

## TIME DOMAIN ELECTRO-MAGNETIC METHOD

The method of TDEM survey consists of reconstructing the distribution of the real resistivity of the subsoil at middle - elevated depth (up to 300-400 m).

The typical configuration of investigation for resistivity sounding is composed of a transmitter connected to a loop of electric cable (square, rectangular or circular) places on the ground and a receiving loop of the same dimensions. The dimension of the loop is proportional to the depth of investigation (greater is the area of the loop and greater is the depth of investigation).

The DC current sent by the transmitter in the loop on the ground is a square wave with null phase that is interrupted and redoubt to zero every second quarter of period. The frequency of the interruptions varies from 300 Hz, generally used for investigations to small depths, to 0.075 Hz, used for investigating to great depths.

The principle of operation of the method is based on the fact that, when a flow of DC current is interrupted, it doesn't instantly decay to zero provoking the variation of the primary magnetic field. This variation instantly induces in the subsoil, in proximity of the transmitting cable, rings of parasitic currents that spreads downward in the subsoil and toward the outside. These currents produce, to them turn, a secondary magnetic field that opposes him to the variation of the primary magnetic field.

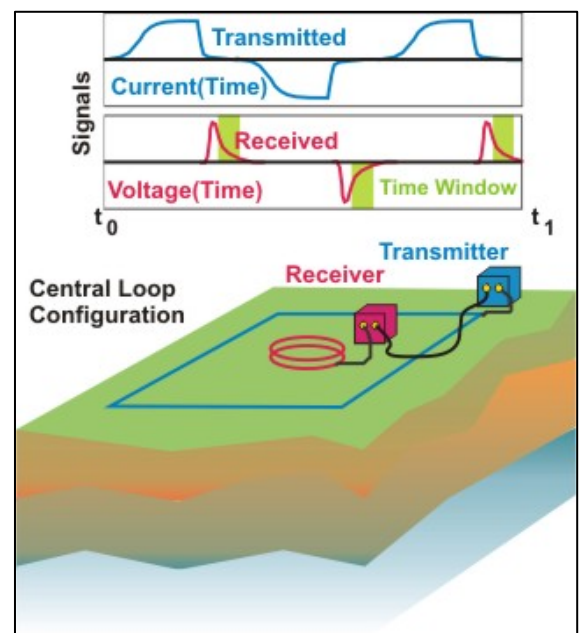
The variation of the intensities of the parasitic currents, and the decadence of the secondary magnetic field are influenced by the resistivity of the grounds and therefore the measure of this variation related to the time furnishes, thanks to elaboration with special software, the measure of the resistivity related to the depth.

The TDEM survey is used for appraising:

1. Presence of underground water (deep water research up to 300-400 m)
2. Depth of the bedrock
3. Location of faults and rock fractures
4. Characterization of cave, projects of infrastructures, landslide, etc.

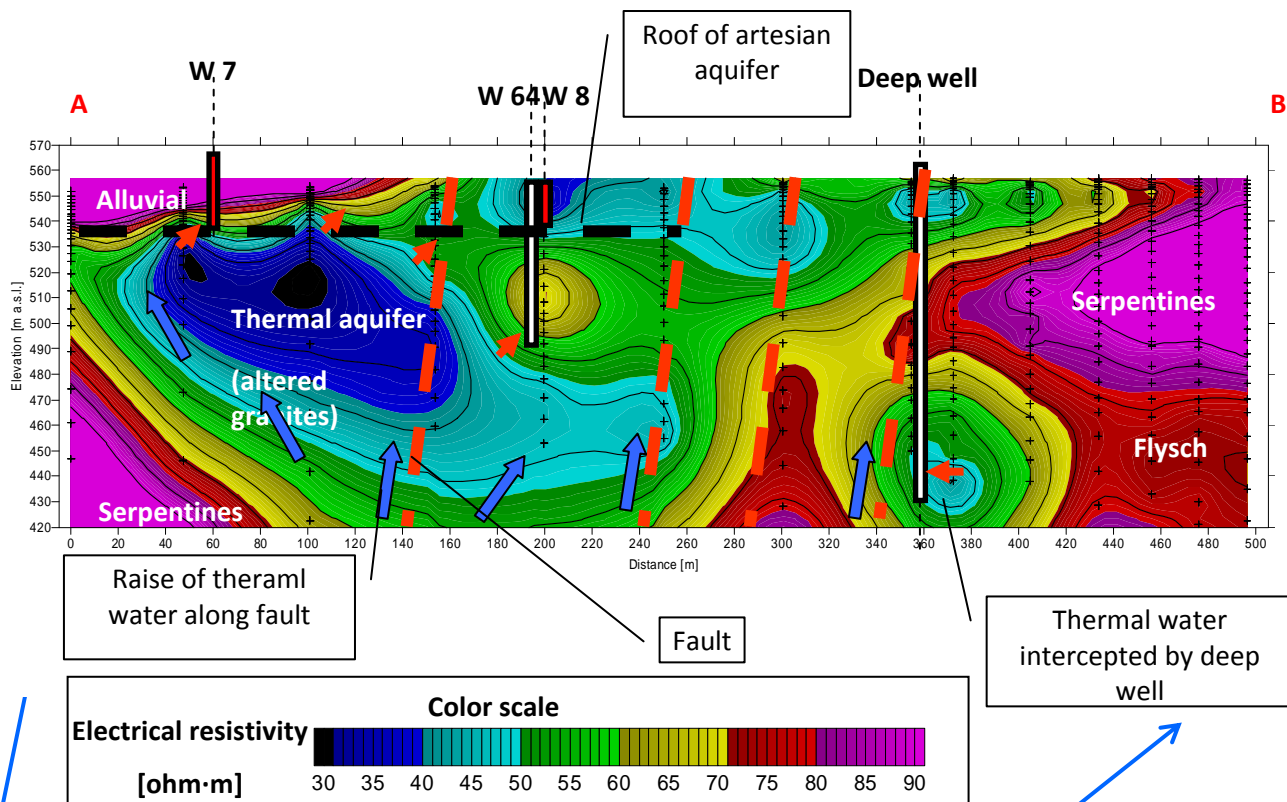
The maximum depth of investigation is about 300-400 m for square loops with side of 150-200 m.

