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3Ts and Li-batteries: Regional zonation and Li potential of rare metal pegmatites in the Great Lakes Region of Central Africa

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The Great Lakes region in Central Africa is geologically rich in deposits mined for tin (cassiterite), tantalum (columbite-tantalite) and tungsten (wolframite/ferberite), also known as the 3Ts. The mineralisation is pegmatite-quartz vein hosted and associated with granitic magmatism across the Mesoproterozoic Karagwe-Ankole (KIB) and Kibara (KAB) belts, with the peak of mineralisation around 1040-960Ma [1,2] The region produces nearly half of the worlds Ta [3], and due to increased demand for Ta, Sn, W as well as Li, the area is subject to extensive prospecting for further development and upscaled mining activities.

Here we present new insights from the Musha-Ntunga pegmatite-quartz vein system (licensed by Piran Rwanda Ltd) in eastern Rwanda, where recent drilling reveals significant spodumene-rich pegmatites at depth [4]. The Musha-Ntunga deposits are spatiotemporally associated with the Lake Muhazi granite and hosted within tourmalinized metapelites and psammites of the Musha formation [5]. At Musha, nuggety cassiterite is extracted from high grade muscovite-quartz veins crosscutting kaolinized pegmatites. At Ntunga and Duha, finely disseminated cassiterite and coltan is mined from soft kaolinized pegmatites (Fig 1). Drill cores up to 400m depth reveal a clear vertical zonation trend, from shallow Sn muscovite-quartz veins, to thin and kaolinized Sn-Nb-Ta pegmatites and high grade Sn quartz veins (>10 % SnO_2), towards unweathered, massive LCT pegmatites at depths below 150m. The latter are rich in large, pink to grey spodumene (up to 10 cm), with minor petalite and amblygonite in a quartz-albite matrix (Fig 2), and with significant intervals showing LiO_2 grades of 1 to 3%. With the addition of LCT pegmatites at depth, the Musha-Ntunga system offers a unique opportunity to study a complete metallogenic zonation within a pegmatite-vein system. Detailed petrographic and geochemical studies are underway to further assess melt-fluid compositions, sources, and their effects on the regional to microscale distribution of ore metals.

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