

Anatomy and post-ore modifications of the Halilağa porphyry Cu-Au deposit, NW Turkey

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The Halilağa porphyry Cu-Au deposit is located in the Çanakkale region of the central Biga Peninsula, an emerging copper-gold district in north-western Turkey. The Halilağa deposit contains indicated mineral resources of 168 Mt grading at 0.3 % Cu and 0.31 g/t Au. Two main fault orientations are identified in the study area: a dominant regional trans-tensional E- to ESE-trending and a secondary normal NNW-trending set. Three east-trending structural domains: Pirentepe, Kestane, and Kunk are defined by the E-trending faults. Volcanic and sub-volcanic rocks with compositions ranging from andesite to rhyodacite characterize the northward dipping stratigraphy within each domain. The copper-gold mineralized Kestane stock of the Halilağa deposit intrudes a volcano-sedimentary sequence that contains andesite, siltstone, and sandstone. It consists of two dominant intrusive phases with similar quartz monzonite composition cross-cut by andesitic dykes. Post-mineralization lithologies comprise andesitic lava flows, breccias and tuffs. The alteration assemblage consists of proximal biotite, magnetite and K-feldspar. In contrast, in medial zones, moderate to weak chlorite-after-biotite, magnetite and chlorite-sericite zones are found at depth and along the edges of faults. Chlorite, epidote, calcite alteration characterizes distal segments of the intrusion. Locally strong sericite alteration overprints all other assemblages. The geometry of the porphyry stock follows a WNW trend controlled by the W-E oriented North and South-Faults. The presence of phengite along the South-Fault suggests that this fault acted as a pathway for hydrothermal fluids, while montmorillonite observed along the north margin of the Kestane stock supports a kinetic model where post-mineral movements mainly occurred along the North Fault.