
Lithium Pegmatites in Africa: Understanding Parageneses

Kathryn Goodenough[1], Richard Shaw[2], Anouk Borst[3], Paul Nex[4], Judith Kinnaird[4], Marieke van Lichtervelde[5]
1. British Geological Survey, Edinburgh, United Kingdom, 2. British Geological Survey, Nottingham, United Kingdom, 3. KU Leuven, Leuven, Belgium, 4. University of the Witwatersrand, Johannesburg, South Africa, 5. Geosciences Environnement Toulouse, Toulouse, France

Lithium is a key battery raw material and is experiencing significant growth in demand, driving increased exploration for new resources. The continent of Africa has significant potential for lithium pegmatites, with many deposits now being explored and undoubtedly many more yet to be found. Lithium pegmatites occur from the Archaean of the Zimbabwe craton, through the Palaeoproterozoic Birimian belts in West Africa and the Mesoproterozoic Karagwe-Ankole and Kibara belts of Central Africa, to the Neoproterozoic belts in Namibia. Many of these pegmatites share morphological similarities; they are tabular bodies, typically a few tens of metres in thickness, commonly with sharp contacts against their host rocks. However, their detailed mineralogy and paragenesis varies significantly, with major implications for lithium mining and exploration. This talk will compare the paragenesis of lithium pegmatites from different African tectonic belts to illustrate their variability. In Zimbabwe, the Mesoproterozoic Kamativi pegmatite has a complex four-stage paragenesis typical of LCT pegmatites: (1) a coarse-grained magmatic assemblage of quartz, alkali feldspar, and spodumene; (2) widespread albitisation with growth of cassiterite and columbite group minerals; (3) irregular quartz-muscovite greisenisation; and (4) widespread subsolidus alteration. In similar-aged pegmatites in Rwanda, intense kaolinization of spodumene pegmatites (up to 150 m depth) adds further paragenetic variability. In contrast, the Palaeoproterozoic Ewoyaa pegmatites in Ghana have a similar magmatic assemblage of quartz, feldspar, spodumene, and apatite, but show limited albitisation. Localised potassic alteration and greisenisation appears to be structurally controlled. The Mesoproterozoic Manono-Kitolo pegmatites, DRC, similarly lack widespread albitisation. The Archaean Arcadia pegmatite has a different magmatic assemblage, with petalite rather than spodumene, and the lower-temperature alteration has led to the generation of eucryptite. Understanding what controls these parageneses is vital to underpin efficient lithium exploration across the continent.