

CRC LEME OPEN FILE REPORT 145

THOMSON REGION GEOCHEMICAL SURVEY, NORTHWESTERN NEW SOUTH WALES

Patrice de Caritat and Megan E Lech
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ABSTRACT

The Thomson Orogen Project is a collaborative research project between CRC LEME, the NSW Department of Primary Industries and Geoscience Australia that aims to provide stakeholders with pre-competitive data pertaining to the mineral prospectivity of the NSW portion of the Thomson Orogen. The Project includes geological, geophysical and geochemical components, of which the geochemical survey presented in this report is part.

The Thomson geochemical survey establishes the concentration ranges and distributions of over 60 geochemical properties measured in surface and near-surface regolith material over the ~155,000 km² project area. The main sampling media were 'catchment outlet sediments', which in fluvial dominated settings equate to overbank sediments, but are generalised to also apply to other, e.g., aeolian-dominated, environments. All together, 99 catchment outlet sites have been sampled over the area, giving an average sample density of 1 site per 1561 km². At each site a sample was taken at the surface (0-10 cm depth), which is called the top outlet sediment (TOS), and another one at depth (a 10 cm interval generally between 60 and 90 cm depth), which is called the bottom outlet sediment (BOS). Both sample types are composited to enhance their representativeness. In addition, shallow outlet samples (SOS) were taken from an intermediate depth (10-25 cm depth) for mobile metal ion analysis. In the field, the sites were described and photographed, and field pH and dry and moist colours of the soil were recorded. In-field trials of portable X-ray fluorescence and digital data entry were also carried out over the course of the project. In the laboratory, small splits of the bulk samples were dried and subjected to laser particle size analysis, X-Ray diffraction and pH and electrical conductivity of 1:5 (soil:water) extracts were determined. The bulk samples were dried and split into 2 halves. One half was archived for future analysis, whilst the other was sieved to <180 µm and <75 µm fractions. Both size fractions were analysed for over 60 analytes by:

- X-ray fluorescence for multiple elements (at Geoscience Australia, Canberra)
- inductively coupled plasma-mass spectrometry after 4-acid 'near-total' digestion for multi-element analysis (at Acme Laboratories, Vancouver, Canada)
- inductively coupled plasma-mass spectrometry after HF and multi-acid digestion for Se analysis (at CSIRO Laboratories, Adelaide)
- inductively coupled plasma-mass spectrometry after proprietary MMI-M® leach for multi element analysis (at ALS Chemex Laboratories, Perth)

- ion selective electrode after alkaline fusion for F analysis (at ALS Chemex Laboratories, Brisbane)
- Graphite furnace-atomic adsorption spectrometry for Au analysis (at ALS Chemex Laboratories, Brisbane)

Geochemical maps and diagrams were constructed for all elements/sample types/size fractions and are presented in this Report. Preliminary interpretations suggest that proximity to known mineralisation is detected in many cases by elevated concentrations of, e.g., Cu, Pb or Sb. Recent drilling by industry has intersected sulfide accumulation in a catchment with elevated concentrations of these 3 elements in the outlet sediments. Several anomalous concentrations were also revealed in areas with no known mineralisation and/or where cover is thicker, particularly in the east of the study area. These may warrant further investigation. Au distribution appears to be subject to nugget effects.