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Magmatism and tectonics of Cenozoic volcanism and Plutonism in the NW of Iran (Arasbaran): subduction and collision-induced mantle dynamics and its magmatic fingerprint (Geochemical features).

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The Arasbaran Copper belt occurs in the soughteastern part of the Lesser Caucasus in the hinterland of the Arabia–Eurasia collision zone in the broad Alpine–Himalayan orogenic belt and includes Cenozoic plutonic and volcanic sequences that provide important clues for collision-driven continental magmatism and mantle dynamics. Two main magmatic episodes (Eocene and late Miocene–Quaternary) formed the volcanic landscape and the igneous assemblages in the Arasbaran region. The Eocene sequence consists of trachybasalt and basaltic trachyandesite with subordinate tephrite-basanite, basaltic andesite, and trachyandesite, showing shoshonitic, mildly alkaline and Calc-Alkaline compositions.
The Miocene– Quaternary magmatic episode in this area, is represented by andesite, trachyandesite, trachydacite, dacite and rhyolite lavas, and by a late phase of upper Pliocene–Quaternary trachybasalt, basaltic trachyandesite, basaltic andesite, trachyandesite, trachyte, and rhyolite flows, with high-K calc-alkaline compositions and high-K shoshonitic compositions, defining an alkaline trend and a K2O-enriched melt source. All volcanic rocks show depletion troughs in Nb, Ti, and strong enrichment in Rb, Ba, Th, La, like subduction related criteria in their multi-element patterns. The enrichment of incompatible elements and K suggests derivation from a metasomatized mantle source, whereas the troughs in Nb and Ti indicate a subduction influence in the mantle melt sources. Mantle-derived magmas were modified by radiogenic isotope studies for all type rocks in volcanic or intrusive sequences. These geochemical features are similar to those of coeval volcanic associations in the subduction region, and indicate the existence of subduction-metasomatized lithospheric mantle beneath the Lesser Caucasus during the Cenozoic. Partial melting of this subduction-modified subcontinental lithospheric mantle in the Arasbaran region was triggered initially by slab diving and continental collision events in the late Oligocene. The later Miocene–Quaternary volcanism in this region was provided by break off magmatism upwelling, which itself was caused by delamination of the mantle lithosphere following the final collision at ,22Ma. Appeared Adakitic type magmatism in the center of this Arc that resulted from the convert of stress basin to extentional basin in postcollisional magmatism.