Geophysical Research Abstracts, Vol. 9, 05307, 2007
SRef-ID: 1607-7962/gra/EGU2007-A-05307

Multidisciplinary monitoring and early warning projects: Examples from Åknes in western Norway and Turtle Mountain in Alberta, Canada

L.H. Blikra (1) And C. Froese (2)

(1) Lars Harald Blikra, Åknes/Tafjord project/International Centre for Geohazards, Estenstadveien 93, N-7049 Trondheim, Norway (labl@stranda.kommune.no)

(2) Alberta Geological Survey/Energy and Utilities Board 4th Floor, Twin Atria Building, 4999 - 98 Avenue, Edmonton, AB T6B 2X3, Canada (corey.froese@eub.ca)

Early-warning systems require several approaches to obtain reliable understanding of landslide movement and triggering; including investigations, modelling and monitoring. Over the past four years, teams have undertaken investigations, designed and installed monitoring networks and developed warning systems for three large rock slopes on two continents; the Åknes/Tafjord project in western Norway and the Turtle Mountain project in Alberta, Canada. The projects have large similarities, but differ also at several points. While the sites differ in geology and setting and the projects in budget, both projects have many common features in the challenges faced with site access, communications networks and development of warning thresholds and response protocols. Both projects also have involved a variety of research groups and private companies that have collaborated to undertake both ground based and remote sensing studies to characterize the geological structure and the extents of movement, but the primary focus of the projects is to use the studies and near real-time data stream from the sensor networks to provide warning of rapid movements that will impact on urban populations and infrastructure.

The unstable rock slopes at Åknes and Tafjord are situated in remote areas on steep mountain slopes along deep fjords, and the risk is related to the generation of destructive tsunamis. The Turtle Mountain area and the Frank slide are situated in more habitated area, and the risk is related to the direct influence of a rock avalanche.

The organization of the early-warning projects is also different, with the Turtle Moun-

tain project being a provincial responsibility, with the Geological Survey being in charge of the monitoring. The Åknes/Tafjord project on the other hand is managed by the municipalities, with the Geological Survey as geoscientific advisors.

The investigations in the projects have differed due to budget and practical problems of doing geophysical investigations and drilling at Turtle Mountain. The Åknes/Tafjord investigations have used large efforts in getting data on the 3D geometry and drilling at several sites. The investigations related to mapping of movement pattern and kinematics has been focused to methods like periodic GPS, total station, photogrammetry and satellite and ground-based SAR interferometry. At Åknes, also instrumentation in boreholes has been performed in order to detect movement pattern in the subsurface.

The design of continuous monitoring have many similarities in the two projects, and includes GPS, total station, extensometers, tiltmeters and single lasers. At the Åknes/Tafjord project, also radar monitoring and instrumentation in boreholes are being performed (inclinometrs, pietzometers, temperature).

Both projects prioritize to build a systematic database of all the data, and to integrate all the monitoring data in order to have optional and effective routines for the analysis of data.

The overall early-warning routines for the different sites will be compared, especially the complex challenges related to tsunami problems.