



Seismic monitoring of the unstable rock slope at Aaknes, Norway

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The unstable rock slope at Aaknes has an estimated volume of about 70 million cubic meters, and parts of the slope are moving at a rate between 2-15 cm/year. Amongst many other direct monitoring systems we have installed a small-scale seismic network (8 three-component geophones over an area of 250 x 150 meters) in order to monitor microseismic events related to the movement of the slope. The network has been operational since November 2005 with only a few short-term outages. Seismic data are transferred in real-time from the site to NORSAR for automatic detection processing. The resulting detection lists and charts and the associated waveform are forwarded immediately to the early warning centre of the Municipality of Stranda. Furthermore, we make them available after a delay of about 10-15 minutes on our public project web page (<http://www.norsar.no/pc-47-48-Latest-Data.aspx>). Seismic monitoring provides independent and complementary data to the more direct monitoring systems at Aaknes. We observe increased seismic activity in periods of heavy rain fall or snow melt, when laser ranging data and extensometer readings indicate temporary acceleration phases of the slope. The seismic network is too small and the velocity structure is too heterogeneous in order to obtain reliable localizations of the microseismic events. In summer 2009 we plan to install a high-sensitive broadband seismometer (60 s - 100 Hz) in the middle of the unstable slope. This will allow us to better constrain the locations of the microseismic events and to investigate potential low-frequency signals associated with the slope movement.