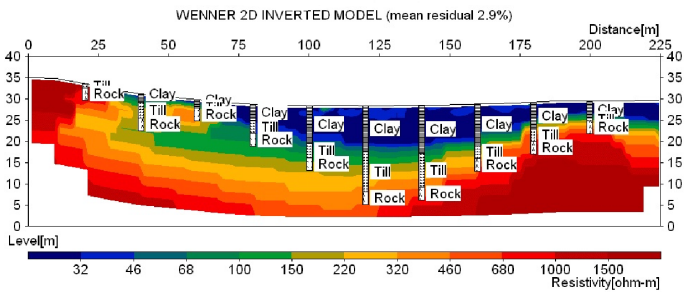
Electrical Imaging

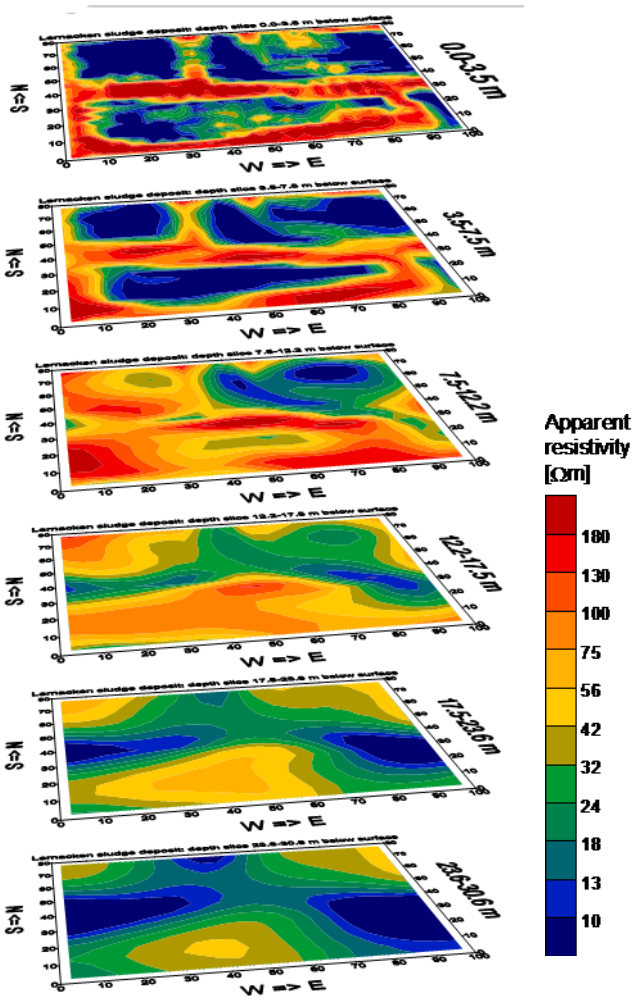
Electrical imaging has emerged as a prime method for infrastructure projects and environmental studies in recent years and the demand for better information is expected to continue. In such applications the following is essential:

- High resolution at shallow depths
- Automated data acquisition for cost effectiveness
- Superior area coverage through at least two-dimensional information
- Output presented in easily interpretable form

The ABEM Terrameter LS Imaging System, developed in cooperation with the Dept. of Engineering Geology at Lund University, provides fast, accurate and automated resistivity and IP imaging in 2D and 3D. The entire data handling process is automated as far as possible, including data acquisition, processing, interpretation and presentation. This is made possible by utilising state of the art technology.



2D resistivity image with geotechnical information. Note the good correlation between low resistivity areas and clay



3D resistivity model outlining a buried sludge deposit and migration of contaminants towards depth

Key features of the LS Imaging System

- Integrated roll-along function
- Automatic electrode contact test
- Possibility to measure IP

System Components

- Terrameter LS (4, 8 or 12 channel) resistivity and IP instrument, with integrated PC for full control of data acquisition process and storage of data. Built-in true constant current regulator with maximum ±600 V (1200 V peak-to-peak) and 2500 mA out put. 12 V DC power supply.
- Terrameter LS housed in rugged waterproof (IP66) casing for reliable performance during harsh field conditions.
- Field cable set with electrodes and cable jumpers. Highly durable multi-conductor cable terminated in both ends with military standard connectors. User friendly acquisition and presentation software for standard or user defined arrays.

Major advantages

A major advantage of the electrical imaging method is that it produces continuous images of the variation in properties in the subsurface. This method can serve as an excellent basis for planning detail investigations via for example a drilling and sampling programme with optimized sampling locations. The detail investigation results can then in turn be used as a base for a refined interpretation of the electrical imaging data, leading to a comprehensive and reliable model of the underground.

Typical areas of application include:

- Groundwater resource management and vulnerability assessment
- Mapping and monitoring of contaminated ground/groundwater
- Geotechnical pre-investigation
- Geological mapping
- Mapping/prospecting of natural resources
- Geothermal prospecting
- Sub-bottom mapping at sea and in lakes
- Mapping of frozen ground/permafrost
- Archeology

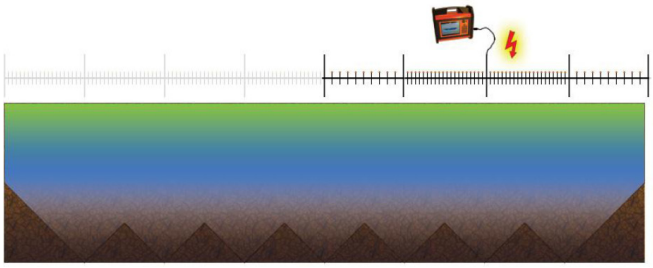
Resistivity Imaging - a Robust Method

Resistivity imaging is a robust method, which often produces good results even close to for example power lines and railways, in contrast to EM methods that are mostly useless near such installations. It is, however, important to realise that disturbances can occur and that false anomalies can arise from for example metal pipes of other conductive objects in the ground.

The method is well suited for long term monitoring. A series of measurements taken at different times can provide information about variations in water content, movement of pollutants in the ground, seepage through embankment dams etc.

Automated data acquisition allows a field crew to carry out complementary investigations during measurement (e.g. levelling, GPS positioning). However, the Terrameter LS system offers outstanding field productivity; in standard electrical imaging it means that the major limiting factor is the pace of work of the field crew rather than the equipment.

On-screen pseudo section of imaging profile enables instant quality control during field operations



Principle of roll-along using the Terrameter LS and 4x21 Imaging cable system

The Terrameter LS system can be expanded using optional relay switches (ES10-64), each adding up to 64 electrodes to the array.