Monitoring of a Mass Movement Performed by the Ground-based Radar System IBIS-L

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ABSTRACT:

Monitoring of a mass movement performed by the ground-based radar system IBIS-L Volker Buhl1, Andreas Eichhorn1 and Sabine Rödelsperger2 1Geodetic Institute, TU Darmstadt, Petersenstraße 13, 64287 Darmstadt, Germany, {buhl, eichhorn}@geod.tu-darmstadt.de 2Institute of Physical Geodesy, TU Darmstadt, Petersenstraße 13, 64287 Darmstadt, Germany, roedelsperger@ipg.tu-darmstadt.de Growing settlement activities in mountainous regions on one hand and the increasing appearance of extreme climatic conditions on the other hand can cause hazardous situations to men and infrastructure especially in densely populated areas. For this reason there is a strong motivation for monitoring and alarming of landslides. Especially the installation and investigation of innovative monitoring and early warning systems shall contribute to an increasing security and limitation of damages. The project KASIP (Knowledge-based Alarm System with Identified Deformation Predictor) is funded by the Austrian Science Fund (FWF) and deals with the investigation of the combination of slope monitoring data with a parametric numerical model which describes the physical structure of the slope. In this context, the model shall enable the calculation of simulations and predictions of slope failure and support the interpretation of the monitoring data. Starting in 2003, the monitoring of the slope was performed by tacheometer measurements in a few selected points with time intervals of several months. This not really representative monitoring data was extended in 2010 by an innovative ground-based radar system (IBIS-L, IDS company). Now, it is possible to collect laminar geometrical information of the mass movement with a temporally high resolution. In this paper the studysite ‘Steinlehnen’, the ground-based radar system and the development of analysis procedures for the monitoring data are presented. In this context, major challenges are the processing and interpretation of the laminar data. First results derived from the current IBIS-measurements are shown. A special focus is set on the combination of the IBIS-results with simulations calculated with the numerical slope model. The goal is the development of an ‘alarm manager’ which evaluates the progress of the slope deformation and indicates a possible change of the current alarm level. This is supported for example by methods of case-based reasoning (CBR).