

Petrogenesis of the Khangai granitoids, central Mongolia: Implications for the crustal generation

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Mongolia is the heartland of the Central Asian Orogenic Belt (CAOB) and that CAOB is renowned for the massive generation of juvenile crust in the Phanerozoic. In central Mongolia, the Khangai basin filled by Devonian to Carboniferous sedimentary rocks (Kelty et al., 2008; Purevjav and Roser, 2012; Erdenechimeg et al., 2018) and intruded by voluminous granitoid plutons in the Late Permian–Early Triassic of 269–237 Ma (Jahn et al., 2008; Yarmolyuk et al., 2016; Dolzodmaa et al., 2020). We present new whole-rock Sr–Nd isotopic data and combining with previous our published geochemical, geochronological data set on the Khangai granitoids (Dolzodmaa et al., 2020) emplaced in central Mongolia. The Khangai granitoids have unique geochemical and isotopic features, to know the origin(s) of them is important for understanding crustal generation. The Khangai granitoids can be divided into two stages magmatism: (1) 269–248 Ma granitoids that consist of Bt–Hbl granodiorite with mafic microgranular enclave and Bt granite have high-K calc-alkaline, I-type granite affinity, on the other hand (2) associated 238–237 Ma granitoids consist of pegmatitic granite have a post-orogenic A-type affinity. Both Bt–Hbl granodiorite and Bt granite have SiO₂ content ranging from 54.44 to 75.93 wt% and both define a single trend on silica vs. major and trace elements diagrams that likely reflects fractional crystallization processes (Dolzodmaa et al., 2020). Using whole-rock chemical data, Bt–Hbl granodiorites and Bt granites plotted on the hornblende, biotite, and plagioclase vector diagram indicates that these two suites of granitoids can be linked by the fractionation of plagioclase and hornblende (Dolzodmaa et al., 2020).

Newly obtained whole-rock Sr–Nd isotopic data of (1) granitoids have a low variation of initial ⁸⁷Sr/⁸⁶Sr ratios between 0.7062 and 0.7283 and characterized by near-zero ε_{Nd}(T) values of –2.13 ~ +1.11 suggests that granitoids may have been derived from a source composed of juvenile material involving crystal fractionation and assimilation processes supported by above geochemical features whereas (2) granitoids have high initial ⁸⁷Sr/⁸⁶Sr ratios between 0.7128 and 0.7576 and show near-zero ε_{Nd}(T) values of –1.68 ~ –1.52 suggests that the (2) granitoids may be formed by assimilation fractional crystallization processes with the interaction between lower crust derived magma and meta-sedimentary rocks supported by their high silica concentration ranging from 71.46 to 78.32 wt% and have high TFe₂O₃/MgO, Ga/Al values, strong depletions in Ba, Sr, relatively flat REE patterns, significant negative Eu anomalies, and high-K calc-alkaline compositions (Dolzodmaa et al., 2020).

Keywords: central Mongolia, granitoid, whole-rock Sr–Nd isotopes, Assimilation fractional crystallization (AFC) process

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