

Catchment-scale gold prospectivity analysis from the National Geochemical Survey of Australia

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The characterisation of regolith geochemical and geophysical properties is a key theme of the UNCOVER initiative, an industry-government-academia collaboration aiming to assist future mineral discovery within and beneath Australia's regolith. This characterisation is crucial to understanding the relationships between regolith and bedrock as an aid to mineral exploration under cover. This study applies the Self-Organising Maps (SOM) technique to cluster catchment-scale geochemical data from the National Geochemical Survey of Australia (NGSA) and first and second order statistical summaries by catchment area of airborne geophysical data. SOM is a machine learning technique that has the potential to reveal new and hidden patterns in multilayer (high-dimensional) datasets that are not evident in conventional analysis. We show that clusters associated with significantly high gold concentrations are found to represent catchments immediately downstream of regions known to host gold mineralisation. This finding is a significant result as it suggests gold is being liberated from regions of gold mineralisation and transported by colluvial and alluvial processes. The approach documented here suggests that high dimensional catchment-scale geochemical data and summaries of geophysical data can be combined to highlight regions not previously recognised to host gold mineralisation.