

## 29

### **SaMoLEG – development of a geoelectrical large scale monitoring system using long electrodes**

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Salt water intrusion through tectonic weakness zones or eroded clay layers threatens the fresh water supply in some regions of northern Europe. The aim of this project is to develop an ERT monitoring system that covers a typical catchment area of water plants using metal cased boreholes as long electrodes (Daily et al. 2004) in conjunction with surface-electrodes.

A first measurement for a static case was made in late 2012 on a 500 x 500 m test site in Müllrose (Brandenburg). The setting consists of 12 boreholes and 7 additional surface-electrodes. A permanent cabling is installed and ready for further time lapse measurements on a field scale. For testing a time lapse approach for Long Electrode Electrical Resistivity Tomography (LEERT) a laboratory experiment was designed. An 88 x 76 x 48 cm aquarium filled with filter gravel was saturated with tap water. Twelve electrodes inserted up to a depth of 20 cm were distributed on a regular 3 x 4 grid with 20 cm spacing. An optimal set of electrode combinations with the highest data importance was calculated. An inflow of a common salt solution mixed with uranine-tracer was made on the left side of the tank over the whole front. The saturation with salt water and the following desaturation was monitored by ERT measurements. Inversion results coincide with photographs of the aquarium and prove the effectiveness of the method in a small scale.

3D static inversion results of the test site Müllrose show good agreement with 2D ERT profiles and water samples allowing for first monitoring tests. The time lapse results of the laboratory measurement using the first time step as a base line model show reasonable resistivity distributions comparable to the optical observation.