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Morpho-structural Features and Structural Classification of Chromite Pods in the Tropoje-Has Ophiolite Massif, Albania

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Tropoje-Has ophiolitic massif of eastern Mirdita (Albania) ophiolitic belt, is a major source for metallurgical chromite ore in Albania. Massif consists of a thick mantle section of SSZ type, 8-10 km thick and oceanic crust, 4-6 km thick. Mantle section through serpentinite, overlie the sub-ophiolitic metamorphic sole developed widely in peripheral parts of north-west of Tropoje-Has ophiolitic massif in contact areas with passive continental lips and usually associated with synrifting or preophiolitic volcano-sedimentary formation.

The geological section of this massif is characterized by lithological continuity from the bottom to the top as following: mantelore sequences represented by basal peridotite, hartzburgite, hartzburgite -dunite, dunite-hartzburgite; transition zone represented by massive dunite; cumulate sequence represented by serpentinized dunite, wehrlite, pyroxenite; plutonic sequence represented by gabbro, diorite and plagiogranite; sub-volcanic sequences represented by sheeted dyke complex (composed by diabase, quartz gabbro-diabase, mikrodiorite, less boninite, quartz andesite-dacite, dacite and rhyodacite); volcanic sequences represented by basalts, basaltic andesite, boninite, andesite, rhyolite, rhyodacite.

In the massif there are some showings and deposits, small in size and not important, of refractory chromite, located mainly in the north-western part just in the periphery of ophiolitic massif, within the basal clinopyroxene bearing hartzburgite. In the middle parts of mantle section composed of harcburgit-dunite and upper parts composed of dunite – harcburgite are discovered important metallurgical chromite ore deposits up to several million tons. Areas of transition dunite contain plate – like chromite ore bodies of metallurgical type. Small chromite ore bodies with high iron content located within dunite – pyroxenite cumulate sequences show no interest for metallurgical chromite, but they are very important for Platinum Group Elements. Most of discovered podiform chromite deposits have high chromium content, with ≠ Cr (70-85).

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It is recognized a systematic change in the composition of olivine and magnezial chromite passing from hartzburgite in the surrounding dunite, towards massive, nodular and disseminated chromite ore, reflecting reaction of the melt with rock walls. It is noted that grains which build mass of the podiform ore bodies in the massive, nodular, antinodular, spot-like, orbikular, and disseminated structures are subhedral and anhedral forms and consolidated earlier than silicate mass of serpentine as matrix ores, which seems to cement those. This magnesial serpentine derived by olivine has high magnezial chemical composition, lemon yellow in color, and forms reaction rings around chromium grains as well as serpentine veinlets and nets inside them which intersect the chromite ore.

Based on the morphological - structural features and structural classification are distinguished concordant, subconcordant and discordant ore bodies.

Concordant ore bodies constitute around 85% of the all showings in Tropoje – Has ophiolite massif. Most of the ore bodies are tabular, but they may also be lens-layered, lens – like, pensel – like and sometimes very irregular. Textures are varied as: banding texture, nodular, antinodular, orbicular, massive, dense disseminated, average disseminated, rare disseminated, spot – like, irregular, skeletal, dendritic etc. These ore bodies are located in hartzburgite – dunite and dunite hatzburgite mantle sequences. The pull–apart structure, perpendicular to the lineation is well developed in the most of ore deposits.

Subconcordant ore bodies are less developed and constitute around 5% of all known ore deposits and showings in the massif. The ore bodies and their internal structures have discordance up to 25^0 with structure of surrounding rocks.

Discordant ore bodies constitute around 10% of all known ore deposits and showings in the massif. The angle between internal structures of ore bodies and structure of surrounding rocks has discordance over than 25^0. The lineation is poorly expressed or in the most cases deformation is absent.