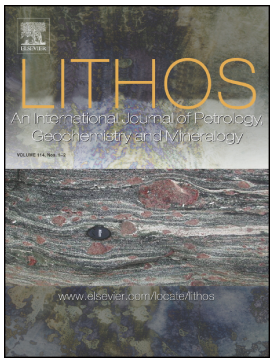

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Petrogenesis and geodynamic implications of Ediacaran highly fractionated A-type granitoids in the north Arabian-Nubian Shield (Egypt): constraints from whole-rock geochemistry and Sr-Nd isotopes

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Abstract

Mineral chemistry, whole-rock geochemical and Sr–Nd isotopic data are reported for the Abu-Diab granitoids in the northern Arabian-Nubian Shield (ANS) of Egypt, to investigate their petrogenesis and geodynamic significance. Gabal Abu-Diab constitute a multiphase pluton, consisting largely of two-mica granites (TMGs) enclosing microgranular enclaves and intruded by garnet bearing muscovite granites (GMGs) and muscovite granites (MGs). The granitoids are weakly peraluminous (A/CNK=1.01–1.12) and show high SiO_2 (>72.9 wt.%) and alkali (K_2O+Na_2O = 8.60-9.13) contents. The geochemical features show that they are post-collisional and highly fractionated A-type granitoids. Compared to their host TMGs, the microgranular enclaves are strongly peraluminous (A/CNK = 1.18-1.24) with lower SiO_2 and higher abundances of trace elements. The TMGs are depleted in Ba, Nb, P and Ti and are enriched in LREEs relative to HREEs with weakly negative Eu anomalies (Eu/Eu* = 0.45-0.64). In contrast, the GMGs and MGs are extremely depleted in Ba, Sr and Ti and have tetrad-type REE patterns (TE_{1-3} = 1.1-1.3) with strongly pronounced negative Eu anomalies (Eu/Eu* = 0.03-0.26), similar to rare metals bearing granites. The Ediacaran (585±24 Ma) TMGs, are characterized by