Magnetotellurics and Airborne Electromagnetics as a combined method for assessing basin structure and geometry.

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MAGNETOTELLURICS AND AIRBORNE ELECTROMAGNETICS AS A COMBINED METHOD FOR ASSESSING BASIN STRUCTURE AND GEOMETRY.

MT & AEM AS A COMBINED EXPLORATION METHOD

ABSTRACT

Unconformity-type uranium deposits are characterised by high-grade and constitute over a third of the world's uranium resources. The Cariewerloo Basin, South Australia, is a region of high prospectivity for unconformity-related uranium as it contains many similarities to an Athabasca-style unconformity deposit. These include features such as Mesoproterozoic red-bed sediments, Paleoproterozoic reduced crystalline basement enriched in uranium (~15-20 ppm) and reactivated basement faults. An airborne electromagnetic (AEM) survey was flown in 2010 using the Fugro TEMPEST system to delineate the unconformity surface at the base of the Pandurra Formation. However highly conductive regolith attenuated the signal in the northern and eastern regions, requiring application of deeper geophysical methods. In 2012 a magnetotelluric (MT) survey was conducted along a 110 km transect of the north-south trending AEM line. The MT data was collected at 29 stations and successfully imaged the depth to basement, furthermore providing evidence for deeper fluid pathways. The AEM data were integrated into the regularisation mesh as a-priori information generating an AEM constrained resistivty model and also correcting for static shift. The AEM constrained resistivity model best resolved resistive structures, allowing strong contrast with conductive zones. There was not enough resolution in the MT models to establish the presence of uranium mineralisation.

KEYWORDS

Magnetotellurics, electromagnetic induction, airborne electromagnetics, static shift,

Cariewerloo Basin, Pandurra Formation, uranium, exploration, unconformity

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