Geoelectric long-time monitoring: Changes and pattern within subsurface resistivity during different precipitation events in the Salcher landslide, Gresten (Lower Austria)

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Geoelectric methods are a firm component within the investigation of landslides. Commonly, geoelectric methods are used for single measurements only, integrations into continuous long-term monitoring programmes exist indeed, but are rare. Of particular interest is hereby the linkage of different methods and techniques in order to be able to monitor the subsurface pattern which determines heavily landslide dynamics. Within the NoeSLIDE project (noeslide.at), a variety of geotechnical, hydrological, meteorological and geoelectric measuring systems have been installed to investigate the landslide dynamics in detail. With the Installation of a long-time-monitoring system at the Salcher landslide in Gresten in Lower Austria, also continuous electrical resistivity data with a 4-hour resolution became available since 2014. The installation and operation of the geoelectrical monitoring system (Geomon4D) was carried out by the Geological Survey of Austria in the frame of the project LAMOND funded by the Austrian Academy of Science.

The aim of this study is to analyse selected resistivity data within the period from 2014 to 2016. Especially, their spatial changing behaviour for distinct different precipitation events are examined. Subsurface points within the longitudinal profile were selected using time-lapse-inversion. Then, the resistivity-timelines of those points and their 2-dimensional clustering were analysed.

It appeared that the profile can be divided relatively well into clusters: In parts of the profile surface the resistivity and its change over time is relatively high, nevertheless, with increasing depth these values clearly decrease. The reaction of the resistivity distribution to different precipitation showed that only a strong precipitation event of several days leads to a change of resistivity in the subsurface. A very short but heavy rain as well as continuous precipitation lasting over several days, sometimes even associated with snowfall and –melt, showed no effects in resistivity. Further investigations need to couple that behaviour also with other important parameters (e.g. soil moisture, soil temperature). Those interlinkages will be assessed in the future.