

## Spartan Magnetotellurics for Geothermal Exploration

### SPARTAN MT TECHNOLOGY

Magnetotellurics and the use of Spartan MT continue to increase in the geothermal exploration industry. Spartan magnetotellurics is a proven technique for acquiring high quality ground magnetotelluric measurements in a variety of geologic terrains. Here we discuss:

- What is Spartan?
- How is it configured?
- What do the data look like?
- What are the benefits of Spartan?
- What are the benefits of Spartan for geothermal exploration?
- Why Quantec?

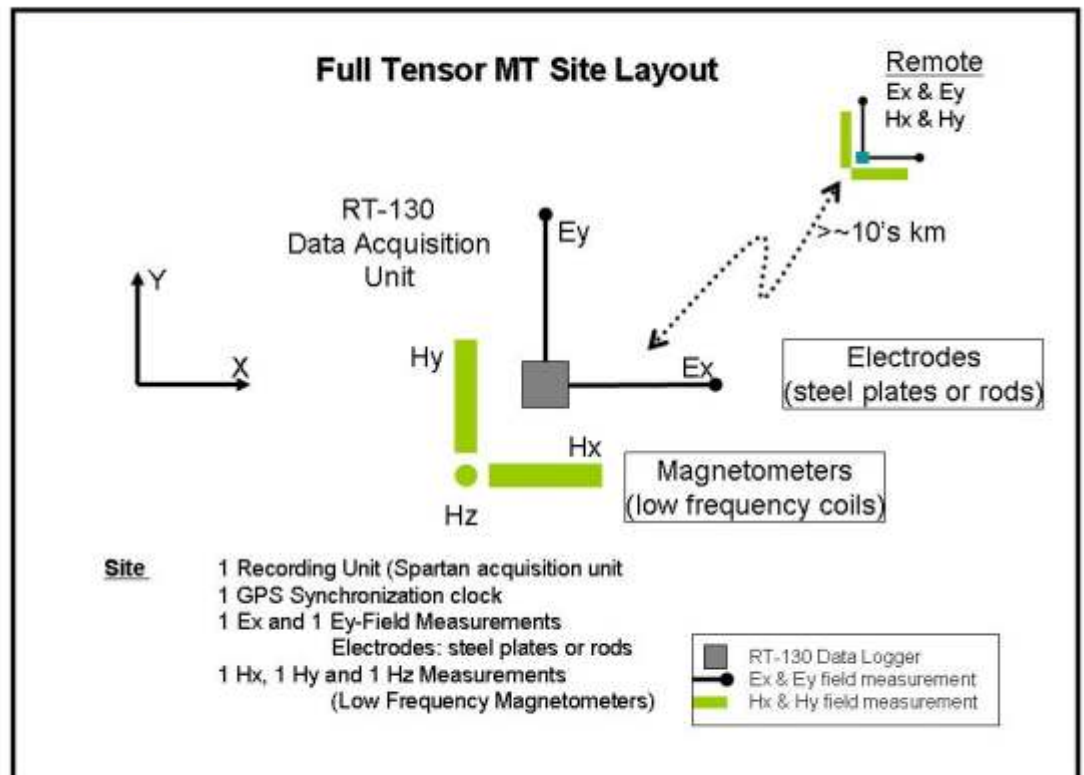


### WHAT IS SPARTAN?

Spartan MT is an electromagnetic geophysical technique that uses natural electric fields from lightning sources, solar flares and ionospheric resonances to induce current flow in the ground. Data are measured as Resistivities and correlate with geology, structure and potential hydrocarbon traps. Spartan MT is a deep penetrating method that routinely penetrates from 400 m to 10 km.

### HOW IS IT CONFIGURED?

The key components of Spartan MT are shown. These include electrodes for measurement of electric fields in two directions and magnetometers for measurements of magnetic field in three directions (full tensor). Location of remote site for noise removal is also shown.



## Spartan MT for Geothermal Exploration

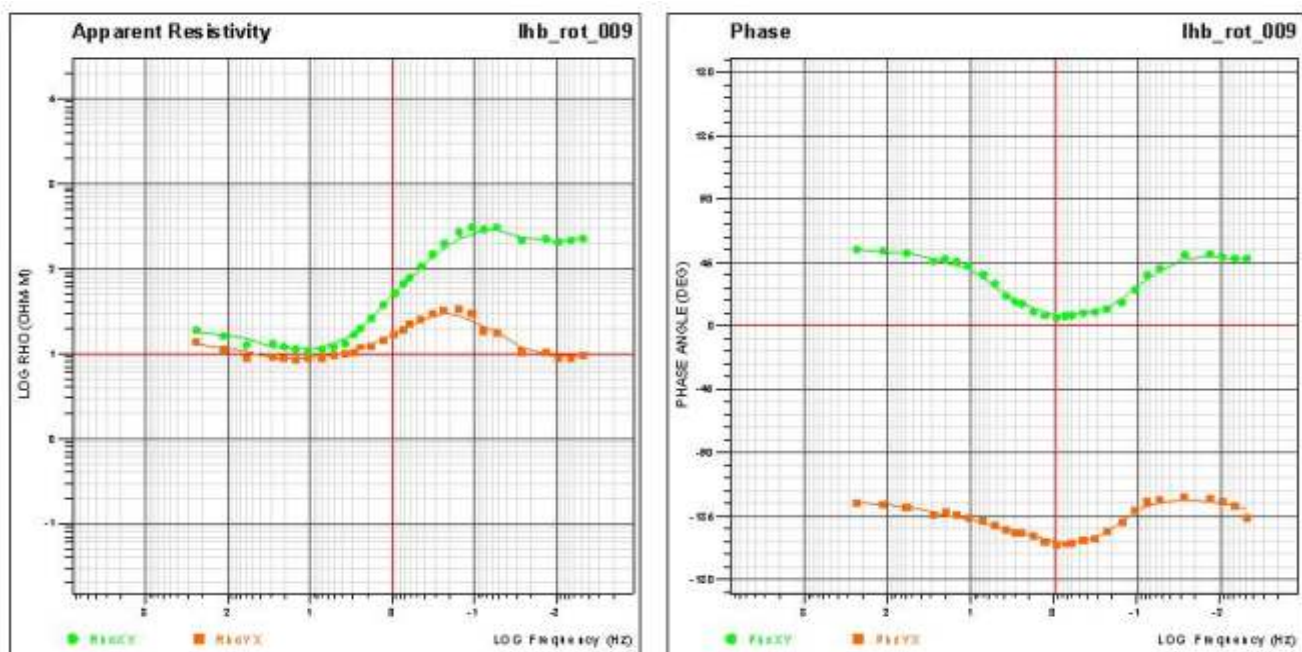
The following images capture some of the elements of field work -- conducted with a focus on data quality and safety in acquisition.



