

ADELAIDE UNIVERSITY
School of Earth and Environmental Sciences



**Weathering, erosion and element
mobilisation in a catchment at the
Luxemburg Copper/Gold site, Olary
Domain, South Australia.**

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Abstract

The Olary Domain, Curnamona Province has significant economic importance as a target for base metal and gold exploration. A veneer of Cainozoic or younger regolith occurs over large areas of the Olary Domain, which complicates mineral exploration. The study area is located within a small catchment at the old Luxemburg Cu/Au mining site in the mid North of South Australia in the Southern area of the Olary Domain. This investigation focuses on relating physical and chemical weathering processes present between basement amphibolite, granites and gneisses and a local waterway, including parameters such as bedrock geochemistry, regolith profile interpretation, channel morphology, and landscape evolution. Mapping the extent and character of the regolith in the Luxemburg area in a detailed Regolith Landform Map was also a large feature of this study.

Results from the Regolith Landform Map allow inferences on the present day surface dispersion pathways. Geochemical investigations of the regolith profile within the catchment indicate a considerable fingerprint from the underlying amphibolite, specifically shown by Fe, Ti, Ni, Cr, V and Sc values. The elemental signature of the surface regolith reflects the underlying parent regolith units. Geochemical patterns within the ephemeral channel can be related to source geology, streambed morphology and landscape position. Harker plots and grain size analysis indicate that the channel sediment is chemically immature and La/Sc plots against Ti, Zr and Th illustrate that the amphibolite body primarily controls its elemental signature.

The geochemistry of the underlying moderately weathered bedrock can be seen and deciphered in an area of iron rich, relatively thin regolith. Bedrock signatures are also evident within the chemistry of bulk samples from the local ephemeral channel deposits. Recent mining activity within the area does not seem to have influenced the results of this study.

Keywords: Amphibolite geochemistry, Curnamona Province, element mobilisation, geochemical exploration, Olary Domain, regolith.
