

### **From Data to Discovery: Targeting Sedimentary Copper in South Australia Using a Mineral Systems Approach**

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Sedimentary copper deposits are globally significant but remain relatively underexplored in Australia. The Adelaide Superbasin in South Australia hosts known occurrences but has seen little systematic targeting using modern mineral systems frameworks.

Here, we applied a data-driven mineral systems approach to identify new opportunities for sedimentary copper. Historic drilling, surface geochemistry, geology, and geophysics were compiled into a unified GIS database, and weights of evidence modelling was applied to generate a sedimentary copper prospectivity map.

This process identified several key geological controls, including the Tapley Hill Formation as a critical stratigraphic host unit, tillite as an additional host rock, mafic sediments and volcanics as significant copper sources, diapiric breccias as a proxy for a brine source, major faults and crustal boundaries as transport pathways, and Cu-Co anomalies in drillholes and rock chips as evidence for metal deposition.

A prospectivity map was generated and used to delineate high-priority targets, which were compared against existing tenements, leading to strategic ground acquisition and discussions with tenement holders regarding potential partnerships.

Field validation confirmed high-grade copper and silver mineralisation at a top-ranked target and identified untested historic workings. These results demonstrate the effectiveness of systematically combining geological knowledge with data-driven prospectivity modelling.

Our work highlights that significant near-surface exploration opportunities remain available in South Australia, challenging assumptions that exploration must shift under deep cover. It also underscores the value of revisiting historic datasets with modern, systematic approaches to generate actionable targets.