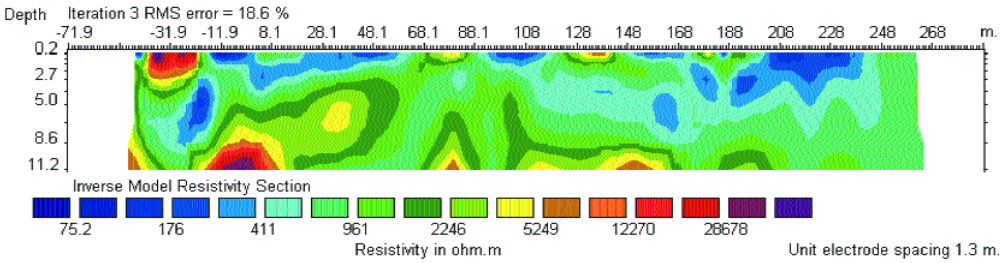
OhmMapper – Resistivity Mapping

- No Metal Electrodes Required
- Single Person Operation
- Low Power Consumption
- Rapid Deployment, Fast Data Acquisition
- Optimized for Use in Highly Resistive Areas (permafrost, deserts, sand, snow, resistive geology, even roads and pavement)

OhmMapper being towed over grass and pavement. Contact is made capacitively with the ground through insulated cables.



OhmMapper TR data collected over granite with surface weathering. Inversion done with RES2DINV program from MH Loke.

Fast Resistivity Measurements Without Probes

The new Geometrics OhmMapper is a capacitively-coupled resistivity meter that measures the electrical properties of rock and soil without cumbersome galvanic electrodes used in traditional resistivity surveys. A simple coaxial-cable array with transmitter and receiver sections is pulled along the ground either by a single person or attached to a small all-terrain vehicle. Thus, data collection is many times faster than systems using conventional DC resistivity.

Create Continuous Depth Sections Easily

Multiple passes with the OhmMapper, at different transmitter-receiver spacings, permit electrical sounding done at a fraction of the time of expanding-spread resistivity or electromagnetic methods. Data collection is continuous so the near surface is finely sampled, providing high quality data even in areas with complex geology.

Superior Mapping Technology

The OhmMapper's Geometrics DataMapper console provides graphical display of both position and data. View the last five profiles or scroll a window through the entire data set – right in the field.

FEATURES

- ***QUALITY RESULTS IN DIFFICULT AREAS:***

  The OhmMapper operates on ice, frozen ground, rock outcrops, or paved roads where standard DC resistivity cannot be used. There are no stakes to put in the ground.

- ***FAST SURVEY OPERATIONS:***

  Operators can collect resistivity data as fast as they can walk, or quickly collect data using a snow-mobile, ATV, or other tow vehicle using the OhmMapper's towable resistivity array.

- ***ACCURATE, HIGH-RESOLUTION TARGET DETECTION:***

  The OhmMapper provides high-resolution resistivity information for a wide variety of applications because of its high data acquisition rate.

- ***EASY OPERATION:***

  A compact unit and simple operation allows surveying by a single operator.

- ***IMMEDIATE RESULTS:***

  Operators can see what has been surveyed, any gaps in the survey, and where they are on the survey grid using the OhmMapper's real-time grid mapping.

- ***ACCURATE POSITIONING:***

  The OhmMapper allows real-time acquisition of position information through a GPS interface.

APPLICATIONS

- ***GROUNDWATER EXPLORATION***

  Detect geologic faults
  Detect fracture zones
  Image clay layers and aquitards
  Find buried stream channels
  Locate likely aquifer structures
  Trace salt-water intrusions

- ***MINERALS EXPLORATION***

  Measure depth to bedrock
  Detect mineralized zones
  Find sand and gravel beds
  Define limits of clay and marble deposits
  Define structural geology of potential mines

