



Seismic monitoring of a rock slope Åknes, Norway: time-reversal localization of seismic activity

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The Åknes rockslide in western Norway is characterized by a steady movement of a rock mass of about 1 km² area with yearly rate of few centimeters. A seismic network consisting of 8 three-component geophones is used to monitor the slope. Tens to hundreds of local and distant seismic events are recorded daily. The local seismic events show a variety of waveforms, both with abrupt and emergent onsets, including events related to the rock-slide activity, rolling stones and snow avalanches. This makes, along with the relatively low frequency content of the waveforms, the standard processing in the form of arrival time measurement rather difficult.

We present a method of time reversal stacking of signal envelopes and their STA/LTA ratios, which allows for identification and approximate location of the local seismic events. The method was successfully tested by locating two types of ground-truth data: surface blasts carried out during a seismic survey and a block rock collapse occurring in September 2012. The test proved the ability of the method to determine the approximate position of microseismic events, which enables to distinguish among several foci of the rock slide activity. Application of the method to 8 years of recorded data showed a continuous seismic activity that is concentrated at the centre and at the eastern edge of the monitored area. A seasonal increase of activity is observed during spring, which is probably related to the snow-melt period.