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A Magnetotelluric Profile across the Broken Hill and Olary Domains

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Seventeen magnetotelluric survey sites were occupied across the Olary and Broken Hill Domains in the Curnamona Province, Australia. Two dimensional modelling along the magnetotelluric profile identifies the Broken Hill Domain as a zone of high electrical resistivity to a depth of 15km. Gravity modelling along a coincident profile has also shown the Broken Hill Domain to be significantly more dense than its surrounds. Seismic data have provided evidence of numerous faults and shear zones within the Precambrian Broken Hill Domain basement, and is indicative of compression during the Delamarian Orogeny. It is proposed that the majority of crustal fluids were removed from these rocks by granulite facies metamorphism and tectonic compression. The boundary of the Olary Domain appears to be delineated by the Mundi Mundi Fault with an order of magnitude increase in resistivity on the Broken Hill side. The location of the Flinders Conductivity Anomaly was also observed and a number of conducting mechanisms considered, including crustal fluids and graphite films.

Key words: Curnamona Province, Olary Domain, Broken Hill Domain, Magnetotellurics, Geomagnetic Depth Sounding, Electrical Resistivity Modelling.