

GEOLOGICAL RESOURCES, CRITICAL RAW MATERIALS AND ENERGY TRANSITION SESSION

Elvin Ahmedov, Haşim Ağrılı, Okay Çimen, Nazan Yalçın Erik

The main theme of the 79th Geological Congress of Türkiye, to be held on 12–16 April 2027, has been designated as "Geosciences in Addressing Global Challenges: Earth–Society–Future." Within this framework, the session entitled "Geological Resources, Critical Raw Materials and the Energy Transition" aims to examine the relationship between geological resources and the energy transition from scientific, environmental and societal perspectives.

Addressing climate change, ensuring energy supply security and using natural resources sustainably are closely interconnected global challenges. The transition from fossil fuel-based energy systems to low-carbon systems is reshaping raw material requirements as renewable energy technologies, electrification and energy storage solutions become more widespread. Copper, lithium, cobalt, nickel, graphite and rare earth elements are among the raw materials that have gained prominence in this transition. However, meeting growing demand for raw materials depends on more than the discovery of new resources. The efficient use of existing resources, the development of recovery and recycling opportunities, and improvements in the reliability and continuity of supply chains are also important in this process.

Geosciences play a fundamental role in the exploration, characterization and evaluation of the natural resources required for the energy transition. Understanding the geological processes through which mineral resources form, their spatial distribution, and their mineralogical and geochemical characteristics provides the scientific basis for activities ranging from exploration to resource and reserve assessment. Nevertheless, the economic viability and sustainable use of a resource depend not only on its geological characteristics but also on technological, economic, environmental and societal conditions. In keeping with the Congress theme of "Earth–Society–Future," this session seeks to consider geological resources in relation to the energy transition and to discuss resource potential, supply security, environmental impacts and responsible resource management in an integrated manner.

The session will address the formation processes, mineralogical and geochemical characteristics, geophysical investigation methods, exploration strategies, and resource assessments of mineral deposits containing critical raw materials. Studies on Türkiye's potential for critical raw materials will also be an important focus. In addition, the session will cover the geological foundations of fields relevant to the energy transition and emissions reduction, such as geothermal energy, natural (geological) hydrogen and geological carbon dioxide storage, as well as the recovery of critical and strategic raw materials from mine waste and other secondary sources. Alongside fundamental and applied research, contributions based on field studies, case studies and integrated assessments that bring together findings from different disciplines are encouraged.

In this context, we invite researchers from all relevant disciplines to submit abstracts to the "Geological Resources, Critical Raw Materials and the Energy Transition" session of the 79th Geological Congress of Türkiye and to contribute to the scientific discussions.

Session Topics

1. Geology, formation processes, and mineralogical and geochemical characteristics of critical and strategic raw materials
2. Exploration for critical raw materials using geophysical, geochemical and other methods; resource and reserve assessments
3. Türkiye's critical and strategic raw material potential
4. Raw material requirements of energy transition technologies and geological supply potential
5. Recovery of raw materials from mine waste and secondary sources
6. Geothermal energy and raw material extraction from geothermal fluids
7. Natural (geological) hydrogen resources
8. Geological carbon dioxide storage: site suitability, capacity and safety
9. Responsible and sustainable use of geological resources; environmental impacts and rehabilitation