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Possible application of seismic methods to detect and characterize landslides

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The applicability of seismic methods developed for studying snow avalanches to similar natural phenomena, such as landslides is discussed. The methods proposed involve time, frequency and time-frequency analysis techniques of the seismic records.

Our earlier studies showed that traditional analysis in the time and frequency domains of the seismic records generated by avalanches can be used to obtain valuable information on the time evolution of the position of the source. Energy considerations can also be extracted. Nevertheless, the time series analysis is not enough to understand and characterize the source of the signal and it has limitations when applied to small avalanches or when the avalanche propagation path topography is gentle. To overcome this limitation we have developed new time-frequency methods of the avalanche seismic signal analysis, based on running spectrum (RS) calculations. Using the RS method we were able to achieve the reproducibility of avalanche seismic records in relation to the specific avalanche characteristics, such as types of snow and propagation path. The RS method has also proved to be useful in the detection of the movement of avalanches where the topography is gentle.

The current work explores the possibility of portability and consequent application of the above seismic methods to the study of mass movements such as landslides and rock falls. We expect our approach to be successful.