

# **25 million years of episodic magmatism and pulsed porphyry Cu-Mo formation in the Meghri-Ordubad pluton, Lesser Caucasus**

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The Meghri-Ordubad composite pluton is exposed over 1400 km<sup>2</sup> in the Lesser Caucasus of Armenia. It is the one of the largest plutons in the Tethys belt and hosts important Cu-Mo porphyry deposits. We here present an extensive zircon U-Pb geochronology survey on thirty samples highlighting multiphase pluton emplacement during three successive magmatic episodes over a total period of at least 25 million years. Pluton construction commenced with a calc-alkaline hornblende gabbro to quartz diorite suite and coeval basaltic-andesitic dikes dated between 45.9 Ma and 43.0 Ma. This was followed by emplacement of an alkaline-shoshonitic suite comprising gabbros, monzo/syenodiorites, quartz monzonite and trachyandesitic/syenitic dikes dated between 37.7 Ma and 31.8 Ma. The last episode of pluton construction involves a trachybasaltic mafic dike swarm yielding ages between 26.7 Ma and 24.3 Ma and emplacement of felsic granodioritic to granitic intrusions and dikes between 22.7 Ma and 22.2 Ma. Each of these three magmatic episodes culminated in the formation of Cu-Mo porphyry deposits dated by molybdenite Re-Os geochronology.

Within this geochronological framework, we illustrate important geochemical changes from a subduction-related calc-alkaline mid-Eocene magmatic suite to a syn-collisional alkaline-shoshonitic signature in the Upper Eocene-Lower Oligocene suite, followed by transitional post-collisional magmatism ranging from alkaline dikes to calc-alkaline granodiorites in the Upper Oligocene-Lower Miocene suite. The Hf isotopic composition of U-Pb dated zircons and whole rock Nd-Sr isotopic compositions become systematically more juvenile from the Eocene to Miocene magmatic episodes. These isotopic trends either reflect a decrease in crustal contamination through time or a change in the crustal contaminant to cannibalization of young juvenile intrusions. These time-resolved geochemical and isotopic variations document important tectonic and petrologic processes operating during construction of the Meghri-Ordubad pluton and key controls on Cu-Mo porphyry formation during long-lived multiphase pluton emplacement.