



## **Processing of seismic signal for different water-sediment flow processes in torrents**

Coraline Bel, Firmin Fontaine, Hervé Bellot, Guillaume Piton, and Frédéric Liébault

Université Grenoble Alpes, Irstea, UR ETGR, 2 Rue de la Papeterie, BP76, 38402 Saint Martin d'Hères, France

Geophones are ground vibration sensors widely used to monitor debris flows and bedload transport, both for research purposes and in warning systems. Torrent monitoring is constrained by harsh operating conditions and may request functional specifications such as efficient storage capacity and low power consumption. At the same time, the signal conditioning is decisive to deal with the variety of water-sediment flow processes involved without suffering from signal saturation or missing flow.

A dedicated acquisition system was developed to overcome these limitations. It makes it possible to use 10-Hz sampling rate while preserving the signature specific to the type of flow by increasing the measurement sensitivity. After a few tests aimed at validating the consistency of the data processing, this system was deployed at various monitoring sites in the French Alps. Results show that this system is appropriate for detecting event occurrence, and distinguishing among different flow processes. They also stress the expected dependence on the distance from the geophone to the seismic source. However, whereas this is sufficient to complete a database or be applied in warning systems, further investigation is mandatory for a quantitative use of the seismic data.