



Characteristics of the seismic signals and acoustic signals recorded from large-scale dam-break tests

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Seismic waves and acoustic waves will be generated when dam-break or landslide event occurs. In this research, we discussed the characteristics of the seismic signals and acoustic signals recorded from several large-scale dam-break tests. The characteristics of seismic waves and acoustic waves should be different because seismic waves are transmitted through strata but acoustic waves are propagating in air. We performed several dam-break tests and built a model dam and slope in a creek for each test. We filled the dam and caused it to overflow. The overflow water eroded the dam and gradually formed a breach. During this breach process the eroded materials of the dam body induced seismic signals. The overflow water rushed downstream and eroded the toe of the model slope and caused the slope to collapse locally. We installed accelerometers to collect vertical seismic signals and set up microphones to collect acoustic signals. During some of the tests, we also installed non-polarized electrodes under the surface of the dam and slope to detect the variation of 'self-potential' of the dam and slope. We used unmanned aerial vehicle to continuously take photos for the collapsed areas of the slope for making digital surface model to analyze the volumes of the collapsed materials. We used Hilbert-Huang Transform to obtain the time-frequency spectra for the recorded acoustic signals and seismic signals. We found that the acoustic signal showing earlier indication of overtopping than that of the seismic signal. The erosion processes of the dam and slope can be corresponded to the seismic signals. In addition, the seismic signals of the collapse events can be distinguished from the flooding signals. The variation of the self-potential can be correlated to indicate the erosion process of the dam and slope in some tests.