



Magnetotelluric characterization of the northern margin of the Yilgarn Craton (Western Australia)

Perla Piña-Varas and Michael Dentith

Centre for Exploration Targeting, School of Earth Sciences, The University of Western Australia, 35 Stirling Highway, Crawley, Western Australia 6009. (perla.pinavaras@uwa.edu.au)

The northern margin of the Yilgarn Craton (Western Australia) was deformed during the convergence and collision with the Pilbara Craton and the intervening Glenburgh Terrain that created the Capricorn Orogen. The Yilgarn Craton is one of the most intensively mineralised areas of continental crust with world class deposits of gold and nickel. However, the region to its north has surprisingly few deposits. Cratonic margins are considered to be key indicators of prospectivity at a regional scale. The northern limit of the Yilgarn Craton within the Capricorn Orogen is not well resolved at date because of overlying Proterozoic sedimentary basins. We present here some of the results of an extensive magnetotelluric (MT) study that is being performed in the area. This study is a component of large multi-disciplinary geoscience project on the 'Distal Footprints of Giant Ore Systems' in the Capricorn Orogen.

The MT dataset consists of a total of 240 broadband magnetotelluric stations (BBMT) and 84 long period stations (LMT). Analysis of the dataset reveals a clear 3-D geoelectrical behaviour and extreme complexity for most of the sites, including an extremely high number of sites with phases out-of-quadrant at long periods.

3-D inverse modelling of the MT data shows high resistivity Archean units and low resistivity Paleoproterozoic basins, including very low resistivity structures at depth. These strong resistivity contrasts allow us to successfully map northern margin of the Yilgarn Craton beneath basin cover, as well as identifying major lateral conductivity changes in the deep crust suggestive of different tectonic blocks. Upper crustal conductive zones can be correlated with faults on seismic reflection data.

Our results suggest MT surveys are a useful tool for regional-scale exploration in the study area and in area of thick cover in general.