

## **CONSIDERATIONS REGARDING SMALL-SCALE BOREHOLE TO SURFACE ERT**

*Norbert Klitzsch, RWTH Aachen University; Johanna Ochs, RWTH Aachen University*

We developed a geoelectrical borehole tool for near-surface measurements, allowing for highly resolved resistivity distributions in soils. The tool consists of 20 ring electrodes distributed over one meter on a plastic rod. For ERT measurements, we push it into the ground ensuring good electrical contact and operate it in combination with surface electrodes. With the latter, we aim at recovering 2D structures beyond the near borehole region.

The small electrode distances of the setup allow a high resolution but also pose a challenge. A typical assumption used in ERT inversion does not hold anymore, neither the ring electrodes of the borehole tool nor the surface electrodes can be represented by dimensionless point electrodes. Thus, we consider the electrodes with their real 3D-shape as conductive bodies, i.e., we utilize the conductive cell model using the program BERT (Boundless ERT). Therefore, the data gathered with a 2D-layout (consisting of surface and borehole data) have to be inverted in 3D too. This approach allows for an exact replication of the real conditions, as the whole electrode surface is involved in the measurement.

We evaluate the approach for a couple of artificial models using crossed-bipole configurations. Moreover, we apply it to laboratory data from a well-defined layered box model using the borehole tool only. The inversion procedure accurately reconstructs the artificial model cases and is also able to recover the laboratory model.