



## **Alpine mass movement identification based on a combination of infrasound and seismic sensors**

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The sediment related disasters which occurred last year in Switzerland and Styria showed the effectiveness of warning systems for natural hazards but they also highlighted, that the identification of the magnitude, velocity and the event type is an important task for warning and can make early warning more efficient.

To this end, this work aims to develop a reliable remote warning system for sediment-related mass movements in steep torrents based on seismic and infrasound techniques, which will provide basic information on type and magnitude of torrential events. This system is based on one infrasound sensor and one geophone which are placed co-located and a microcontroller where a specially designed detection algorithm is executed which can detect mass movements in real time directly at the sensor site. The use of low cost sensors like standard geophones and Electret microphones in combination with a microcontroller for data processing and as datalogger provides an easy to install and inexpensive approach for a detection and warning system. Based on a large database of different events from several test sites, a method for an identification of the magnitude and process type has been developed. So this system can provide a rough estimation of the peak discharge and the total volume based on the infrasound signal and can distinguish between bedload transport processes, debris flows and debris floods. The system is currently tested on six test sites in Austria, three in Italy and one in Switzerland as well as one in Germany. These tests show promising results, however, further research based on a large databases of different well categorized events at different test sites will be necessary for a reliable event identification.