

## Long-term ERT monitoring of embankment dams in Sweden

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Electrical resistivity tomography (ERT) monitoring with automatic daily measurement is carried out on two embankment dams in northern Sweden since over 10 years. On one of the sites, Hällby, monitoring started in 1996, but the on-shore electrodes and the instrument were replaced in 2006. Data are transferred in zip archives to a server at Lund University on a daily basis. The data are evaluated with time-lapse inversion of weekly averages derived from time-base de-spiking and filtering using automated routines based on the approach described by Sjödah<sup>1</sup> et al. (2008). The evaluation frequency varies from once a year to once every three or four years depending on the need of each dam. The evaluation and interpretation focusses on variation and long term changes in the resistivity, with the aim to get an early warning for anomalous leakage and internal erosion inside the embankment dam. Time-domain induced polarisation (IP) is also measured along with the resistivity, but so far IP data are not included in the automated evaluation.

During the first 10 years at Hällby increasing annual variations and a long term trend increase in resistivity were detected in the left embankment dam. Together with other observations that indicated anomalous leakage and internal erosion, which lead to reinforcement of the dam. This necessitated re-installation of the electrodes and cables. During the past decade the monitoring results show normal annual variation which is mainly caused by temperature effects and so far no indication of anomalous trends have been detected in any of the dams (see example in Figure 1).

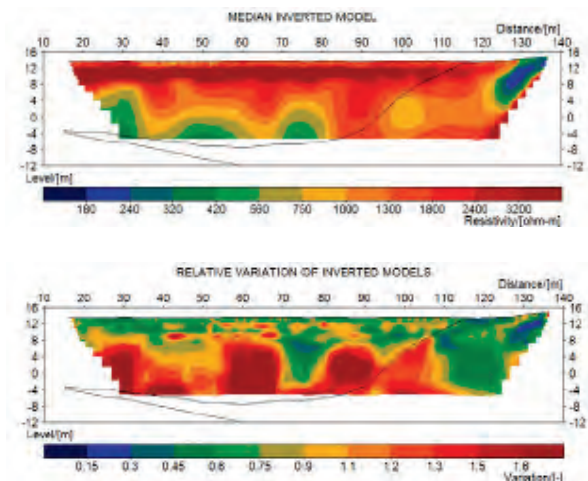


Figure 1: Example of typical results for evaluation over a period of one year showing (a) median resistivity, (b) variation

### REFERENCES

Sjödah<sup>1</sup>, P., Dahlin, T., Johansson, S. and Loke, M.H. (2008): Resistivity monitoring for leakage and internal erosion detection at Hällby embankment dam, *Journal of Applied Geophysics*, 65, 155-164.