

## Electrical responses of mineral systems from the lithosphere to prospect scale

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### SUMMARY

As mineral exploration moves to regions with increasingly thick cover sequences, MT and other deeply penetrating geophysical techniques are becoming increasingly important exploration tools. At the same time, the concept of 'mineral systems' is guiding more and more exploration strategies. In the mineral systems approach, the entire process of mineralisation is considered, including lithospheric architecture, favourable geodynamics, a fertile source region, and preservation of the deposit.

There remains considerable scope to link deeply penetrating geophysics to mineral systems concepts. In many cases, MT will be the optimal tool to image the key ingredients required in the mineral system. For instance, many types of ore deposits require a fertile, metasomatised mantle source, which is likely to have a low resistivity. Subsequent melting of a fertile mantle source is likely to leave a depleted zone of high resistivity. Interpretations of subsurface composition can be further constrained by including seismic data in the geophysical interpretation.

In this poster I present examples of the MT response of major mineral systems, with a particular focus on the Olympic Domain in South Australia. The Olympic Domain hosts a suite of world-class iron-oxide-copper-gold (IOCG) deposits, whose formation involved processes from the lithospheric-scale to the near-surface. Using MT datasets that also span these scales, I explore how the geochemical and petrological processes involved in forming the deposits are expressed in the MT data. By understanding these genetic links between the mineral system and its electrical response, MT can be a more reliable tool for exploration targeting and prospectivity mapping for giant mineral deposits.

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