

Biogeochemical expression of base
metal mineralisation in the
northwestern Flinders Ranges.

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TITLE

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RUNNING TITLE

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ABSTRACT

The northwestern Flinders Ranges hosts a variety of Pb/Zn/Cu/Ag mineralised sites. It is, therefore, an ideal setting to investigate the plant biogeochemical expression of proximal base metal mineralisation in bedrock geochemistry. Twigs and leaves from *Eremophila freelingii* along with bedrock collected from traverses across four sites of known and background mineralisation have been analysed to show this expression in biogeochemistry as well as disparities in this expression throughout plant organs.

Increased concentrations of Ni, As, Mo, and Cd in bedrock and to an extent in plant biogeochemistry are associated with the distribution of the commodity elements, Pb, Zn, Cu, and Ag. This corresponds with a decrease in the concentration of Na, Ca, Al, Fe, and Y in the vicinity of the mineralisation.

Plant biogeochemistry results are able to identify a discriminatory signature for different geological settings and display the effects of regolith – landform settings on the distribution of elemental concentrations in the landscape and also display different sized geochemical dispersion halos for each commodity element. Biogeochemistry analytical results have also shown that concentrations of most selected elements vary between leaf and twig organs from the same plant, with concentrations generally lower in twigs. An implication of this study is that *Eremophila freelingii* leaf biogeochemistry would be a suitable sampling medium for geochemical exploration for base metal mineralisation in areas of shallow transported cover. Its advantages over bedrock sampling are that once regolith-landform settings are accounted for, samples are reasonably representative of underlying geological substrate, light weight (assisting field transport) and have negligible long-term environmental impact to the sample site.

KEYWORDS

Biogeochemistry, Copper, Emu Bush, *Eremophila freelingii*, geochemistry, Lead, North Flinders Ranges, Silver, Zinc.

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