

SEG 2024 Conference: Sustainable Mineral Exploration and Development

Geochemical and REE Data for Sheeted Leucogranites at the Primary Uranium Deposits of the Damara Orogen, Namibia

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The inland branch of the Pan African Damara Orogeny is product of continent-continent collision and distinctly zoned. The southern Central Zone (sCZ) is characterised by highly deformed Neoproterozoic metasedimentary sequences intruded by an abundance of granitoid rocks ranging from dioritic to alkali feldspar granite in composition. sCZ metamorphism is high- T° /low- P , up to granulite facies, present structural architecture was facilitated, in part, by rheological contrasts between the Damara metasediments and unconformably underlying Mesoproterozoic and older granite-gneiss basement inliers and domes, collectively the Abbabis Metamorphic Complex (AMC). The oldest intrusives in the sCZ are calc-alkaline diorites and were emplaced from the onset of inter-craton collision; the youngest intrusives comprise suites of highly evolved, variably uraniferous, late-orogenic sheeted leucogranites (SLG). The SLG suite comprises six sub-types (types A-F) of syenogranite- through alkali-feldspar granite composition; they are mostly distinguishable through systematic field-, textural-, accessory mineral assemblage-, and selected trace-element geochemical characterisation. Two of the younger types (D, E) host economic U concentrations with strong structural and stratigraphic relationships determining the emplacement location of the deposits, reflected also in mobile element chemistry. Discrimination between uraniferous and non-uraniferous SLGs is possible with whole-rock geochemistry; however, with considerable major- and trace-element overlap. Sources of the SLGs thus appear ambiguous, with support for the basement gneisses, pelitic units of the Damara sequence, and the early calc-alkaline suites all considered as candidates. Systematic ICP-MS analyses of the SLG whole rocks have revealed contrasts of HFS- and REE abundances and ratios, discriminating uraniferous and non-uraniferous SLGs. The overall REE patterns of the uraniferous SLGs are comparable to the early calc-alkaline suites and to younger anorogenic granitoids. HFS element discrimination plots distinguish the SLGs from the older diorites and younger granitoids. Uraniferous SLGs are likely derived from different areas of basement source, not diorites, relative to the non-uraniferous SLGs.