ELECTRICAL RESISTIVITY METHOD

GEOVision geophysical services

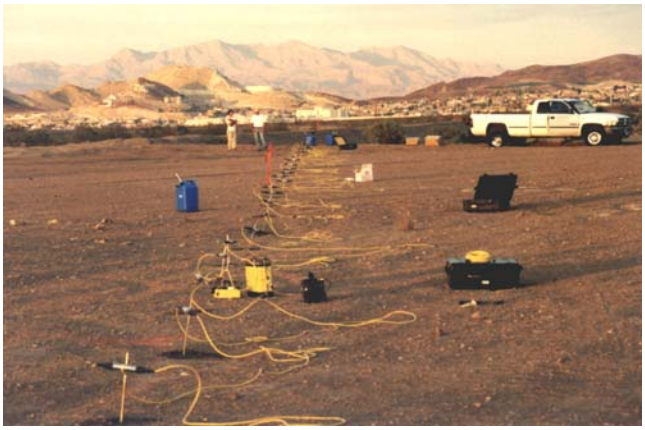
The electrical resistivity method involves measuring the apparent resistivity of soils and rock as a function of depth or position. The resistivity of soils is a complicated function of porosity, permeability, ionic content of the pore fluids, and clay mineralization. The most common electrical methods used in hydrogeologic and environmental investigations are vertical electrical soundings (resistivity soundings) and resistivity profiling.

During a resistivity survey, current is injected into the earth through a pair of current electrodes, and the potential difference is measured between a pair of potential electrodes. The current and potential electrodes are generally arranged in a linear array. Common arrays include the dipole-dipole array, pole-pole array, Schlumberger array, and the Wenner array. The apparent resistivity is the bulk average resistivity of all soils and rock influencing the current. It is calculated by dividing the measured potential difference by the input current and multiplying by a geometric factor specific to the array used and electrode spacing.

In a resistivity sounding, the distance between the current electrodes and the potential electrodes is systematically increased, thereby yielding information on subsurface resistivity from successively greater depths. The variation of resistivity with depth is modeled using forward and inverse modeling computer software.

GEO*Vision* geophysicists apply resistivity sounding techniques to

- Characterize subsurface hydrogeology
  - Determine depth to bedrock/overburden thickness
  - Determine depth to groundwater
  - Map stratigraphy
  - Map clay aquitards
  - Map saltwater intrusion
- Map vertical extent of certain types of soil and groundwater contamination
- Estimate landfill thickness



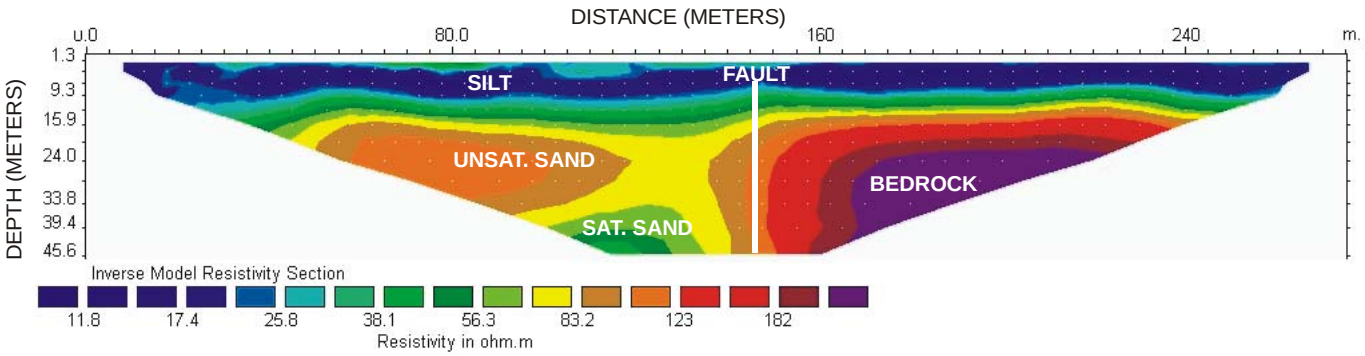
AGI Sting Resistivity Imaging System

In resistivity profiling, the electrode spacing is fixed and measurements are taken at successive intervals along a profile. Data are generally presented as profiles or contour maps and interpreted qualitatively.

GEO*Vision* geophysicists apply resistivity profiling techniques to:

- Map faults
- Map lateral extent of conductive contaminant plumes
- Locate oil field sumps and mud pits
- Locate voids and karsts
- Map heavy metals soil contamination
- Delineate disposal areas
- Map paleochannels
- Explore for sand and gravel

When information on both the horizontal and vertical extent of a subsurface feature is desired, it is common to combine the sounding and profiling techniques. The recent advent of automated data acquisition systems has made it possible to very efficiently gather 2-D resistivity data. With these systems it is possible to lay out a large portion of the line, connect the electrodes to the data acquisition system using multi-core cable or intelligent nodes, and have the resistivity system automatically gather all of the measurements using preprogrammed arrays. The resistivity data is then downloaded to a computer and modeled using 2-D forward and inverse modeling software.



2D Resistivity Imaging to Map Fault in Mohave Desert

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