Seismic monitoring of the Åknes rockslope, Norway

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In Norway, glacial erosion has shaped the landscapes for thousands of years, creating very steep fjords over the western parts of the country. The steep flanks of the fjords are potentially unstable, and their collapse could generate local flood wave causing both infrastructure damages and casualties. In this presentation, we focus on the Åknes unstable rockslope that has been well studied and instrumented over the past decades. In particular, a surface network of eight three-component geophones was installed in 2005 and has been running permanently since 2006. The seismicity recorded on-site via the automated detection of seismic signals gives precious indications about the changes in the slope movement rate. Since 2017, an automated classifier has also been implemented, sorting the detections in local microseismic events, rockfalls, distant earthquakes, noise and electronic spikes. Only the two first classes are of interest for the direct monitoring of the movements on the slope. Due to the very heterogeneous medium, the accurate location of seismic events is more difficult. More recently, in the fall 2017, a seismic string of eight three-component sensor was installed in one of the boreholes on the slope, reaching a depth of 50 m, just above the sliding plane. Although the data are strongly affected by electronic noise coming from two generators placed above and below, we have been able to identify a few events after applying an adapted filter. We aim to use the information provided by the seismic data (both surface and borehole) in terms of location and classification and integrate them with other measurements (meteorological, displacement,...) in order to be part of a robust Early Warning System on the slope.