



Seismicity of the acceleration phase of a deep-seated gravitational slope deformation

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The deep-seated gravitational slope deformation Gradenbach (Carinthia/Austria) shows a deformation with a quasi-stationary velocity of about 10 cm/a which is irregularly interrupted by acceleration phases. These acceleration phases last for months to years with maximum displacements from several decimeters to several meters. Within the framework of the International Strategy for Disaster Reduction (ISDR) of the Austrian Academy of Sciences, the last major acceleration of the slope in 2009 has been monitored by a seismic network consisting of 6 stations. The acceleration phase started in May 2009, lasted for about 3-4 months, and showed a peak velocity of about 0.8 cm/d. The continuously recorded seismic data has been semi-automatically screened for events related to the displacement of the slope. Several different types of seismic events have been identified as events being induced by the displacement of the slope. Some of the event types show a clear correlation with the evolution of the acceleration phase while the occurrence of others precede the geodetically measured begin of the acceleration phase. A characterization of the seismic event types recorded on the slope and how they are related to the deformation of the slope and other external parameters like the snow-melt is presented. Further the information content of the events in terms of the mechanism of the slope deformation and the usability of the seismic monitoring for early warning is discussed.