- ***ENGINEERING STUDIES***

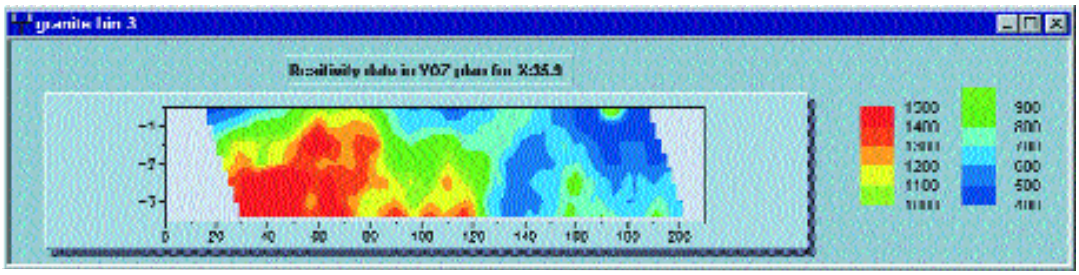
  Measure integrity of levees
  Detect permafrost and ice lenses
  Detect seepage from dams
  Measure resistivity for power-line grounding
  Detect voids under roads and building sites

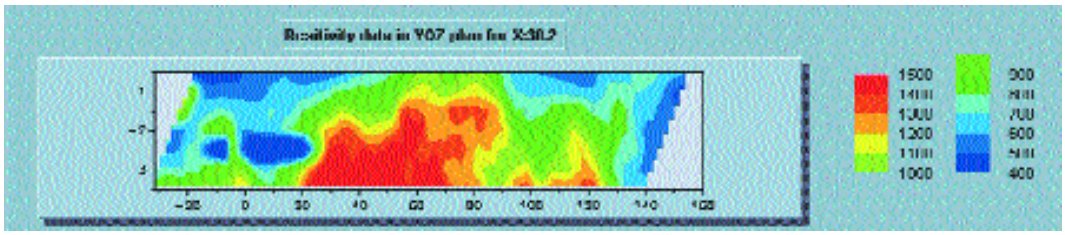
- ***ENVIRONMENTAL INVESTIGATIONS***

  Detect leakage plumes from landfills
  Map environmental contaminant plumes

- ***OTHER APPLICATIONS***

  Archaeological studies
  Academic research





Two separate pseudosections made from OhmMapper data with Geometrics DataMapper software. First section done in N-S direction and second section done in S-N direction. Note close matching in overlapping areas.

GENERAL DESCRIPTION AND THEORY OF OPERATION

- **The OhmMapper TR1 is a capacitively-coupled resistivity system** designed to measure subsurface resistivity in areas where exploration using a traditional galvanically coupled (DC) resistivity system is impractical, slow, and expensive. The OhmMapper consists of an ungrounded dipole transmitter, receiver, and a data logger. An AC current is coupled into the earth by the transmitter and measured at the receiver. This measured voltage is proportional to the resistivity of the earth between the dipoles. Apparent resistivity is calculated using the appropriate geometric factor for the capacitively-coupled antenna array.

- **The OhmMapper is designed to be pulled along the ground as a streamer**, providing a nearly continuous apparent resistivity profile. This design increases the resolving power and productivity of the system relative to traditional DC resistivity systems. Data is logged using the Geometrics DataMapper Console. The OhmMapper receiver is connected to one of the console's serial ports for data acquisition via a fiber-optic interface. Data are graphically displayed in real time on the console screen. At a sampling rate of two times per second the OhmMapper TR1 has a total storage capacity of approximately 24 hours of data acquisition.

- **Geometrics DataMap software is used to download, edit, and process OhmMapper data** and export it in standard format for inversion using commercial DC resistivity interpretation tools.

- **Survey Types:** OhmMapper surveys are based on the in-line (axial), dipole-dipole arrangement for resistivity measurements. There are three ways to view OhmMapper data depending on the method of data collection. The simplest method is to keep a single, constant distance between the transmitter and receiver (N-spacing) as the operator walks a multi-line survey grid. This provides a "constant-depth" resistivity contour map of the survey site.

