Geochemical characterization of regolith in the NE Albany-Fraser Orogen, Western Australia

WALID SALAMA[1], IGNACIO GONZÁLEZ-ÁLVAREZ[1], RAVI ANAND[1] AND TANIA ABDAT[1]

[1]CSIRO, Earth Science and Resource Engineering, Minerals Down Under Flagship, Kensington, Western Australia
Email: walid.salama@csiro.au

Climatic changes and paleolandscape evolution are critical elements to understand the stratigraphic development of the cover in regolith-dominated terrains. This understanding enhances geochemical characterization and interpretation of regolith units. The Albany-Fraser Orogen is an underexplored, deeply weathered terrain that extends along the southern margin of the Yilgarn Craton in Western Australia.

The regolith profile in the studied area is developed over Proterozoic sheared granitoids intruded by gold-bearing mafic intrusions. It is subdivided into *in situ* weathered regolith (20 to 55 m) and overlain by a transported cover of poorly-cemented, ferruginous sands, gravels and lateritic pisoliths (2 to 25 m). The *in situ* regolith consists of lower ferruginous and/or upper kaolinitic saprolite that were formed under warm and humid climate and terminated by a discontinuous silcrete layer that was formed under an arid to semi-arid climate. The contacts between these regolith units are either physical or chemical interfaces along which chemical variations are mainly dependent on the mineralogical composition of bedrocks and the intensity of weathering.

Ferruginous saprolite is best-developed over mafic intrusions and biotite and hornblende-rich granitoids. Weathering of ferromagnesian minerals and sulphides led to formation of goethite and enrichment in Fe, Cu, Ni, Co, V and Zn. This unit changes laterally and vertically into a bleached, kaolinitic saprolite unit, overlain by silcrete duricrust. The latter is best developed on alkali granites and quartzofeldspathic gneiss in low-lying basinal areas, and consists mainly of quartz, anatase and zircon. It is associated with residual enrichment in Si, Zr and Ti, coupled with leaching of Au, alkali, alkaline earth and transition elements.

The transported cover and the coarse-grained soil fractions are enriched in Fe, V, Th and Cr and depleted in Au, which reflect the composition of lateritic pisoliths. The fine-grained clay fractions are enriched in Al, alkali and alkaline earth elements.

In conclusion, the ferruginous saprolite develops mainly above the underlying mafic bedrocks. The transported cover does not reflect any significant enrichment in Au related to buried mineralization.