Goldschmidt 2023 Abstract
https://doi.org/10.7185/gold2023.16333

Exploration and environmental assessments using regional and local scale biogeochemical patterns in the Cobar Region, Australia

JOSEPH SCHIFANO, **DAVID COHEN** AND NEIL RUTHERFORD

University of New South Wales

Presenting Author: d.cohen@unsw.edu.au

In regional or local scale geochemical mapping, the choice of sampling media and analytical methods will be influenced by the source, form, mobility and spatial distribution of elements being mapped. For environmental monitoring and mineral exploration there are potential advantages in using plant organs rather than regolith materials as the sampling media, including the capacity of plants to sample large volumes of underlying regolith and the averaging of their biogeochemical composition over timeframes extending from months to years. The limited use of plant organs in geochemical mapping relates partly to perceived complicating factors such as variability between plant species, seasonal variability in some plant organs and analytical costs.

Needle samples from over 4,000 cypress pines (*C. glaucophylla*) in the highly mineralised Cobar Basin in central New South Wales have been analysed by both ICPMS and pXRF. The study spanned regional mapping of a 42,000 sq. km area using samples collected adjacent to roads and tracks, and detailed grids and traverses across 16 mineral deposits. For various major and trace elements, there is strong correlation between results obtained by total digestion ICPMS and by portable XRF, including direct pXRF analysis of unprocessed samples in the field.

There are distinct lithological influences on variation in the background values for various elements, including Au and Pb (Fig. 1), noting that the majority of mineral deposits are structurally hosted within the Devonian sandstone and siltstones regionally intruded by felsic intrusives. There is an extensive zone of elevated base and precious metal values in the needles between the Peak Au mine site and the city of Cobar which was the focus of mineral processing for many decades (Fig 2). Highly elevated values for Ag, Au, Pb, Zn, Ni, Co, W and/or REE occur above known mineral deposits, depending on deposit style, and commonly display more consistent geochemical spatial patterns than in regolith samples. Pines in general typically restrict uptake of Cu in the needles to within the range of 3–12 ppm due to its function as an important trace nutrient but progressive toxicity if concentrations increase beyond c. 25 ppm.