

A comparative study of Oligocene and Quaternary magmatism in the Sabalan region, NW Iran: Implications for adakite petrogenesis

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The Quaternary Sabalan volcano, NW Iran was built on a unique site at the Arabia-Eurasia collision zone where two Tertiary magmatic belts (i.e. Urumieh-Dokhtar and Alborz) converge. Zircon U-Pb age and geochemical data were obtained from samples representative of the Quaternary and Tertiary magmatic suites to examine their geneses and potential relations to the Arabia-Eurasia collision. The Tertiary magmatism was active from ca. 22 to 29 Ma and the Quaternary magmatism consists of a pulse at 1.8 ± 0.1 Ma and another at ~ 0.33 Ma. Both suites are characterized by intermediate-felsic compositions, metaluminous character, orogenic geochemical signature and similar Sr-Nd isotopic compositions. The majority of samples exhibit enrichments in Sr and LREE, and depletions in Y and HREE, features typical of adakitic magmas. Some Oligocene rocks are not adakitic and their coexistence with coeval adakitic rocks is consistent with a thickened crust overlying the zone of melting, assimilation, storage and homogenization (MASH) where high-pressure fractionation of mantle wedge-derived magmas might take place. The Quaternary adakitic magmas erupted at the Sabalan volcano are likely generated by melting of thickened lower crust associated with small-scale removal of the crust and the underlying lithospheric mantle. We propose that the ~ 20 m.y. gap between the two groups of adakitic magmas denotes a period of tectonic reconfiguration from a syn-collisional to a post-collisional setting.