

Statistical analysis on topography of mountain watersheds with frequent debris flows using multi-temporal high-resolution DEMs

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Ohya Landslide, located along the uppermost reach of the Abe River, is a gigantic landslide generated in the early 18th century. It has been producing abundant clastic sediments, which may increase the risk of sediment disasters in the Abe River basin. Quantitative estimation of sediment supply from the landslide is important for effective sediment control. The landslide can also be regarded as a natural laboratory of rapid geomorphic change; therefore, investigating the landslide and the surrounding area is of geomorphological importance. The objective of this study is to examine topographic changes and the relationship between the topography and the frequency of debris flows and sediment transportation in the area. For quantitative analyses, high-resolution digital elevation models (DEMs) for eight periods from 2005 to 2013 were used, and the areas of generated debris flows were extracted. A parameter *DF* was defined as the debris flow frequency in each raster cell, and it was used for statistical analyses. The results revealed the important characteristic of the watersheds with frequent debris flows: they have V-shaped valleys with enhanced erosion, and both longitudinal and transversal inclinations of watersheds are sufficiently high. The DEMs were also used for differentiation to obtain erosion and deposition amounts and rates. The result shows that the average erosion rate of the landslide for the eight years is 23.7 mm/yr, which is significantly high even for Japanese mountains known for very rapid erosion rates.

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