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Mixing/mingling as the main evolutionary processes of Malayer plutonic rocks, Sanandaj-Sirjan zone, west Iran.

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The Middle-Jurassic Malayer plutonic rocks are elongated bodies which injected into the regional metamorphic rocks and located in the northern Sanandsaj-Sirjan Zone (SSZ), west Iran. The heterogeneity of their lithology which is documented by highly abundant of ma[U+FB01]c microgranular enclaves (MME) with diorite and quartz diorite compositions and xenolths (country rocks), 87Sr/86Sri range of 0.70797 to 0.71087, disequilibrium minerals such as andalusite with reaction rims, symplectic intrergrowths in olivine and acicular apatite, antonym mineral assemblages (e.g. hornblende + allanite + titanite + monazite + andausite $\pm$ muscovite $\pm$ cordierite $\pm$ garnet $\pm$ ilmenite), simple mixing lines between ma[U+FB01]c and felsic rocks for major-elements on the Harker variation diagrams, and hyperbolic patterns of the Ti/Zr vs. Rb/Sr and La/Sm vs. Rb/Th (ppm) suggests a mingled/mixed origin for rocks, which have been variably contaminated by the country rocks.
Most ma[U+FB01]c rock in this study is not a primary melt but belongs to the mixing series and contaminated by wall-rocks. The geochemical and isotopic differences between the various granitic rocks exclude the possibility of a unique homogeneous source for the origin of all studied rocks. The presence of gabbros in the region, probably originated from mantle, and the presence of granodiorites-quartz monzodiorites as well as the occurrence of MMEs in the granites, support a mixing model for their genesis, involving a basic magma and a felsic crustal magma. The ma[U+FB01]c enclaves occur as well rounded blocks [U+FB02]oating in the granites. These rounded blocks indicate that the diorite was not fully crystallized and therefore mingled with granitic host rock. They are interpreted as magma globules separated from ma[U+FB01]c magma through convection currents and incorporated in the crystallizing granitic magma. Mixing also is suggested by intermediate composition of MMEs between granitoids and gabbro. The model proposed for evolution of the Malayer crocks involves intrusion of ma[U+FB01]c magma into the crust, causing its partial melting and generating granitic magma above the ma[U+FB01]c chamber. Injections of ma[U+FB01]c magma invaded the felsic chamber and those magmas interacted mainly by intermingling. The assimilation of country rocks which is documented by the metasedimentary enclaves was also included in the evolution of igneous rocks. According to U-Pb age, the Middle-Jurassic tectonomagmatic activity during the subduction the Neotethian oceanic crust under Central Iran is responsible to formation and emplacement of studied rocks.