Plan Overview

A Data Management Plan created using DMPonline

Title: Spodumene pegmatite haloes: characterization, exploration vectoring and ore potential

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Template: Health Research Board DMP Template

Project abstract:

The growing demand for lithium is driven by the need for a clean energy and transportation transition (Bibienne et al., 2019). To date, the majority of lithium is extracted from salars, their occurrence however is in the main part restricted to South America and subordinately China. Hard-rock lithium sources such as Li-Cs-Ta (LCT) pegmatites (e.g. Selway et al. 2005) or rare metal granites (RMG) have a wide distribution globally and in Europe specifically (e.g. Gourcerol et al., 2019). Spodumene is a Li-Al pyroxene ($LiAlSi_2O_6$) and spodumene pegmatites are the main hard-rock source for lithium. Often not or poorly exposed, the first step in successful Li exploitation is the establishment of quick and comparably cheap exploration tools. This project aims to target the metasomatic haloes surrounding the pegmatites and employ the geochemical halo signature in certain minerals as a tool to vector towards spodumene pegmatites. The preliminary research hypothesis states that the parental liquids of the spodumene expel a- or multiple pulses of a hydrothermal fluid at the transition between magmatic and hydrothermal conditions. The process by which this fluid separates from the late-stage magmatic liquid may be liquid immiscibility (Kaeter et al., 2018). The expelled fluid forms chemical haloes around the pegmatite intrusion, the intensity of this halo signature decreases with increasing distance from the pegmatite. The main study area is located in Ireland in the southern part of Leinster, where both barren as well as mineralized pegmatites intruded the East Carlow Deformation Zone along the margins of the ~400 Ma (Fritschle et al., 2018) Leinster granite. The objectives of the research projects are both scientific as well as economic in nature. Scientifically, the process of halo formation is aimed to be constrained from the chemistry of certain mineral phases and subsequently connected to the processes of pegmatite crystallization. The question whether halo formation should be seen as single-or multi scale process is central. The second part of the project is economically in nature and aims to establish effective tools for future exploration of hard-rock lithium sources. A hand-held Laser Induced Breakdown Spectrometry (LIBS) method is to be developed, which aims to make detection of the halo signature on drill cores and outcrops further away from the pegmatite possible. For the same reason geochemical analysis of typical halo minerals in stream sediments is planned in order to detect mineralized pegmatites upstream.

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ID: 169532

Start date: 01-09-2022

End date: 01-09-2026

Last modified: 04-02-2025

Grant number / URL: 13/RC/2092_P2

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