

New Re-Os Molybdenite Ages for Porphyry-Type Prospects from the Eastern Pontides Paleo-Magmatic Arc, Turkey

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The Eastern Pontides of Turkey belong to the central segment of the Tethys metallogenic belt. It is a Cretaceous paleomagmatic arc that formed during the northward subduction of the Neotethys and subsequent Late Cretaceous to early Cenozoic collisional to postcollisional processes. The magmatic-metallogenic evolution of the Eastern Pontides is tightly associated with the orogenic and postorogenic stages of Neotethys evolution. In this contribution, we focus on the exact timing of hydrothermal processes related to the porphyry-type mineralizations and their geodynamic evolution within the Pontides magmatic arc. We present new Re-Os molybdenite age data for four porphyry-type prospects from the Eastern Pontides, which are, from west to east, the Elbeyli Mo ± Cu ± Au, the Emeksen Mo, the Güzelyayla Cu-Mo, and the Ispir-Ulutaş Cu-Mo porphyry-type prospects. Two molybdenite samples from the Elbeyli mineralization hosted within a Late Cretaceous (78.5 Ma) shoshonitic monzodiorite yielded Re-Os ages between 76.0 ± 0.3 and 75.7 ± 0.3 Ma, and one molybdenite sample from the Elbeyli prospect hosted within Late Cretaceous (79–78 Ma) calc-alkaline to high-K, calc-alkaline granites yielded an Re-Os age of 77.2 ± 0.9 Ma. One molybdenite sample from the Güzelyayla Cu-Mo mineralization hosted within a Late Cretaceous (81.4 Ma) dacite porphyry and arc-related volcanic rocks gave an Re-Os age of 50.7 ± 0.2 Ma, and one molybdenite sample from a Cu-Mo mineralization related to the Early Cretaceous multiphase porphyritic intrusions (133–131 Ma) at the Ulutaş-Ispir prospect was dated at 131.0 ± 0.5 Ma. Our new Re-Os molybdenite ages together with published host-rock ages and lithogeochemical, whole-rock isotope data from porphyry-type mineralizations in the Eastern Pontides indicate a long-lived magmatic-hydrothermal system and reveal that porphyry-related hydrothermal systems within the belt are associated with the subduction and the subsequent collisional-postcollisional stages of the Neotethys evolution from Early Cretaceous to Eocene. We conclude that the Ispir-Ulutaş prospect was emplaced during the main Early Cretaceous subduction stage of the northern branch of the Neotethys Ocean, that the Elbeyli and Emeksen prospects formed during a transitional, compressional to extensional stage during subduction, and that the Güzelyayla hydrothermal system was related to early Cenozoic postorogenic processes.