

KEYNOTE LECTURE: Monitoring of embankment dams and waste deposits

Torleif Dahlin¹

(1) *Engineering Geology, Lund University, Sweden*

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Electrical resistivity tomography (ERT) monitoring with automatic daily measurement has been carried out on three embankment dams in northern Sweden over several years, on two of them since over 10 years. 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 Sjö Dahl et al. (2008). The evaluation and interpretation focusses on relative 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. A method for seepage flow quantification has also been presented (Sjö Dahl et al. 2009). Time-domain induced polarisation (IP) is measured along with the resistivity in on-going monitoring, but so far IP data are not included in the automated evaluation.

Short term monitoring has been made on some waste dumps in southern Sweden on a number of occasions, with typical duration of a couple of weeks. Initially the objective was to track the water flow paths during injection tests in a biocell reactor, which was successfully achieved via patterns of decrease in resistivity. The results, however, also revealed patterns of increasing resistivity that were initially thought to be caused by noise but were eventually linked to gas production and migration in the biocell reactor. Following this ERT monitoring was successfully tested for tracing both water and gas migration inside waste deposits (Loke et al. 2009; Rosqvist et al. 2011).

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