

SEG 2024 Conference: Sustainable Mineral Exploration and Development

Petrogenesis and Structure of the Uis Pegmatites, Namibia: A New Source of Battery Metals in Africa

Laurence J. Robb¹, Lewis Lloyd¹, William Maloney¹, Frederick Wright-Morris¹, Simon Tapster²

1. University of Oxford, Oxford, United Kingdom, 2. British Geological Survey, Keyworth, United Kingdom

The Neoproterozoic Damara Orogen (~900-500 Ma) hosts several pegmatite belts containing economic concentrations of minerals such as cassiterite (Sn), columbite group minerals (Nb-Ta), lepidolite, petalite, spodumene (Li) and U-bearing phases. This study focuses on the Uis pegmatites which form part of the Cape Cross-Uis Pegmatite Belt (CUPB) in central Namibia. Several hundred Sn-Ta-Li rich pegmatites occur in the Uis district but no parental granite source is observed and the question whether such a body exists at depth, or the pegmatites are derived by local anatexis of a metasedimentary source, is addressed.

The Uis pegmatites intrude the Zerrisene Group, a thick sequence of marine turbiditic sediments, and are likely to have been derived by melting of this dominantly metapelitic precursor. During peak orogenesis the area experienced tight to isoclinal folding and thrusting as a consequence of the transpressional collision between the Congo and Rio de la Plata Cratons. Several stages of granitic plutonism occurred between 540-510Ma, creating contact related cordierite-schists over wide areas. Orogenic collapse and cooling caused extension and multiple stages of syn- to post-tectonic pegmatite emplacement – cassiterites from the Uis pegmatites have been dated at 520 Ma, an age that is identical to the youngest concordant zircon also dated from these intrusions.

Barren pegmatites are different in mineralogy and composition to the mineralized Uis pegmatites and these differences, evident in tourmaline compositions, suggest that such features could be useful in identifying other prospective pegmatite belts in Namibia. Current ore reserves, from just two of several historical open pits at Uis, stand at more than 70 Mt of ore at 0.13% Sn, 0.63% Li₂O and 85ppm Ta. Excellent infrastructure and a ready global market, coupled with ambitious development plans, will ensure that this region becomes an important battery metal producer of the future.