

Diversity of geodynamic settings during Cu, Au and Mo ore formation in the Lesser Caucasus: new age constraints

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Recent regional studies, and new Re-Os and U-Pb age data presented in this contribution have allowed us to constrain the relationship of the geodynamic evolution and the formation of metallogenic belts in the Lesser Caucasus, characterized by an evolution from Jurassic-Cretaceous subduction environments to Neogene, postcollisional events.

Jurassic-Cretaceous northeastswardsubduction of the Tethys below Eurasia resulted in the formation of island arcs along Eurasia (Somkheto-Karabakh belt and Kapan block). Initial ore formation resulted in copper-rich pyrite massive ore lenses and veins, and polymetallic, Au- and Te-bearing veins, which are still somehow enigmatic, and which are hosted by Middle Jurassic volcano-sedimentary formations. Published $^{40}\text{Ar}/^{39}\text{Ar}$ mineralization and K-Ar ages fall between 162 and 141 Ma. A distinct event at the transition between the Late Jurassic to Early Cretaceous resulted in the formation of porphyry-Cu, precious metal epithermal and skarn deposits, with molybdenite Re-Os ages of 145.9 Ma at Teghout (northern belt) and 133.3 Ma at Khar-Khar (central belt), and a pyrite isochron Re-Os age of 144.7 Ma at Centralni East in the Kapan block.

During the Late Cretaceous, abundant felsic to intermediate volcanic and sub-volcanic rocks, with a composition transitional between calc-alkaline and tholeiitic, were deposited in a mostly shallow submarine setting during local extension of the Somkheto-Karabagh island arc and its Variscan basement (Bolnisi mining district). These rocks host bimodal-felsicvolcanogenic massive sulphide deposits with transitional features to epithermal gold deposits, as recognised elsewhere in the Turkish Eastern Pontides. New U-Pb zircon TIMS ages of 86.6 to 87.1 Ma for dikes crosscutting the host rocks confirm the Coniacian-Santonian age attributed to the magmatic and ore forming events.

After Late Cretaceous collision of Gondwana-derived terranes (e.g. South Armenian block) with the Eurasian margin, the Tertiary metallogeny of the Lesser Caucasus was dominated by theformation of various epithermal gold and Mo-Cu porphyry deposits (including the world-class Kadjaran deposit). The most important mineral district is the compositeMeghripluton, southern Caucasus, marked by Eocene to Miocene calc-alkaline to alkaline mafic to felsic magmatic suites. U-Pb zircon TIMS ages confirm the pulsating nature of magmatism with an early Eocene event (40-45 Ma) followed by Oligocene (30-32 Ma) and Miocene (20-23 Ma) events. Re-Os molybdenite dating of Mo-Cu porphyry deposits indicates discrete ore forming events at 40-44 Ma (Agarak, Aygedzor, Dastakert), 31 Ma (Kaler) and 27 Ma (Kadjaran, Paragachay), overlapping with magmatic events. Eocene events of the Meghripluton are correlated with peak Eocene magmatic activity reported along Iran and linked to subduction of the Neotethys, whereas the Neogenemagmatism and ore formation in the Lesser Caucasus are attributed to postcollisional events following the closure of the Neotethys between Arabia and Eurasia.