Subduction- to collision-related magmatism along the Tethyan orogenic belt (Meghri-Ordubad pluton, Lesser Caucasus)

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The Lesser Caucasus belongs to the central segment of the Alpine-Himalayan orogenic belt. The Meghri-Ordubad pluton (MOP) was incrementally assembled over 30 Myr within the realm of the Cenozoic Arabia-Eurasia orogeny, from subduction, collision to post-collision. In the MOP, a new comprehensive zircon U-Pb geochronology survey along with whole-rock geochemistry revealed three temporally and chemically distinct magmatic series, including the calc-alkaline series from hornblende gabbro to tonalite (45.9 - 43.1 Ma), the shoshonitic series characterized by gabbro, monzogabbro, hornblende gabbro, monzonite (37.8 - 28.1 Ma), and the "adakite-like" series (26.6 - 21.2 Ma) consisting of shoshonitic lamprophyres and high-K calc-alkaline granodiorite intrusions and dikes. Despite the evolution of the geodynamic setting and magma composition over time, complementary in situ zircon hafnium (εHfzircon = +8 to +11.3) and oxygen (δ^{18}Ozircon = +4.6‰ to +6.0‰) isotope data support a mantle-dominated magma source with limited crustal contribution. Whole-rock radiogenic isotope also corroborates a mantle-related magmatic source. Mineral chemistry, textures and thermobarometry indicate that at least two different crystallization levels can be distinguished for each individual magmatic series. Hornblende gabbros cumulates and lamprophyres crystallized from mid- to lower crustal reservoirs at temperature and pressure higher than 900°C and 400 MPa, respectively. By contrast, other intrusions and dikes represent upper crustal crystallization conditions at temperature ranging from 750°C to 900°C, but pressure lower than 300 MPa. Conclusively, the protracted mantle-dominated magmatism in the MOP documents the construction of a Cenozoic juvenile arc through crustal fractionation, which have ultimately contributed to a net continental crustal growth along the central Tethyan margin.