

Cobalt ores in the Asturias (Spain): Providing key raw materials for the future of electric vehicles

Supervisor(s): Dr Guilio Solferino (RHUL), Dr Dave Lowry (RHUL), Wilson Robb (Aurum Exploration Services), Marilena Moroni (University of Milan)

Project description:

Cobalt is critical for manufacturing of EV batteries; however, it is in seriously short supply. It is imperative to find cobalt ores in areas of social and political stability. An exceptional potential resource exists in the Asturias (Spain) where local government and the EU support mining prospection. To estimate these resources, we need to understand the geological triggers that formed them. Localities in Asturias, labelled by Paniagua as 'epigenetic hydrothermal veins', and others in the Caledonide, Variscan and Alpine orogenic belts, are often designated as "five-element type" veins (Ni-Co-As-Ag-Bi). In the 80s these were linked to shallow-magmatic intrusions and metasomatic alteration (epithermal ores). It is now accepted that this model is not plausible, although robust explanations of the mineralising process are lacking. A combination of a tectonic framework study, determination of key structural-stratigraphic controls, purpose-designed mineralogical characterization, physic-chemical modelling of fluids (e.g. thermal reduction/oxidation of dissolved metals) and mining prospection methods is required to explain the genesis of cobalt-bearing hydrothermal veins and altered breccia envelope systems, necessary to respond to an urgent societal need in Europe.

Research methodology

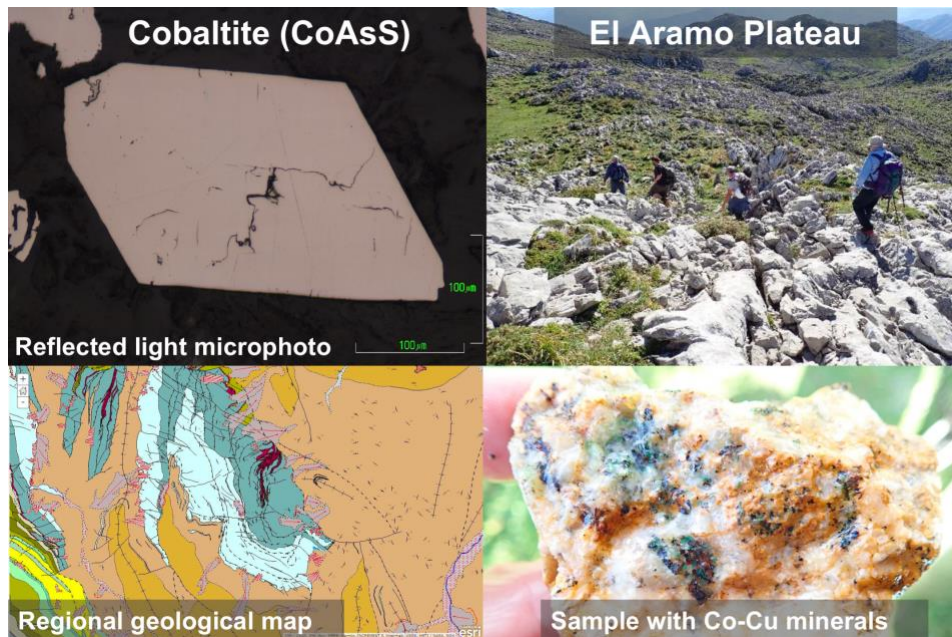
This project combines detailed research on geological history of the target areas (structural-stratigraphic synthesis), expert-guided field-work, fluid petrology (fluid inclusion studies) and geochemical analysis (stable isotope determination). Ore body modelling will reveal the mechanism of 'hydrothermal cobalt vein' genesis and quantify the resources of a series of genetically-related mineralisations.

Training

The student will carry out fieldwork guided by prospection experts from Aurum Exploration Services. They will receive training in mineral identification using microscopy, fluid inclusion data collection and processing, energy and wavelength dispersive spectroscopy (EDS, WDS) and stable isotope data interpretation. They will learn to reconstruct physic-chemical conditions of mineral formation mentored by a scientist of Milan University (<https://www.unimi.it/en/ugov/person/marilena-moroni>), and quantify ore resources under the direction of Aurum (<https://www.aurumexploration.com/saint-patrick-asturias-spain-dolomite-breccia-hosted-cobalt/>).

Person specification

The project requires a Geology/Earth Sciences graduate. Knowledge of ore minerals is essential. Familiarity with software for ore resources estimation and/or analytical geochemistry is desirable but not essential as those are part of the specialist skills training offered with this project.



References:

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Application

For further information contact: giulio.solferino@rhul.ac.uk

Closing date for applications to [Royal Holloway Direct](#): 7th January 2020

This project has been shortlisted for funding by the ARIES NERC Doctoral Training Partnership. Shortlisted applicants will be invited to interview in late February 2020.

Successful candidates who meet UKRI's eligibility criteria will be awarded a NERC studentship (in 2018/19 the stipend was £14,777). In most cases, UK and EU nationals who have been resident in the UK for 3 years are eligible for a full award. For non-UK EU-resident applicants NERC funding can be used to cover fees, RTSG and training costs, but not any part of the stipend. Individual institutes may, however, elect to provide a stipend from their own resources.