

# The role of topography in the formation of Ni-laterite deposits in Fars province, Iran

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The Ni-bearing laterites occurred on ultramafic rocks of the Neyriz ophiolite in the Bavanat region, in the Crushed Zagros Structural Zone, between the Zagros Orogenic and Sanandaj-Sirjan belts, Fars province, Iran. The undisturbed laterite profiles from the bottom to the top include protolith, hard and soft saprolite, and oxide horizon. The critical metals Co, Ni, and Cr are enriched in the oxide horizons relative to protolith and saprolite. Ni concentration of the studied soils reaches 1.2 wt%. SEM-EDS data showed that Ni released from serpentine group minerals in the parent rock was concentrated in iron oxides, mainly hematite in the oxide horizon. Ni is likely adsorbed onto oxy-hydroxides probably in the oxide horizons also replaced in the secondary Fe-oxide minerals. Considering the paleoclimate in post-Cretaceous time, the study area was close to the equator under humid tropical climate conditions with heavy rainfall during the Late Cretaceous to the Eocene, and the formation of the Ni-laterite deposits in the study area occurred in this period. Nickel laterites in the Bavanat region were formed in the Mesozoic and Cenozoic eras, especially in the Paleogene-Eocene time. There was a thermal peaking during those eras and the geological, palaeogeographical, and climatic conditions were favourable to the formation of nickel laterites in the Tethys belt by the weathering of harzburgite rocks. Ni-bearing laterite formation in Bavanat is consistent with other Ni-bearing laterites in the Mediterranean areas which are also found in the Balkan Peninsula, Greece, and Turkey. Although the ophiolite complexes of the same age are widespread in Iran, there is no report on the preservation of weathered soils derived from ultramafic rocks from other ophiolites. The preservation of the Ni laterites on the Neyriz ophiolite in Bavanat is attributed to the gentle topography of this region and rapid covering by younger sediments. The low topography at Bavanat makes it more prone to preserving, resulting in thick lateritic horizons; finally accompanied by higher Ni concentrations.

**Keywords:** Paleoclimate, Topography, Ni-laterite deposits, Bavanat, Fars, Iran.