

Lateritic Nickel-Cobalt and Bauxite Deposits of the (western) Tethyan and Peri-Tethyan Belt

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Laterites are regoliths developed under tropical to subtropical conditions and are host to key deposit types, notably bauxites (major sources of Al) and Ni-Co laterites. Bauxite develops from weathering aluminosilicate rocks, while the weathering of ultramafic rocks leads to formation of Ni-Co laterites. In the western Tethys, bauxites and Ni-Co laterites developed during the Mesozoic into Cenozoic times, when geology, paleogeography, and climate were ideal for the deep weathering of favorable lithologies. Bauxites were developed on the rocks forming the continental margins to the various branches of the Tethys ocean and were already forming in Triassic times, while the Ni-Co laterites developed on fragments of obducted ophiolite from the Tethys ocean, which were only uplifted and exposed for weathering after the Jurassic. In situ lateritic bauxites are known in the region, but karst bauxites are much more common. Ni-Co laterites are found as in situ profiles but also as distinctive and extensively redeposited nickeliferous iron ores. The bauxite belt extends from Spain in the west, includes the type locality at Les Baux in France, and runs intermittently all the way through the Balkans, Greece, and Turkey to Iran and beyond. Bauxite resources in Europe constitute around 2% of the world's current known stock. Significant Ni-Co laterites are found in a more restricted geographic area, stretching from Serbia through to Turkey. The bulk of both Al and Ni-Co production currently comes from Greece, today accounting for about 1% of world production of both Ni and bauxite with other mines in Turkey, Albania, and Kosovo. Ferronickel plants are located in Greece, but also FYROM and Kosovo. Primary aluminum is produced from local bauxite in both Greece and Turkey. The region has significant potential for further bauxite deposits, although these tend to be karst bauxites developed as irregular pockets, less suited to large-scale mining efforts. The published resource base of Greece is in the order of 650 million tonnes at >50% Al₂O₃. Many undeveloped Ni-Co deposits are recorded through the region, with a recent focus on unlocking the potential of limonitic mineralization using novel hydrometallurgical technologies. Particularly noted is the potential for large, low-grade redeposited lateritic Ni-Co-iron ores, and at least one of these deposits indicates a geologic resource of more than 1 billion tonnes at 0.7% Ni, 0.05% Co (Mokra Gora, Serbia). New technological advances in mineral processing could make the region more attractive for Ni, but also for the co-recovery of other useful metals like Co and Sc, which have been neglected by former and current mining operations.