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Regolith mapping and exploration geochemistry in the Chapada-Mara Rosa Cu-Au district, Central Brazil

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The Central Brazil region contains proterozoic meta volcano-sedimentary sequences that are favorable for Cu and Au deposits. However the region has been subjected to intense lateritization possibly since the Miocene, resulting in a regolith cover that may reach a several 10's of meters. This cover is not uniform and has been altered by reworking and erosion significantly impacting the interpretation of geochemical surveys. Therefore regolith mapping becomes an essential tool to understand regolith evolution and guide geochemical exploration and is often applied in the semi-arid lateritic terrains of Australia [1].

The Mara Rosa-Chapada region is a classic laterite terrain under seasonal to humid tropical regime [2]. Regolith mapping was performed over an area of nearly 7000 km² at the scale of 1:100.000. It was based on the accumulation of several years of field experience in the area coupled with simple techniques based on SRTM from where declivity maps and DEM were produced and aerogamaspectrometry survey with line spacing of 500m.

Regolith regimes were defined as Residual; Erosional and Transported [1]. Eight regolith units could be identified: The Residual regime is composed of (1) *lateritic plateaus*, dominated by in situ ferruginous duricrusts covered by latosols and (2) *lateritic colluvium* on slopes with gentle gradients dominated by stone-line profiles with lateritic materials and latosols [2]. The erosional regime is composed of (3) *colluvium slopes* with higher gradients dominated by stone-line profiles with little influence of lateritic material [2] and (4) *saprolite* with residual soils on top. It was also identified a regolith unit representing (5) *reworked lateritic plateaus* with limited aerial extension composed of degraded ferruginous duricrusts covered by latosols. This unit represents a transition from residual to erosional regimes. The Transported regime include, beyond (6) *quaternary alluvium*, (7) *lateritic plateaus over unconsolidated detrital materials* and (8) *colluvium slopes* with derived lateritic material.

An orientation survey was conducted around the Chapada Cu-Au deposit [3] which occurs near the limit between the residual and erosional regimes. Detailed regolith mapping of the area was conducted using air photos and field control over grid lines. The regolith stratigraphy of the area was established based on information from diamond drill holes coupled with auger holes. Geochemical surface and sub-surface samples, consisting of saprolite, ferruginous duricrusts, latosol and lateritic lag allowed an appreciation of the dispersion patterns. Geochemical response is very dependent on the regolith regime. Lag sample has proven to be an effective sample media while the latosol over ferruginous duricrusts is generally metal depleted.

References:

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