

## **Integrated Geological, Geochronological and Geochemical Approach to Exploration in the Hod Gold District, Türkiye: Implications for the Origin of the Hod Maden Au-Cu Deposit**

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Since discovery of the Hod Maden “hybrid VMS”- type Au-Cu deposit (2.8 Moz Au) in 2015 by Lidya Madencilik/Marianna Resources, Eldorado Gold/Tüprag Metal Madencilik has been conducting detailed exploration within the surrounding district. Driving this initiative has been a comprehensive program of geological mapping complemented by U-Pb dating and geochemical fertility studies, which together have provided a robust geological framework for ongoing exploration. Key findings include (1) that highly prospective Late Cretaceous-age strata, and more specifically the distinctive volcano-sedimentary/felsic volcanic interval (“Hod Maden Complex”, HMC), which constitute the immediate host to the Hod Maden deposit, extend for at least 7 km north along strike from the Hod Maden deposit; (2) locally hydrothermally altered, concordant felsic flow domes within the HMC at the Kurak, Hizarli, and Derinkoy prospects overlap in age (86-84 Ma) with felsic domes spatially associated with Au-Cu mineralization at Hod Maden (85-84 Ma); and (3) indicators of submarine hydrothermal activity contemporaneous with rhyolitic volcanism include stratiform and/or stratabound zones of hydrothermal alteration, exhalative-type chemical sedimentary horizons, banded disseminations of base-metal sulphides within fine-grained volcanoclastic units, and discordant quartz-sulphide veins associated with hydrothermally altered zones. Trace element geochemistry of rhyolites in the district are consistent with fertile VMS environments, whereas fertility studies on zircon suggest the Cretaceous suite is unproductive for porphyry copper systems. Geochronology also highlights a younger (83-80 Ma) intrusive suite of intermediate to felsic composition that intruded the thick andesite-basalt units in the stratigraphic footwall and hanging wall to the HMC (e.g., Kırmızıyaya and Hızarlıyaya). These younger intrusions are overprinted by IS-type base metal-rich quartz vein mineralization within propylitic and advanced-argillic alteration zones. These relationships suggest a possible intrusion-related or deep epithermal overprint on pre-existing volcanogenic mineralization within the HMC following Late Cretaceous thickening of the volcanic pile.