

EMERALDinho

Project title: EMeraldinho II - Stimulating Innovation & Entrepreneurship in EMerald Master



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Project coordinator: Université de Liège (UL), Belgium

Consortium:

University of Zagreb, Faculty of Mining, Geology and Petroleum Engineering (RGNF), Croatia

Université de Lorraine (UL), France

Luleå University of Technology (LTU), Sweden

Technische Universität Bergakademie Freiberg (TUBAF), Germany

Helmholtz-Zentrum Dresden-Rossendorf e.V. (HZDR), Germany

Geological Survey of Finland (GTK), Finland

ERAMET IDEas, France

Atlantic Copper S.L.U., Spain

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Project description

EMeraldinho2 aims to develop an entrepreneurial mindset and foster a spirit of innovation among students enrolled in the Master in Resources Engineering (EMerald) programme, through more active involvement of industry in the curriculum as well as a range of extracurricular activities. The project seeks to make a significant contribution to changing the public perception of the raw materials sector, thereby attracting the most talented students from across the European Union and beyond.

The EMerald Master's Programme in Resources Engineering is part of the EIT RawMaterials Academy. It educates students from all continents, offering a unique interdisciplinary education that combines geosciences and engineering, covering both primary and secondary resources from a life-cycle perspective. The highly qualified engineers trained within the EMerald programme will be capable of developing a responsible approach towards the environmental impacts of extraction and recycling, while simultaneously addressing key societal challenges.

The EMeraldinho2 project aims to develop an entrepreneurial mindset and stimulate innovation among students enrolled in the EMerald Master's Programme through enhanced involvement of industry in the teaching process and extracurricular activities.

Students participate in various networking activities to ensure that EMerald graduates are recognised within the professional community (e.g. career days, field trips, regular online lectures) and engage with the latest research questions by participating in innovation seminars, research projects, etc. A business school is also organised to help students understand the fundamentals of business administration (e.g. how to develop a business plan or model). An essential component of the programme is the participation of industry partners in curriculum redesign and in providing professional placements. Future graduates will be capable of developing innovative technologies that contribute to the more efficient use and conservation of resources for future generations.

Objectives and scope of the project

Main objective: to complement the academically and research-oriented education of the EMerald Master's Programme by providing students with deeper insight into the economic realities of the mineral raw materials sector through greater engagement of industrial partners in the educational process; by enabling student visits to infrastructure facilities and examining the need for greater innovation and higher ESG standards; by encouraging students to devise creative solutions; and by providing them with basic knowledge in business and management.

Scope: the project covers all aspects of raw materials supply challenges, both from primary and secondary sources. The programme is designed as a gradual introduction to the innovation needs expressed by industrial partners. It will stimulate creative thinking while simultaneously equipping students with strong entrepreneurial and communication skills.

The consortium reflects the three components of the “Knowledge Triangle” (education, research, innovation) and covers all six EIT RawMaterials Co-location Centres. All partners have clearly defined responsibilities in coordinating work packages (WPs) or contributing to specific objectives and deliverables.

The business school is led by partners from the Eastern Co-location Centre; field teaching covers the wider Dinaric (Adria) region; and industrial partners from (South-)Eastern Europe offer professional placements.

The project also involves alumni (today a community of 140 professionals active worldwide, ideally positioned to reflect on global challenges of sustainable raw material supply) and contributes to strengthening partnerships with strategic resource-rich countries (e.g. Brazil, the Philippines, etc.).

Role of RGNF – ADRIA field teaching

UNIZG-RGNF (Faculty of Mining, Geology and Petroleum Engineering, University of Zagreb) aims to further enhance and maintain six existing introductory lectures based on case studies for students and to update them with current geological and mining knowledge. It also plans to continue and improve the **ADRIA Field Guide**, as well as to organise an **annual ADRIA field course/excursion** – progressing from a regional level towards an ideal integration of knowledge through the three directions of KTI – Knowledge Triangle Integration, applied to various types of primary raw materials across the ADRIA region, according to two principles:

1. **Metallogenetic approach**
2. **Knowledge Integration (KTI) approach**

(1) The **classical metallogenetic approach** follows the sub-parallel NW–SE structure of the Dinaric orogen and includes typical ore deposits associated with all developmental stages of the Wilson cycle:

- A. Initial intracontinental rifting of the Dinarides (Early Permian Ljubija Fe deposit)
- B. Advanced intracontinental rifting of the Dinarides (Early Triassic, Veovača/Rupice Fe-Pb-Zn-Cu-Sb-Ag-Au-barite deposits)
- C. Subduction within the Dinarides (Cretaceous age, Borov Dol Cu-Mo-Au open pit)
- D. Passive continental margin – carbonate platforms, deposits linked to platform emersion (Cretaceous, bauxite deposits in Jajce)
- E. Post-collisional magmatism in the Dinarides (Oligocene, Viogor-Zanik Pb-Zn/Cu, Ag, Bi, W deposit)
- F. Post-orogenic collapse of the Dinarides (Miocene Nexø limestone deposit)

(2) The **Knowledge Integration (KTI) approach** focuses on both traditional and new critical raw materials in the ADRIA region, analysing their cycles in both categories.

Traditional materials such as the iron cycle and aluminium cycle in Bosnia and Herzegovina are analysed alongside new and critical raw materials, such as the potential exploitation of antimony in Bosnia and Herzegovina, lithium and borates in Serbia, and graphite in Croatia.

Students will study the types of deposits, reserves, production, industrial development, processing, waste management options, working conditions on site, safety, energy consumption, and potential improvements for each raw material.

Through these activities, students will become familiar with the specificities of regional knowledge integration (KTI) for different raw materials and understand its deviations and degradation over recent decades. Wherever possible, students will be introduced to more targeted and cost-effective methods for mineral exploration and extraction, learning how to reduce the environmental impact of mining activities and improve overall mineral and metallurgical processing.

Building on knowledge gained from other courses in the field of circular economy, students will, through group work during the final days of the field excursion, simulate and present the ideal knowledge integration (ideal KTI) for selected case studies from the ADRIA region.