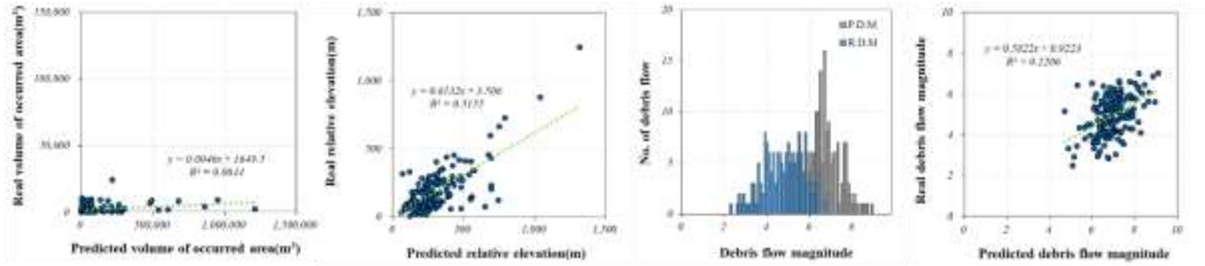

Fig. 2. Characteristics of measured and predicted magnitude of debris flow in the South Korea.