The data are processed with specific software developed by the Polytechnic of Turin, that allow the definition of 2D and 3D models of the subsoil.



## DEEP GROUNDWATER WATER RESEARCH

TDEM SECTION IN THERMAL AREA

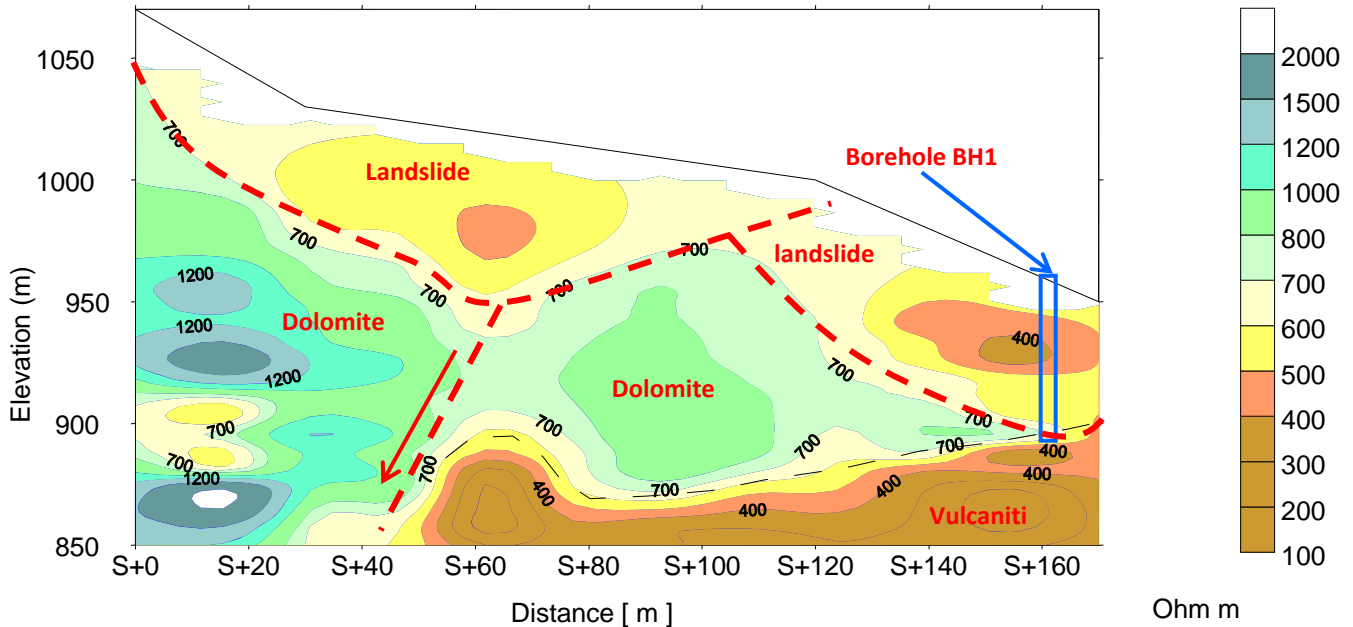


The TDEM section illustrated above has been traced in the thermal Uludag area (Turkey), to define:

1. the geological and hydrogeological models of thermo-mineral water
2. the extension of the aquifer
3. the potential productivity of the aquifer for new water wells.

## DEEP GEOLOGICAL MODELS

### CHARACTERIZATION OF LANDSLIDE



The TDEM section illustrated above has been traced on an ancient body of landslide characterized by several phases of gravitational movement, sets on a dolomite/volcanic bedrock. Compared with other geophysical methods, TDEM has a very favorable ratio between length of the section and depth of investigation. For the example showed above, the maximum depth of investigation is about 200 m versus a total length of the section of 160 m. As for the geoelectrical survey, the passage from the physical model (distribution of the electrical resistivity), to the geologic model (stratigraphy) is obtained by calibration with boreholes logs.

