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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 K_2O (~3.6–5.9 wt.%), with SiO_2 (~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 εHf(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 $\delta^{18}O$ values for the SMC are variable from +6.1 to +8.1‰, significantly higher than those of mantle–derived melts. The whole–rock εNd(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