

### **REE Mineralization at Koppamurra, South Australia: Insights into the Transport, Vertical and Lateral Distribution of REEs in a Low-Temperature Environment**

**Jasmin Hiller**<sup>1</sup>, Stefan Löhr<sup>2</sup>, Laura Morrissey<sup>1</sup>, Andre Baldermann<sup>3</sup>, Justin Payne<sup>1</sup>, Casey Doolette<sup>1</sup>, Carmen Krapf<sup>4</sup>, Carl Spandler<sup>2</sup>

<sup>1</sup>University of South Australia, Adelaide, Australia, <sup>2</sup>University of Adelaide, Adelaide, Australia, <sup>3</sup>Graz University of Technology, Graz, Austria, <sup>4</sup>Geological Survey of South Australia, Adelaide, Australia

The demand for rare earth elements (REE) is expected to increase in the near future as new technologies develop and supply chain issues force countries to identify their own resources. Ion-adsorption REE mineralisation is known from tropical weathering profiles developed on igneous rocks mainly in South China and Myanmar. Recent research by Löhr et al. (2024) on the unusual ion-adsorption REE deposit at Koppamurra, South Australia, identified REE mineralization hosted in authigenic clays, secondary formed carbonates, and cerianite, which acts as a Ce sink. This deposit has formed above a marine limestone unit and thus lacks an underlying REE-rich protolith, and it has not experienced tropical weathering conditions, which contrast common ion-adsorption REE deposits. Instead, the mineralization is proposed to have formed through rapid ( $< 2$  Ma), pedogenic weathering-induced redistribution of REEs within lacustrine sedimentary material.

Our research provides new insights into the spatial and lateral distribution of REE in the Koppamurra deposit and their controlling factors. In addition, we show that REE-rich horizons are predominantly associated with neo-formed smectitic clays (Fe-smectite or nontronite-like) and secondary carbonates. Steep pH gradients within the weathering profile exert a significant control on the immobilisation of REE. Our new data provides additional constraints on the availability and origin of REEs in Koppamurra.