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Integration of GB-InSAR, laser scanning and in situ monitoring on the rockslope instability of Mannen/Børa (western Norway)

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This work is part of a master thesis about the use of Ground-Based InSAR for the monitoring of rock instabilities (University of Lausanne in cooperation with the Åknes/Tafjord Early Warning Centre in Norway). Main goals are (1) the evaluation of the GB-InSAR potential to investigate different kinds of instabilities, (2) the combination of data from GB-InSAR, conventional in situ devices and laser scanning to get information about instability behavior and geometry.

The rockslope instability of Mannen/Børa is located in Møre of Romsdal County (western Norway). Mannen is a complex rockslide of 15-25 mill. m3 of volume, affecting the left side of the Romsdalen valley. Børa is a large plateau directly located on its south-eastern side and showing signs of activity. In this case, the analysis included GB-InSAR data of 2011 and 2012 campaigns in Børa compared with results of a permanent GB-InSAR in Mannen. The results of continuous monitoring in Mannen (GPS, extensometers, laser-reflectors and tiltmeters) since end of 2009, as well as periodical GPS campaigns on Børa plateau were integrated. The analysis showed a quite regular inter-annual velocity with seasonal effects in Mannen site and a slower movement in Børa. Moreover, it allowed highlighting an area in mid-slope, affected by high variations and periodical inversions of movement in the overlap sector between the two GB-InSAR. The first interpretation of this pattern involves networks of water flow across the slope.

A novel point of this site is to have two GB-InSAR systems (one permanent and one temporary) imaging the rockslope with an overlap of views. GB-InSAR results were compared to other types of monitoring data, in terms of spatial coverage (punctual vs. large area), temporal scale (continuous monitoring vs. periodical campaigns) or recorded information (eg. 3D vs. 1D along the LOS). Moreover, a structural geology analysis based on terrestrial and airborne laser scanning data provided information about the geometry of rock instabilities and sliding surfaces.