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Reappraisal of Peri-Arabic ophiolites and geodynamics: Why the Kermanshah ophiolite (SW Iran) is a Paleocene-Eocene magmatic arc at the foot of Eurasia

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The nature and significance of the Kermanshah ophiolite (Zagros, Iran), classically identified as one of the few remnants of the Peri-Arabic ophiolite system obducted onto Arabia during the Late Cretaceous, are reinvestigated in this study. Systematic major and trace element geochemistry was performed, mainly on magmatic rocks, from two distinct areas: the Kamaryan Paleocene to Eocene arc and the so-called Harsin-Sahneh "ophiolites". Both domains display low to medium-K calc-alkaline signatures with variably negative anomalies in Nb, Ta, and Ti and positive ones in Sr, Ba, Th, and U. The magmatic activity of the Palaeocene-Eocene magmatic group shows an evolution through time, with a geochemical signature close to tholeiitic Back-Arc Basin-Basalts (BAB) for Palaeocene rocks and a clear calc-alkaline arc signature for Eocene volcanics. The presumably ophiolitic gabbros of the Harsin-Sahneh complex intruding harzburgites, as well as the associated dykes, also show a BAB geochemical signature. Overall, field relationships and geochemical patterns suggest that these rocks were emplaced on a mantle substratum close to the ocean-continent transition.
This Palaeocene-Eocene magmatic activity in Kermanshah, which extended further to the north-west into Turkey, coincided with a marked slowing of the Arabia/Eurasia convergence. It furthermore occurred after the stopping of the Sanandaj-Sirjan magmatism (Mesozoic arc) but before the development of the Urumieh-Dokhtar magmatic arc (Tertiary arc). We relate this transient magmatic activity to slab retreat and back-arc extension at the foot of the Eurasian margin and to lithospheric-scale reconstructions across the Neotethys between Turkey and Iran.