

Critical metals for the energy transition



Niveau d'étude
Master 2



ECTS
3 crédits



Volume horaire
22h



Période de
l'année
Semestre 3

Présentation

DESCRIPTION

For decades, mankind has been convinced that metal reserves would be sufficient to supply it indefinitely, as recycling and the evolution of materials meant that there was no need to search for new reserves. However, recent industrial developments in non-Western countries, associated with the emergence of new technologies and the beginning of energy transitions, showed us the need to look for new resources and reserves for a certain number of metals. This course presents the current state of the art in mining geology and metallogeny, as well as the economic, political and strategic aspects of access to "critical metals".

This course will be focused on :

1) Apprehending the question of limits & planetary frontiers , and various « models » of energetic prospective :

What are limits and planetary frontiers ?

- Overview of raw materials for energy transitions
- Critical materials matrix
- Environmental Problematics of mining footprint and water consumption
- Geopolitical questions linked to renewable energies : questions linked to renewable energies : international

dependency, new mining - contexts (US, China, EU), techno-centered solutions vs sobriety

2) Understanding where and how metal ore deposits are formed : Magmatic, Hydrothermal

and Sedimentary deposits

- relationships between convection and concentration of specific elements
- the role of water/magma interactions
- the relationship between the evolution of the ocean & atmosphere with ore deposits
- biominerals (relations between metal accumulation and evolution of life)

3) Tools for exploration

- Learning to recognize rock and minerals containing specific critical metals (cobalt, Lithium, platinum, REE, nickel ...) through bulk description & petrology (e.g. petrological approach to the alteration of Li-rich deposits)
- Modelling

A practical work session (TP) will be organized at a Mineralogy Museum on the metal composition and origin of minerals used to build modern electronic devices.

OBJECTIFS

Recognizing critical minerals within rocks

Pour en savoir plus, rendez-vous sur > u-paris.fr/choisir-sa-formation

Understanding how they form & where to find them (keys for mineral exploration)

Gain a better grasp of the geopolitical and economic impacts of geological resources on the World's Economy

HEURES D'ENSEIGNEMENT

Critical metals for the energy transition	Cours Magistral	12h
Critical metals for the energy transition	Travaux Dirigés	10h

PRÉ-REQUIS NÉCESSAIRES

Basic knowledge in Geology.

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