

## **Magmatic evolution and timing of ore formation at the high-sulfidation epithermal Au-Ag deposit and porphyry Cu-Mo mineralization, Kirazlı district, Biga Peninsula, Turkey**

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The Biga Peninsula is a major prospective metallogenic province at the north-western tip of the Anatolian plate, which hosts numerous high-(HS), low- and intermediate-sulfidation epithermal Au–Ag±Cu, porphyry Au–Cu–Mo, and base-metal skarn deposits and prospects. The Kirazlı district is located at the center of the Biga Peninsula and consists of a HS epithermal Au–Ag deposit and porphyry Cu–Mo mineralization. The district includes five target zones, namely: Kirazlı Main, Çatalkaya, Kale, Rock Pile, and Iri. The NNW-SSE trending HS orebody, with 0.33 Mt @0.71 Au, lies beneath the Kirazlı main zone, and the porphyry Cu–Mo mineralization at Kale has been intersected by drilling. The epithermal mineralization is hosted by a volcanic-volcaniclastic sequence consisting mainly of a basaltic andesite lava flow and lithic/crystal tuff cropping out as irregular bodies in at Kirazlı main and Çatalkaya. These units are locally silicified and brecciated. An undifferentiated intrusive rock hosts the porphyry mineralization and is highly deformed by conjugate fault systems. The Au–Ag mineralization occurs as disseminations, small veins, and veinlets within argillaceous and silicified (mainly vuggy and massive) host rocks and hydrothermal breccia in the HS environment. The Cu–Mo mineralization occurs as dissemination and porphyry-type veins in potassic alteration overprinted by sericite-chlorite and younger argillic alterations in the Kale zone.

Zircon U–Pb radiometric ages alongside whole-rock geochemistry revealed three distinct high-K calc-alkaline magmatic suites at the Kirazlı district including intermediate intrusions (41.7 – 40.3 Ma), plagioclase-phyric andesite (37.6 – 38.7 Ma), and basaltic andesite and pyroclastic rocks (31.4 – 33.0 Ma). The enrichment in LILE and depletion in HFSE are the common features of all suites. Based on the REE, multi-element, and tectonic discrimination diagrams, we conclude that the generation and emplacement of the volcanic and plutonic rocks at the Kirazlı district derived from a metasomatized mantle affected by AFC processes and/or crustal contamination in a volcanic arc environment.

Re–Os geochronology on two molybdenite samples from the