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Microseismic monitoring at the Aaknes rock slope, Norway

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The unstable rock slope at Aaknes has an estimated volume between 40 and 70 million cubic meters, and parts of the slope are moving at a rate between 4 -15 cm/year. The slope is considered as a high-risk site, because of its potential to trigger a local tsunami in the Storfjorden system. Several monitoring system have been installed and providing data to an early warning system. The seismic monitoring system consists of 8 3C sensors distributed over an area of 250 x 150 meters, a Geode digitizer and a low-power industrial computer. It is connected over a 13 km radio link to the closest internet access point in the village of Hellesylt and from there a via SDSL to NORSAR. The seismic data are transferred in near real time (1-2 min delay) and immediately submitted to further processing. We continuously monitor the network status and run an automatic event detection algorithm. The processing results are displayed in form of charts and waveform plots which in turn can be accessed through a web page (5-10 min delay). The system has been performing very reliable so far and hardly had any outages. We are recording about 1-10 strong microseismic events per week, that we think to be related with the movement of the slope. We also observed increased seismic activity during periods with heavy rainfalls and snow melt that obviously coincided with acceleration phases. The seismic data are complementary to the more direct measurements and local measurements (laser ranging, borehole inclinometers, etc) at the Aaknes slope.