



Contribution ID: 3

Type: **Presentation**

# INTRODUCTION TO THE MAGNETOTELLURIC METHOD FOR CRUSTAL AND LITHOSPHERIC STUDIES

*Monday, 12 August 2013 15:30 (1h 30m)*

Apart from the Earthquake Seismology Method, the Magnetotelluric (MT) method is the only other geophysical method that enables the geoscientist to investigate deep crustal and lithospheric structure of the earth. The largest differences between the two techniques are that the MT technique targets the conductivity and conductivity contrasts between lithologies, while the Seismology technique targets seismic velocity contrasts and density differences between lithologies.

There are many similarities between the two techniques, which include:

1. Deep exploration
2. Long time series to detect the zones of interest
3. Use natural sources
4. Can use artificial sources
5. Fairly complicated and time consuming processing techniques.

This presentation(s) will focus on:

1. Why the MT technique is possible (from sunspots to the earth's magnetic field and the core)
2. Basic theoretical background of the MT Technique (EM – Theory and the Maxwell equations)
3. Basic processing of the data to obtain resistivity curves
4. MT equipment and field practice
5. Examples of how the MT technique was used to obtain information about the lithospheric thickness of the Kaapvaal Craton, the Rehoboth Craton, the Natal Namaqua and Limpopo Mobile Belts, the Colesberg Lineament and the lithospheric expression of the Kimberly Kimberlite feeder
6. Possible future studies which include the complete mapping of the Kaapvaal Craton, the Trompsburg Complex and the Karoo Basin for developing and evaluating the Shalegas exploitation.

The MT technique is under siege in South Africa due to the enormous cultural development in South Africa. It is a matter of urgency that we start with the regional MT surveys across South Africa before it is too late.

**Primary author:** Dr FOURIE, Stoffel (CJS) (Environmental Water and Earth Sciences Department, Faculty of Science, Tshwane University of Technology (TUT))

**Presenter:** Dr FOURIE, Stoffel (CJS) (Environmental Water and Earth Sciences Department, Faculty of Science, Tshwane University of Technology (TUT))

**Track Classification:** Workshop Programme