Geophysical Research Abstracts
Vol. 13, EGU2011-2399-1, 2011
EGU General Assembly 2011

Seismic- and GBSAR monitoring of a rock-slide

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Seismic monitoring on deep-seated gravitational creep usually results in a wide variety of recorded signals related to the creep or sliding of the sagging mass. These events may result from different sources, for example from a stick-slip type motion along a sliding plane, creeping along a transition zone of heavily fractured rock or from surface based events due to rock-fall or debris flow.
At the deep-seated gravitational creep Steinlehnen (Tyrol, Austria) a seismic monitoring network consisting of 5 stations is installed to monitor the seismic activity of a highly active slab (size of ∼400m x 200m) which is embedded within a larger area of the deep-seated gravitational creep Steinlehnen. The slab's depth is estimated to be ∼20m and the current displacement rate is ∼15 cm/a. In June/July 2010, the Institute of Physical Geodesy at the TU Darmstadt accomplished a continuous geodetic monitoring of the slope for the duration of 1 month using ground based Synthetic Aperture Radar (GBSAR). The GBSAR monitoring delivered displacement images of the deep seated gravitational creep including the highly active slab in intervals of 7 minutes.
This high resolution knowledge of the slope displacement, showing the trails of rock-falls and debris flows, allows an exact allocation of seismic waveforms to various geodetically observed causes. Correlating the GBSAR- and the seismic data, the seismic signatures of rock-falls and debris flows can be clearly determined and seismic events which do not correlate with any surface based displacement are likely connected to a source mechanism located in the bedrock of the rock-slide. This delivers valuable information to detect and characterize seismic waveforms recorded at mass-movements and it is another step forward to identify the mechanisms driving rock-slides and deep-seated gravitational creep.