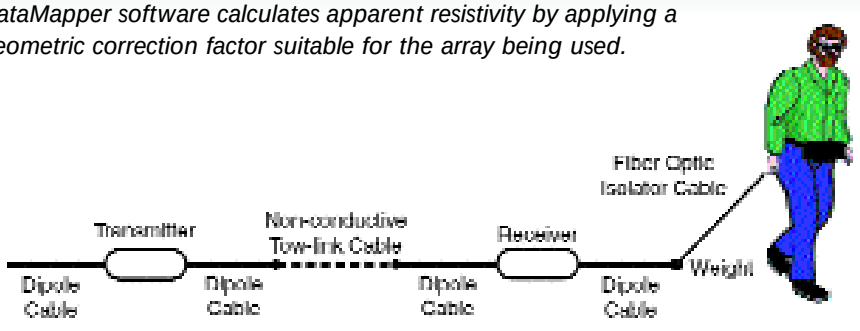
  A slightly more involved technique can be used to give a 2-D depth section, which provides a view of how resistivity varies with depth along a profile. This involves resurveying a single profile line with several different transmitter-receiver spacings.

  By combining the two methods above, and collecting data from multiple profile lines with multiple transmitter-receiver spacings, a 3-D data set can be collected for processing in an appropriate 3-D imaging software package.

- **Depth of Investigation:** The depth to which OhmMapper data can be reliably interpreted depends on the dipole length and the distance from the transmitter dipole to the receiver dipole. The practical distance at which the receiver can detect the transmitter depends on the resistivity of the earth. Typical depths of investigation are 10 to 20 meters.

- **Skin depth effects on EM measurements** often determine the practical limit of the depth of investigation in highly-conductive areas. The approximation of skin depth, in meters, is 500 times sq. rt. (rho/f) where rho = resistivity and f = frequency. For example, in 10 Ohm-meter earth the skin depth is 12 meters.

Here's How It Works: A transmitter electrifies two coaxial cables (transmitter dipole) with an AC current. Current is thus coupled to the earth through the capacitance of the cable. A matched receiver, automatically tuned to the transmitter frequency, measures the associated voltage picked up on the receiver's dipole cables. The receiver then transmits a voltage measurement, normalized to current, to the logging console. After downloading to a computer the DataMapper software calculates apparent resistivity by applying a geometric correction factor suitable for the array being used.



SPECIFICATIONS:

Operating Principle:
Constant-current, capacitively coupled, dipole-dipole resistivity.

Operating Range:
From < 3 to > 100,000 Ohm-meters.,

Cycle Rate:
Selectable data logging rate up to 2 times per second.

Data Storage:
2 Mbytes of non-volatile RAM.

Audio Output:
Metronome, signal amplitude, error alarm.

Visual Output:
320 by 200 graphic LCD display, daylight visible with selectable outputs for:

1. Data Display: 5 line profiles of resistivity.
2. All system setup functions.
3. All survey functions: survey profile number and direction, station or GPS number, test line number.
4. Survey monitor functions.
5. Survey diagnostics.

Weight:
Console: 1.6 kg.
Transmitter with batteries: 3.2 kg.
Receiver with batteries: 3.2 kg.
Battery Pack / Harness: 1.6 kg.
Depressor Weight: 3.2 kg.
Dipole Cables: 85 g / meter.

Transmitter Specifications:
Frequency: approx. 16.5 kHz.
Output Power: Up to 2 Watts.
Output Current Maximum: 16 mA.
Output Current Minimum: 0.125 mA.

Receiver Specifications:
Cable Lengths: 5m standard (x4), others optional.
Input Impedance: >5 M Ohm.
Measured Voltage Accuracy: Better than 3%.
Input Voltage Range: 0-2 V RMS.
Power Line Rejections: > 100 dB.

Dimensions:
Console: 15 x 8 x 28 cm.
Battery: 8 x 13 x 20 cm.

Battery:

1. Transmitter / Receiver – 2 x 6 VDC (12 VDC).
2. Console – 28 V DC.
3. Internal battery backup for clock and nonvolatile RAM.

Environmental:
Temperature: -25 C to +50 C.
Note: At less than –10 C the LCD screen must be kept warm.

Internal Clock:
Resolution of 0.1 drift < 1 second / day

Options and Spares:
Dipole Cables (specify 1m, 2.5m, 5m, or 10m).
Connector termination kit.
Replacement spares kit.
Dipole-Dipole Inversion Software.

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