

Comparison of bedload transport measurements at the Suggadinbach stream with geophones and modified pipe hydrophones

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A new bedload transport monitoring station has been designed by the Institute of Mountain Risk engineering at the Suggadinbach in Austria (Vorarlberg). In cooperation with the Austrian Service for Torrent and Avalanche Control the station has been installed in June 2013 in a check dam. Two different types of measuring systems are installed: 13 Swiss type geophone sensors record the vibrations of the transported sediment. Additionally 3 modified Japanese pipe hydrophones are mounted under steel plates in order to record the acoustic signal produced by the sediment transport. Both systems can be compared directly because they are arranged consecutively in flow direction. For calibration of the sensors a series of systematic tests have been carried out during low water conditions. Sediment has been fed by a crane with a concrete container. A flume has been installed in order to obtain controlled flow and transport over the measuring system. Four different grain classes up to 64 mm and a mixture of all classes were tested. A total amount of 4 tons were fed during the experiments. The signal was recorded with 9.6 kHz. Frequency analyses were performed for different grain-classes in order to investigate the influence of the grain-size distribution on the shape of the signal and the influence of neighbouring sensors. The standard evaluation and storage procedure for 1 minute aggregated data show that the modified pipe hydrophone is able to detect finer grain-sizes than the geophone sensor.