



## Seismic monitoring of deep-seated mass-movements

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Slopes with deep seated mass-movements are frequently observed in high mountain areas and these are commonly investigated with geodetic monitoring and active seismic experiments. However, permanent seismic monitoring is a method which can also be used to obtain additional data and, combined with the methods mentioned above, this can lead to a better understanding of the processes of deep seated mass-movements. The aim of such work to gain an insight into the microseismic activity related to the moving masses and the degree of development of the mass-movements.

Seismic monitoring campaigns have been undertaken at two deep seated mass-movements: Gradenbach (GB) and Hochmais/Atemskopf (HA), in Austria. One reason for choosing these sites for detailed studies is that the slopes are under geodetic control. This enables the relationship between the slope creep rates and the microseismic activity to be investigated. Up to 10 recording stations, equipped with 4.5 Hz geophones or 3 Hz three-component geophones, were used in the field campaigns. The data show a significant amount of micro-earthquakes located in the area of the mass-movements. These results led to the decision to plan and install a permanent three-component broadband monitoring network at Gradenbach. This network, which consists of three broadband seismometers, will be completed at regular periods with a further five stations, each equipped with a three-component 4.5 Hz geophone. The results of the past campaigns and the current permanent monitoring will be shown. A comparison between the broadband and the short period data will be made and the possible advantages of broadband seismometer data compared to short period data will be discussed.