Cooling and mineralisation history of Karakartal porphyry system, Erzincan, Turkey

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The Karakartal porphyry deposit is located near the Kabataş village (Kemaliye-Erzincan) in a metallogenic zone covering Divriği (Sivas)-İliç-Kemaliye (Erzincan) and Tunceli provinces of east central Anatolia. The region has a complex geological setting with the presence of Mesozoic to Tertiary rocks. Early-Middle Eocene subvolcanic rocks (SVR) intrude Jurasic-Crataceous limestones and Early Eocene clastic and volcanic rocks. Field observations on cross-cutting relationships between magmatic phases show at least four (pre- and syn- mineralization, post mineralization dykes and post mineralization volcanic rocks) different magmatic episodes. These magmatic phases have gabbroic to granodioritic compositions and are geochemically similar to volcanic arc granites.

This study aims at exhibiting mineralisation and cooling history of the Karakartal porphyry system based on U-Pb, Ar/Ar and U-Th/He geochronology. Zircon U-Pb data from SVRs, (potassicly altered) syn-mineralization- and post-mineralization dykes, and post mineralization basalts indicate emplacement ages of 49.2±1.5 Ma, 45.81±0.44 Ma and 43.2±1.2 Ma, respectively. Ar/Ar ages from biotites and K-feldspars of K-silicate alteration are determined to be 49.86±0.32 Ma and 47.32±0.57 Ma, respectively. (U-Th)/He thermochronology on zircons from potassicly altered SVR's, however, give an age data of 45.8±0.8 Ma. These age constraints from magmatic rocks and potassic alteration zones within them indicate that magmatism was initiated in the region at around 50 Ma and continued till around 43 Ma, lasting for around 7 Ma. Commencement of porphyry system is nearly coeval with the initial magmatism and went on till about 45 Ma, characterised by zircon thermochronology.

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