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Identification of Eocene-Oligocene magmatic pulses associated with flare-up in east Iran: timing and sources

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Abstract

The Sangan Magmatic Complex (SMC), at the northeastern edge of the Lut block, includes a thick pile of extrusive and pyroclastic rocks, intruded by younger granitoid stocks. New zircon U–Pb ages show subaerial eruptions at ~42–44 Ma, followed by emplacement of granitoids at ~41–40 Ma. The granitoids have high K₂O (~3.6–5.9 wt.%), with SiO₂ (~63.1 and 71.9 wt.%) contents. They are metaluminous to peraluminous, calc alkaline and I-type in composition. The SMC magmatic rocks have typical high–K and shoshonitic signatures, and are characterized by enrichment in large-ion lithophile elements (LILEs) and depletion in high-field-strength elements (HFSE). Zircon $\epsilon\text{Hf}(t)$ from the SMC magmatic rocks ranges from +0.45 to +3.5 for volcanic rocks, –1.6 to +2.5 for granitoids and –4.1 to –1.4 for ignimbrites. Zircon $\delta^{18}\text{O}$ values for the SMC are variable from +6.1 to +8.1‰, significantly higher than those of mantle-derived melts. The whole-rock $\epsilon\text{Nd}(t)$ values range between –4.5 to –3.5 for granitoids, –4.6 to –3 for volcanic rocks and –5.3 to +0.7 for ignimbrites. The whole-rock Nd and zircon Hf crustal model ages (T_{DM}^{C}) for the SMC magmatic rocks range between 0.8 and 1.2 Ga. All of the SMC magmatic rocks have quite similar trace element patterns, and slightly different whole-rock Nd

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