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Time-lapse resistivity measurements in landslide monitoring on example of complex slope deformation Čeřeniřtř (České středohoří Mts, Czech Republic)

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Studies of complex landslides bring us knowledge on structure and behaviour of individual parts of such slope deformation which can differ in several aspects. In case of Čeřeniřtř complex slope deformation we can distinguish upper part close to the headwall which is affected by deep-seated gravitational processes such as spreading and block subsidence of basalt blocks and tuffites. Central part is formed by flat block (platform) which is followed by active landslide built by pyroclastics and tuffites.

This study is aimed to the distal, recently active part of the slope deformation. After the ERT survey along the whole deformation (2012), in 2013 resistivity monitoring of active colluvial lobe was implemented in form of a transversal profile. The profile is 189 m long, of which first and last 40 m reach surrounding slopes. Electrode stepping was 3 m, altogether 64 electrodes were used in Wenner-Schlumberger array. Also, Wenner Alpha and Dipole-dipole arrays were tested.

Repeated resistivity measurements with one month period together with the monitoring of precipitation, air and soil temperature and with soil moisture gauges are aimed to bring valuable and detailed information on conditions in the moving earthflow.

Furthermore, using the monitoring of movement velocity based on repeated geodetic measurements and laser scanning we shall be able to determine the causal connection between precipitation, soil saturation and (re)activation of mass movements. The time-lapse resistivity survey would serve as an effective tool which can yield information on subsurface water saturation and its changes and, also, it could help to reveal relations within the system „precipitation – subsurface saturation – mass movement activation“.

The permanent profile was also used as the testing site for other resistivity techniques, such as vertical electrical soundings (VES) and resistivity profiling (RP).