UNDERCOVER

Redefining deep-earth exploration



UNDERSTANDING THE SCIENCE

UNDERSTANDING MINERAL SYSTEMS

Using geological processes, data and time to identify hidden critical raw material deposits.

OVERVIEW

The Mineral Systems Concept looks beyond individual deposits to understand the geological processes that create them, and to outline the mappable mineral system components which act as vectors towards the deposits. UNDERCOVER applies this approach to deeply buried critical raw materials, combining geological, geophysical, geochemical and geochronological information to understand how mineral systems form and evolve.

Why does it matter?

- **Hidden resources** – Many potential critical raw material deposits remain buried deep underground.
- **Better predictions** – Understanding mineral systems helps identify where undiscovered deposits may occur.
- **Smarter exploration** – Integrating different types of data can reduce uncertainty and help target exploration more effectively.

UNDERCOVER INNOVATION

UNDERCOVER is investigating how the Mineral Systems Concept can be used to explore deeply buried critical raw materials. The research integrates geological, geophysical, geochemical and chronological information to build a more complete picture of how mineral systems form and evolve. By adding time to 3D geological models and combining different datasets with advanced modelling and artificial intelligence, UNDERCOVER aims to improve the identification of geological settings that may host hidden mineralisation. This integrated approach could help make deep-earth exploration more targeted and less uncertain, while providing new knowledge and methods for future exploration.

OUR PARTNERS

GTK · LGI sustainable innovation · brgm · LNEG · Institute of Geophysics · Leibniz IPHT · INRS Institut national de la recherche scientifique · Universität Münster · Technische Universität Berlin · Universidade de Évora · Ongwe · Latitude66 · REDCORP · Cluster Portugal Mineral Resources · supracon · Smart Seismic Solutions

How does it work?

UNDERCOVER brings together different types of geological information to build a more complete picture of what lies deep beneath the surface. Researchers combine geological, geophysical, geochemical and chronological data to understand how mineral systems formed and evolved over time. These datasets are integrated into 3D geological models, supported by advanced modelling and artificial intelligence. The research then uses this combined information to assess which geological settings may be more favourable for mineralisation and develop mineral prospectivity models. By connecting processes, data and time, UNDERCOVER is investigating new ways to identify potential critical raw material deposits that may otherwise remain hidden.

Key technologies

- Geology
- Geophysics
- Geochemistry
- Geochronology
- 3D modelling
- AI

BENEFITS

For exploration

- Better targeting
- Integrated geological understanding
- Reduced uncertainty
- Improved prospectivity assessment

For society

- Supporting a better understanding of Europe's geological resources
- Advancing knowledge of how critical raw material deposits form
- Supporting future exploration of Europe's mineral potential

Funded by the European Union

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