Petrography, geochemistry and tectonic significance of the Mahoor granitoids (Lut Block, Eastern Iran)

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The Mahoor granitoids are Cu–Zn-bearing porphyries that outcrop in the central part of the Lut Block, about 135 km south-west of Nehbandan (eastern Iran). These granitoids occur mainly as dykes and stocks that intrude Eocene volcanics. Petrographically, all the studied intrusives display porphyritic textures with mm-sized phenocrysts, most commonly of plagioclase and hornblende, embedded in a fine-grained groundmass with variable amounts of plagioclase, hornblende, clinopyroxene, quartz and opaques. Hydrothermal alteration affected these granitoids, as revealed by the common occurrence of sericite, chlorite, sphene/leucoxene, epidote and calcite. Chemical classification criteria show that the intrusives may be named as gabbrodiorites, diorites, monzodiorites and tonalites. Major element geochemistry reveals that all the studied lithologies are typically metaluminous (A/CNK $\leq$ 0.94) and, in addition, suggest that they constitute a suite belonging to the high-K calc-alkaline series. Magnetic susceptibility (1485×10^{-5} SI) together with mineralogical and geochemical features show that they belong to magnetite granitoid series (I-type). In primitive mantle-normalized trace element spiderdiagrams, the analysed samples display strong enrichment in LILE compared to HFSE ($15.5 \leq Rb_N/Y_N \leq 45.9$), accompanied by negative anomalies of Nb, Ta and Ti. REE chondrite-normalized plots show slight to moderate LREE enrichment ($4.9 \leq La_N/Lu_N \leq 8.4$) and negative Eu anomalies (Eu/Eu* ratios vary from 0.65 to 0.88). The whole set of geochemical data suggest that the Mahoor granitoids are co-genetic, belong to the calc-alkaline series and have been originated in an active continental margin setting. Sulfide mineralizations (pyrite, chalcopyrite and sphalerite) related to these granitoids are common and occur both disseminated and as hydrothermal veins, indicating a high mineralization potential for this area.

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