OUR ACTIVITIES

The EU-funded project INFACT (Innovative, Non-Invasive and Fully Acceptable Exploration Technologies) supports the development of innovative exploration and stakeholder engagement approaches.

The project, coordinated by HIF, establishes a set of permanent reference sites to trial and assess the technological, social and environmental performance of existing and emerging exploration techniques.

INFACT

WHO WE ARE

HIF is a leading, multi-disciplinary research institute in Europe dedicated to develop innovative technologies and systems for the energy and resource efficient exploration, beneficiation and recycling of mineral and metalliferous raw materials. The advance of novel platforms and tools needed for resource characterization, geospatial modelling, process and system simulation are an integral part of our research.

As Helmholtz Institute Freiberg for Resource Technology, we belong to the Helmholtz-Zentrum Dresden-Rossendorf, which is one of 19 research centers within the Helmholtz Association - Germany's largest scientific organization.

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HiF
HELMHOLTZ INSTITUTE FREIBERG
FOR RESOURCE TECHNOLOGY

HZDR
HELMHOLTZ ZENTRUM
DRESDEN ROSSENDORF

SUSTAINABLE EXPLORATION AND DISCOVERY

OUR STRENGTHS

In order to locate and characterize potential ore deposits, we:

- Merge expert-based and data-based approaches while preserving the full information of the measured signals

- Develop signal and image processing techniques

- Handle remote data as physical property measurements of the Earth´s surface through time

- Incorporate Artificial Intelligence for a comprehensive integration of highly heterogeneous data

OUR FOCUS

Remote Sensing

- Boosting mineral exploration with tools for sensor integration at different scales

- Bridging the gap between outcrop and airborne scales through the use of remotely piloted aircraft systems as a platform for multiple sensors

- Developing processing and data integration tools such as Mephysto and TecGems

- Using unique textural and geomorphological features

Hyperspectral imaging, Siilinjärvi in Finland

Outcrop and subsurface modelling

- Integrated acquisition of schemes and processing routines for ground-based remote sensing

- Integration of ground and drone-borne hyperspectral data into point clouds as input for novel machine-learning-based-classifications

- Supplement subsurface imaging with subsurface geophysical and drill-core data to produce 3D mineralogical resource maps
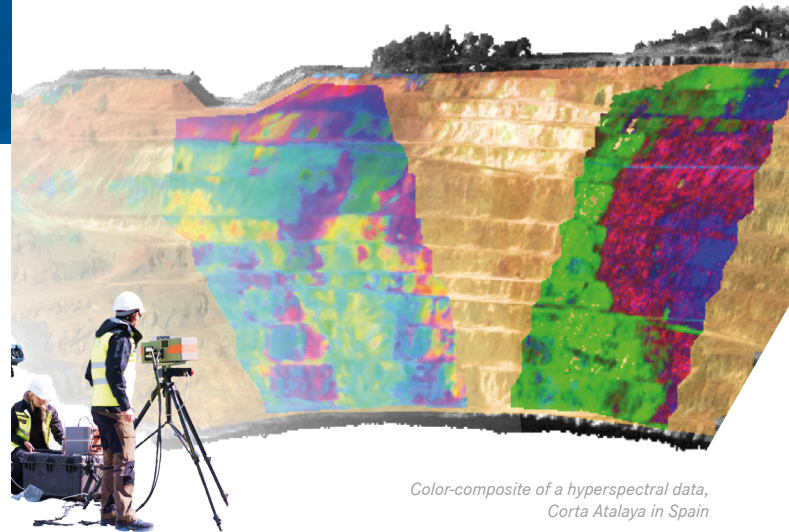
Color-composite of a hyperspectral data, Corta Atalaya in Spain

Near-field sensing

- Innovative, non-invasive optical technologies covering applications from single crystal characterization to drill-core logging

- Application of laser-induced fluorescence microscopy for rare earths detection

- Advanced multi-source data integration, combining absorption and emission spectroscopy

Artificial Intelligence

We bridge the gap between remote sensing, exploration and mining activities by designing advanced machine learning approaches. We cover:

- Multi-modal data fusion

- Change detection and time-series analysis

- Feature extraction and unmixing

- Machine learning and deep learning algorithm development

Data

Multi-sensor

Multi-scale

Multi-temporal

Ancillary Data

Machine Learning

Supervised learning
Feature extraction
Unsupervised learning
Deep learning

Applications

Exploration | Mining | Monitoring | Post-Mining | Re-Mining