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Ore Mineral Deposition in Black Shales, Southern Slope of the Greater Caucasus

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The Greater Caucasus is the northernmost expression of the Caucasus Phanerozoic orogen, which is accreted to the Eurasian continent's south margin, between the Black and Caspian seas. The southern slope of the Greater Caucasus comprises highly deformed Lower-Middle Jurassic shale, sandstones, limestones (with minor black shale), basaltic/andesitic layers and a gabbro/diorite dike system. Related intense hydrothermal processes were responsible for principal sulfide ore mineralization, with more than 500 recognized outcrops [1].

These mineralisations run along the whole length of black shales and are spacially related to regional faults. There are two large genetic mineralization groups: volcanic-hosted massive sulfide deposits; and polymetalic hydrothermal veins associated with magmatic centers. The first type of mineralization was formed during the Early Jurassic and isn't widely spread. The second type of mineralization is genetically related to middle Jurassic dioritic magmatic activity. Such mineralizations outcrop widely and are represented by quartz-pyrite-pyrrhotite, quartz-pyrite-chalcopyrite-pyrrhotite, quartz-chalcopyrite, pyrite, quartz-gold and quartz-antimonite veins and matts

It is considered that the formation of different type deposits in black shales was caused by different hydrothermal fluid sources. The pyrite-chalcopyrite-pyrrhotite occurrences were genetically linked to basic and intermediate magmatism, whereas the pyrite -polymetallic ones were associated with felsic magmatic activity [2]. Based on field observations and experimental data [3] we assume that the composition of hydrothermal deposits reflects the distance between the causative magmatic centre and the mineralization site. The hydrothermal fluid closer to a magmatic center generally deposits chalcopyrite, whereas as it travels further away, preferentially forms sphalerite-galena bodies [4].

References:

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