Various images showing layout of field equipment including recording boxes, cables, electrode and buried magnetometer sites.

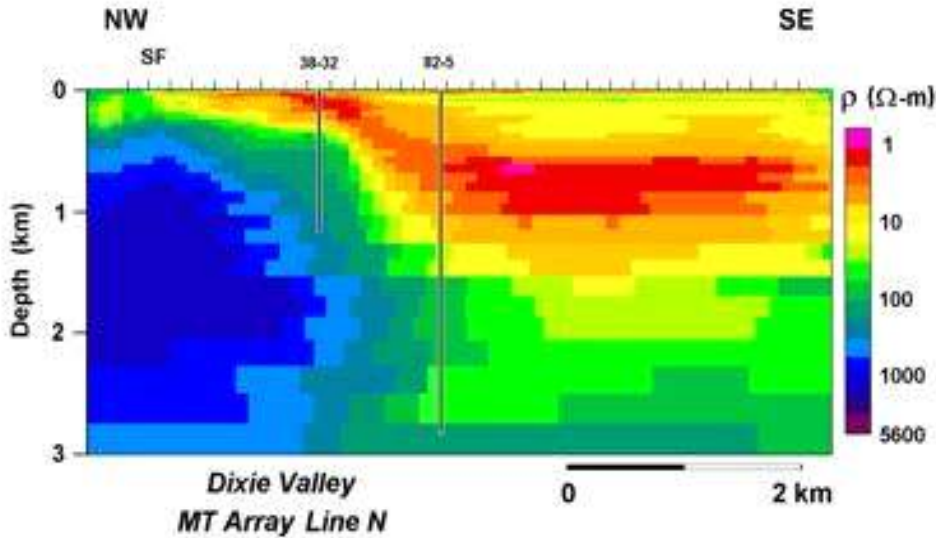
### WHAT DO THE DATA LOOK LIKE?

Data acquired by the Spartan MT system are resistivities and phase values:



## Spartan MT for Geothermal Exploration

The resistivities are used for interpretation, typically using inverted (modeled) sections:



Deep MT results corresponding to sediments at right and intrusive at left. White/blue areas indicate regions of basement. Overlying sediments are yellow/orange/red.

### WHAT ARE THE BENEFITS OF SPARTAN MAGNETOTELLURICS FOR GEOTHERMAL EXPLORATION?

- Integrate with electromagnetic and gravity data for multi-parameter interpretation of results to 10<sup>3</sup> km
- Complimentary data set to seismic achieved at a lower cost
- Image structure, alteration and geology related to geothermal targets
- Provide information on geothermal traps
- Shorten time to discovery
- Work can be done in 1D, 2D or 3D
- Image through thick conductors that may hinder aeromagnetic analysis
- Ability to image where seismic is poor such as basalt / volcanic cover, or ice / permafrost



## Spartan MT for Geothermal Exploration

### WHAT ARE THE BENEFITS OF SPARTAN MAGNETOTELLURICS?

- Flexible survey - MT surveys using site intervals of 500 m, 1000 m separations and/or detailed surveys with site intervals of 200 m or less
- Depth of exploration - from 400 m to 10<sup>+</sup> km
- Not limited to lines - random locations help accommodate topography, geology, culture, etc.
- Top quality data - full tensor measurement provides sensitivity and accuracy
- Integration with other data types offers unique potential to evaluate geothermal sources



### WHY QUANTEC?

Quantec is an excellent choice as a supplier of deep electrical geophysics for geothermal exploration. Established in 1986, we are one of the largest ground geophysical companies in the world. We have proven expertise in MT acquisition and interpretation with over 250 MT surveys in the last 5 years.

Moreover, we have successfully adapted the technology from Mining (hard rock) to Uranium (sedimentary basins), Geothermal (passive and active systems) to Regional Geologic Studies (transects) and now to Oil & Gas exploration, giving us a wide range of knowledge in many geologic environments and for many applications.

Quantec Geoscience is your proven supplier of magnetotelluric solutions.

### About Quantec

**Quantec Geoscience Ltd.** has been helping with discovery for over 20 years.

Our offices throughout the world allow access to a collective knowledge database of thousands of projects with practically all possible geophysical surveys.

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