

Strontium and neodymium isotopic evidence in the identification of a Carboniferous intracontinental rift at northern Iran

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FIGURE 1

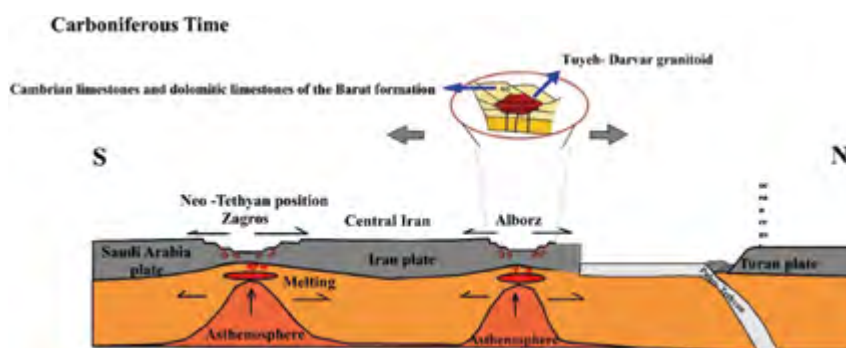
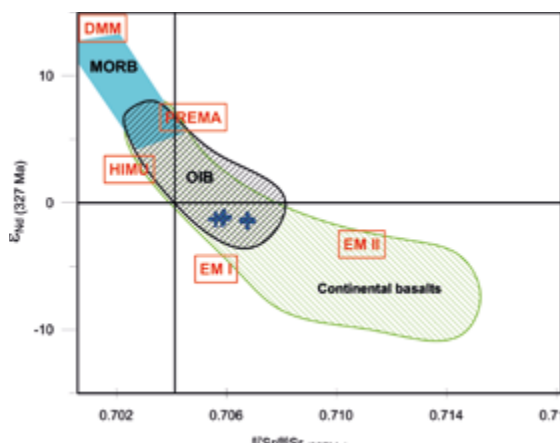
Sr-Nd isotopic correlation diagram. Isotopic composition calculated for an age of 327 Ma. Blue crosses – Tuyeh-Darvar granitoids.

FIGURE 2

Tectonic model for the Alborz region at the time of the emplacement of the Tuyeh-Darvar intrusion.

The Tuyeh-Darvar intrusion (Eastern Alborz zone, northern Iran) has a Carboniferous age and comprises monzonites and monzodiorites, composed mainly of plagioclase, orthoclase, quartz, hornblende and biotite. Strontium and neodymium isotopic data, as well as some elemental geochemical analysis by XRF, obtained at the UA in the scope of a post-graduate internship, had a major role in the characterization of this intrusion. The Tuyeh-Darvar rocks have high values of FeO^T/MgO , $\text{F}/\text{H}_2\text{O}$ and Ga/Al ratios, high concentrations of alkalis, low abundances of CaO, MgO, and strong enrichments of LREE relative to HREE. The whole set of petrographic, geochemical and isotopic evidence shows that the Tuyeh-Darvar rocks may be classified as metaluminous, ferroan and alkalic granitoids of the A-type (“A” stands for both “alkaline” and “anorogenic”).

The initial $^{87}\text{Sr}/^{86}\text{Sr}$ ratios of the studied rocks range from 0.70562 to 0.70678, whilst initial $^{143}\text{Nd}/^{144}\text{Nd}$ ratios vary between 0.512140 and 0.512160, corresponding to slightly negative initial ϵNd values (-1.1 to -1.5). These compositions plot in the an area of the Sr-Nd isotopic correlation (Fig.1) diagram where the fields of ocean island basalts and continental basalts overlap and also relatively close to the composition of enriched mantle I (EMI) component. As such, the Tuyeh-Darvar granitoids seem to derive by magmatic differentiation from mafic melts produced in an enriched asthenospheric mantle source below an intracontinental rift existing at the Alborz block in the Carboniferous times (Fig. 2)^[a].



[a] Naderi, A., Ghasemi, H., Santos, J.F., Rocha, F., Griffin, W.L., Moghadam, H.S. & Papadopoulou, L. (2018) – Petrogenesis and tectonic setting of the Tuyeh-Darvar Granitoid (Northern Iran): Constraints from zircon U-Pb geochronology and Sr-Nd isotope geochemistry. *Lithos*, vols. 318-319, p. 494-508. <https://doi.org/10.1016/j.lithos.2018.08.034>