Western Australian near-surface geochemistry

by

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Abstract

Eight GIS layers depict geochemical data for Western Australian soil, laterite, stream sediment, and outcrop or drillhole rock specimens, extracted from four primary databases maintained by the Geological Survey of Western Australia (GSWA): WACHEM, OZCHEM (WA subset), CRCLEME-laterite, and WAMEX.

WACHEM data were mostly collected by GSWA as part of regular geoscience programs. Most of the 49 123 samples analysed and included here are surface samples from Western Australia, but some are subsurface specimens from drillholes (sample locations are projected to the drillhole collar). Strict quality controls were in place for sampling, rock preparation, and laboratory analysis. The data have high fidelity.

OZCHEM data were collected by Geoscience Australia or its predecessors. Most of the 17 614 samples analysed and here included from Western Australia are surface samples, but some are subsurface specimens from drillholes (sample locations are projected to the drillhole collar). Strict quality controls were applied during sampling, rock preparation, and laboratory analysis. The data have high fidelity.

CRCLEME-laterite samples were collected as part of the 'Astro Yilgarn Regolith' collaborative research project conducted by CSIRO between 1997 and 2000 and sponsored by Astro Mining NL (Cornelius et al., 2005). This publicly available database includes multi-element analyses of 4441 regolith samples from the central Yilgarn Craton. Strict quality controls were applied during sampling, rock preparation, and laboratory analysis. The data have high fidelity.

WAMEX geochemical data are derived from exploration and mining activities in Western Australia and are provided to GSWA by companies as part of their statutory reporting obligations. The complete database includes at least half a billion single or multi-element analyses from a variety of sample media, including surface rock chips, stream sediments, soils, unconsolidated material from shallow drilling, and rock chip or core material from deeper drilling. GSWA applies some quality control measures at the time of data submission, but a proportion of the data are known to be problematic (e.g. errors in unit reporting, multiple field names for the same analyte, incorrect assignment of analyte), and GSWA is progressively identifying and correcting such issues. Only 'near-surface' WAMEX geochemistry and 'maximum grade in drillhole' (projected to surface collar location) are provided in this product release; complete deep drilling geochemistry is not included because of the size of that dataset, and the limitations associated with portraying three-dimensional drillhole data as a two-dimensional map layer.

As part of the Accelerated Geoscience Program, GSWA has also sought to add value to the WACHEM, OZCHEM, CRCLEME-laterite and WAMEX whole-rock geochemical datasets by merging them into a single, internally consistent, interrogable database. This has been done by initially 'harmonizing' the WAMEX geochemistry by extracting as much of the original analytical data as possible into a universal table layout that has unique field names for analytes (e.g. MnO_%) and consistent use of analyte concentration units. The WACHEM, OZCHEM and CRCLEME-laterite datasets were then merged into this universal table layout. Null values for analytes from each dataset have been assigned the numerical value '-9999', and obviously spurious values in WAMEX (those exceeding 100%, and probably indicating originally mis-assigned units) are identified by the value '-6666'. Detection limits were preserved using the '-DLvalue' convention. Finally, appropriate additional fields were added to the universal data table to permit capture of all analytes as element oxide or element

concentrations, and the 'missing' values calculated from the primary data, as required.

The Western Australian near-surface geochemistry GIS layers can be used for generating derivative element abundance and element ratio maps, which are useful for investigating rock and ore-forming geological processes.

How to access

These data form part of the Critical minerals, 2021 Geological Exploration Package, available on a USB via the DMIRS eBookshop.

References

Cornelius, AJ, Cornelius, M, Smith, RE and Shu, L 2005, Laterite geochemical database for the central Yilgarn Craton, Western Australia: Cooperative Research Centre for Landscape Environments and Mineral Exploration (CRC LEME), Open File Report 188, 8p.

Recommended reference

Duuring, P, Then, D, Howard, D and Morin-Ka, S, 2021, Western Australian near-surface geochemistry: Geological Survey of Western Australia, digital data layers.