

SEG 2024 Conference: Sustainable Mineral Exploration and Development

Miocene Western Balkan Lithium-Borates Metallogenic Zone

Sibila Borojevic Sostaric, Tomislav Brenko

University of Zagreb - Faculty of Mining, Geology and Petroleum Engineering, Zagreb, Croatia

The western Balkan lithium-borate metallogenic zone extends over 1,500 km, parallel to the Sava-Vardar and Western Vardar zones, towards its Turkish counterpart, the Ismir-Ankara-Erzincan zone. In the past two decades, a series of new lithium-boron discoveries in the western Balkan countries have significantly enhanced our geological understanding, allowing us to summarise key geological features of this unique metallogenic zone.

1. Lithium-boron mineralization typically occurs in Miocene extensional lacustrine basins, often at depths exceeding 200 meters.
2. These lacustrine sequences comprise fine-grained siliciclastic sediments with intermittent evaporites and volcanoclastic deposits, suggesting proximity to volcanic activity.
3. The basins are typically controlled by normal faults, which likely serve as major fluid pathways.
4. Oligocene-Miocene granitoid rocks in the westernmost area host lithium anomalies and exhibit geochemical characteristics indicative of high-K calc-alkaline-shoshonite magma series.
5. Lithium and boron are likely associated with erosion of lithium and boron-enriched Oligocene-Miocene granitoid rocks in adjacent Miocene lacustrine basins.
6. Geological evidence suggests that adjacent Miocene lacustrine basins were reheated during Middle Miocene exhumation, leading to the discharge of lithium and boron from the eroded material to the hydrothermal fluids and into the lake water during the lower and middle Miocene climatic maximum.