

## A Study on the characteristics of the seismic signals produced by the man-made rockfall and debris flow

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In this study we performed a set of field tests on a 5-meter model slope to investigate the characteristics of seismic signals induced by signal rockfall (single rock rolling) and man-made dry 'debris flow' down a slope. We used a backhaul to release the 3 single rocks in 3 different sizes, and measure/compare the seismic signals they generated during rolling. Furthermore, we used a truck to dump a load of about 3 metric tons of coarse debris with the 3 rocks that used for signal rock rolling test and measure/compare the seismic signals generated by the dry 'debris flow'. The Hilbert-Huang Transform (HHT) was adopted to perform the mode decomposition and to analyze the time-frequency spectra for the seismic signals that we obtained in time domain. We expect that the seismic signals generated by the 3 large rocks in the 3 different sizes will produce distinguishable time-frequency characteristics in the seismic signals; that is, we can recognize that what frequency contents in the time-frequency spectra were produced by which size of the 3 test rocks. The results of this study may help us on interpretation of the seismic signals that we collect from seismic stations and broadband station for landslides.

Keywords: landslide, rockfall, debris flow, seismic signal, time-frequency analysis, HHT