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ELECTRICAL RESISTIVITY IMAGING

Introduction:
Electrical resistivity imaging is a multi-electrode profiling technique that records hundreds of subsurface data points which are used to produce a colored two-dimensional cross section of the earth. Some typical examples are listed below.

Mapping Applications:
1. Bedrock fracture zones
2. Fault zones
3. Delineating tunnels and cavernous zones
4. Contamination plumes
5. Characterizing landfills
6. Water table determination
7. Archeological investigations

Brief Explanation:
The direct current resistivity method uses a man-made source of electrical current that is injected into the earth through grounded electrodes. The resulting potential field is measured along the ground using a second pair of electrodes. The transmitting and receiving electrode pairs are referred to as dipoles. By varing the unit length of the dipoles as well as the distance between them, the horizintal and vertical distribution of electrical properties can be recorded.

Instrument:
Direct current resistivity measurements are made with a Sting R1/IP earth resistivity meter (see figure 1) made by Advanced Geosciences. The instrument serves as the main recording unit for the Swift multi-electrode cable system (up to 64 electrodes).

Figure 1 – Sting Resistivity Imaging System.

Limitations:
Proposed lines should be positioned to avoid large underground metallic pipes electric lines, grounded fencing, and overhead power lines.

The depth of investigation is approximately 20% - 25% of the total line length. It should be noted that the resolution of the resistivity method decreases with increasing depth, due to the systematic widening of the dipoles. The highest resolution and most accurate depth conversion is provided in the upper 30% of the modeled cross section where the resolution is 1/3 the electrode spacing.

Tying lines into existing borehole data can vastly improve the modeling.

Examples:

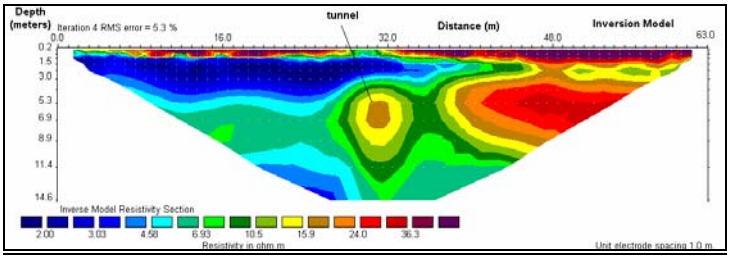

Figure 2 - Example resistivity model recorded across an underground tunnel.

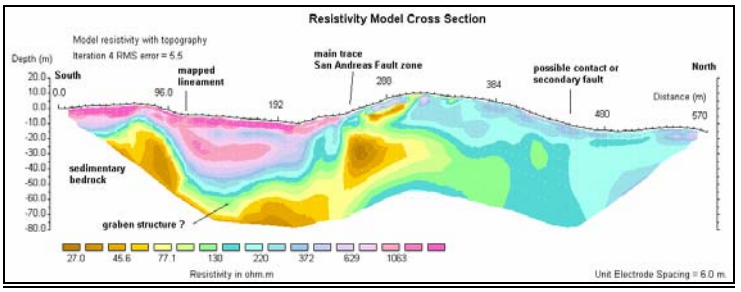

Figure 3 - Example resistivity model recorded across the San Andreas Fault zone.