A Mineral systems approach on critical raw material deposits in Europe

Andersson J.B.H.[1], Bauer, T.E.[1], Tornos, F.[2], and EIS WP2 working group*

[1]Luleå University of Technology, Department of Civil, Environmental and Natural Resources Engineering, 971 87 Luleå, Sweden, joel.bh.andersson@ltu.se
[2]Instituto de Geociencias (CSIC-UCM), 28040 Madrid, Spain

In response to the escalating demand for Critical Raw Materials (CRMs) driven by the global shift towards renewable energy, Europe faces significant challenges in securing long-term supplies of essential metals and minerals. These challenges are exacerbated by geopolitical tensions and heightened competition for resources, as underscored by the European Union's projection of raw material demand doubling by 2060. To navigate these challenges, there is a pressing need to develop robust strategies for the exploration and sustainable exploitation of CRM-bearing deposits within the EU.

The Horizon Europe project Exploration Information System (EIS; HORIZON-CL4-2021-RESILIENCE-01-n°1010557357) emerges as a pivotal initiative in this endeavor, focusing on investigating CRM-bearing mineral systems across Europe. This project prioritizes cobalt in Volcanogenic Massive Sulfide (VMS) systems, -tin-tantalum-tungsten in granite/pegmatite-related systems, alongside REEs and cobalt in Iron Oxide-Copper-Gold (IOCG) systems.

The EIS project aims to address the substantial but underexplored potential of these deposit types, challenging due to their exotic and atypical nature which necessitates specialized exploration strategies. The EIS project harnesses the mineral systems approach for the exploration and development of CRM-bearing deposits within Europe. Originating from studies on Australia's Proterozoic mineral systems, this method prioritizes a holistic grasp of the geological phenomena underpinning the formation and conservation of mineral deposits. It leverages both geological and geophysical data to create conceptual models, shedding light on ore formation dynamics in alignment with the regional geological context. As part of the initiative, new mineral system models are being incorporated into the EIS toolkit, alongside the EIS QGIS Wizard for perspective mapping. These tools, destined for the mining industry and the broader public, underscore the project's commitment to open-source resources, facilitating wider access and usage.

*EIS WP 2 working group: Andreas Knobloch, Guillaume Bertrand, Oliver Blein, Roberto Carlos, Edward Lynch, Blandine Gourcerol, Pentti Grönholm, Matthieu Harlaux, Jiri Zacharias, Johanna Pesonen, Juan Manuel Escobar Torres, Martin Koehler, Martiya Sadeghi, Tero Niiranen, Vesa Nykänen, Peggy Hielscher, Ramon Carbonell, Stefan Andersson, Pekka Tanskanen, Thomas Dittrich, Tom Kearney, Marie Vandewalle, Andreas Barth, Candela Pita Diaz, Carmen Conde, Gonzalo Ares, Iris van der Werf, Janne Kuusela, Krisztian Szentpeteri, Maria Elena Crespo, Percy Clark.