

## **Geophysical measurements and monitoring on the Pechgraben Landslide in Upper Austria**

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In January 2013, after an intense rainfall of about 400 mm, the historic slope movement northwest of the village of Pechgraben (municipality Großraming, Upper Austria) started to move. Already in early March the landslide with an area of about 7 hectares came to a halt. After the long-lasting rainfall (200mm) from June 1st to 3rd 2013 the Pechgraben landslide was reactivated with an extent of about 80 ha on June 6th. This landslide is therefore the largest in Austria since the last 5 years. Several million cubic meters of loose material was moving towards the settlement area. Already one day later, on June 7th, 2013, emergency measures began immediately. The Geological Survey of Austria (GBA), the University of Natural Resources and Life Sciences, Institute of Mountain Risk Engineering (IAN), and the consultant engineering office Moser/Jaritz as well as the local fire brigade and the federal armed forces supported the Torrent and Avalanche Control with their remediation measures.

In addition to the emergency measures, which consisted mainly of water diversion and material removal, a comprehensive monitoring system (GPS, inclinometer, geoelectric monitoring, airborne laserscan and aerial photogrammetry, etc.) has been created in order to document the development of the slope movement and to be able to take further measures if necessary.

The geophysical part undertaken by the Geological Survey of Austria consisted of an airborne geophysical survey (EM, magnetics, gamma radiation) as well as several geoelectric profiles to understand the geology and mechanism of the landslide. To monitor the movement, we set up 5 different geoelectrical monitoring profiles, permanent inclinometers, photo monitoring, piezometers, as well as soil humidity and precipitation sensors.

Hübl, J., Schraml, K., Lindner, G., Tartarotti, T., Gruber, H., Gasperl, W., Supper, R., Jochum, B., Ottowitz, D., Gruber, S., Marschallinger, R., Moser, G. (2015): Synthesebericht der Höhenberg-Rutschung im Pechgraben/Großraming. IAN Report 158, Institut für Alpine Naturgefahren, Universität für Bodenkultur – Vienna (unpublished)

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