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Early-Warning System software for the integrated handling of subsurface monitoring (DMS) of the Åknes rockslide

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The warning system related to the subsurface monitoring in the Åknes/Tafjord early-warning centre was specifically developed as part of the handling of a future potential destructive tsunami generated by large rockslides. The system is developed in order to be able to warn and evacuate people in the hazard zone of potential tsunami waves. An early-warning system should not send any false alarms, it needs to be safe and reliable in case of disaster or fail of a single transmission system (wireless, GSM-GPRS, ethernet etc) or monitoring systems. Also, a real time database should be separate in order to increase safety. A part of the Early Warning System was installed inside the Åknes rockslide body domain (according with Bromhead definition), by means of n° 3 DMS columns (a new one will be installed in 2008). The active automatic monitoring length is 50-50-100 m (upper, middle and lower borehole, 200 m depth). A new modular software DMS Early Warning System was designed for the Åknes/Tafjord project to improve the data analysis in the decision-making support stage, with the capability to manage the data by the geoscientific monitoring group. The system needed to be web-based, also by means of portable devices.

Early warning management

The data from the DMS instrumentation column are sent through RS485 protocol to the control unit, which compares them with threshold values (set by the user) and storages them in a circular buffer. In case of movements larger than threshold values, the control unit sends a warning SMS to the reference mobile phones. The same is the

case of rapid change of water- table levels. Warning levels are counted from 1 to 4, in a growing order of danger.

The monitoring centre 1

In the monitoring centre, the control software GeoMaster takes care of downloading, through GSM network, the data stored in the control unit memory buffer. The data download can be manual or automatic at regular time intervals set by the user. In this way, GeoMaster create and stores the databases related to all monitoring columns. If the data download isn't possible, Geomaster will send a notification to the Administrator, showing the likely matter.

The monitoring centre 2

The software DMS Guardian transfers the databases on the web server through Ftp protocol. This transfer, which respects the security standard of the protocol, occurs at regular time intervals set by the user. Dms Guardian will send a notification SMS if the Ftp transfer doesn't succeed.

DMS EW

The DMS Early Warning is the software that visualize the subsurface data at the monitoring centre and everywhere an Internet connection is possible. The software in a compact check panel allows for the contextual control of displacement (E-W, N-S, Module diagrams, on Polar and Azimuthal plots) as well as the variations of the level of the water table and temperature; time histories of each multiparametric module, and displacement-velocity are also displayed at selected intervals.