

# **Delineating fluid flow paths beneath the Mound Springs, Great Artesian Basin, using magnetotellurics.**

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## **Delineating fluid flow paths beneath the Mound Springs, Great Artesian Basin, using magnetotellurics.**

### **Abstract:**

There is a lack of understanding about the mechanisms that control characteristics about the mound springs of the Great Artesian Basin (GAB). There is question about the origins of water that feed the springs. There is the possibility of local infiltration providing a shallow source of fluid and a deeper source on a more regional scale. How the springs are structurally controlled by faults and to what extent local recharge feeds back into the springs are all areas of active research. Beresford Spring is a mound spring located in the southwest of the Great Artesian Basin, approximately 50 km west of Lake Eyre South. It is one of over 600 springs that are spread throughout the GAB of which over 40% are no longer active. The geology is poorly constrained due to the lack of significant outcrop as a result high weathering and sedimentary cover. Geophysical techniques are cheap and effective method of looking through this cover. This study involves the use of magnetotellurics (MT), which is a low impact, cheap technique that can be used to image the subsurface resistivity without causing significant damage to the local ecosystem, unlike seismic surveys for example. It is used to measure the resistivity of the Earth at varying depths and resolutions. The survey consisted of a north-south line and an east-west line that were used to generate 2D inversion models with the goal of being able to differentiate between the spring and the surrounding confining beds and to delineate fluid flow paths feeding the springs. The results show that Beresford Spring is marked by a resistive high, a 10 fold increase compared to its immediate surroundings. Phase tensor plots reveal that at depth, the preferential direction of electrical current flow is in a northeast-southwest orientation over the entire Beresford region. At shallow depths, the region becomes homogeneous and loses any preferential orientation in conductivity. Beresford Spring maintains its northeast-southwest tensor which is an indication of the fluid pathways that feed the spring.