

Petrogenesis and Tectonic Setting of the Neoproterozoic Granitoid-Greenstone Belt from Central Eritrea, Southern Ans: Constrained from Whole Rock Geochemistry, U-Pb Geochronology and Sr-Nd-Pb Isotopes

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The granitoid-greenstone belt of Central Eritrea is part of the Arabian-Nubian Shield that was primarily formed by accretion of juvenile island-arcs during the Neoproterozoic. The supracrustal rocks in the study area are dominated by metavolcano-sedimentary assemblages invaded by granitoid rocks. The metavolcanic rocks show large variation of major and trace element compositions that form linear correlations against SiO_2 , suggesting they are genetically linked and their variation mainly resulted from fractional crystallization. In general, they have flat chondrite normalized REE pattern with slight negative Eu-anomalies and rich in LILE (Ba, Pb and U) but depleted in HFSE (Ta, Nb and Ti) in the multi-element diagram. They also have low initial $^{87}\text{Sr}/^{86}\text{Sr}$, positive ϵNd values (+4.0 to +6.4) and moderate Pb isotopic compositions. These features indicate that their mantle source was significantly modified by slab-derived fluids and melts.

The ca. 850 Ma Emba-Derho granites display restricted composition range with high SiO_2 , Al_2O_3 , Na_2O , $\text{Fe}_2\text{O}_3\text{T}$ and low K_2O . They have characteristics features of adakitic rocks with high Sr/Y ratio and low Y. The samples exhibit a highly fractionated REE and insignificant Eu-anomalies ($\text{Eu}/\text{Eu}^* = 0.89\text{-}1.07$), while their multi-element diagram shows elevated LILE (Ba, Pb and Sr) and troughs of the HFSE (Ta, Nb and Ti). They also have low initial Sr (0.7008-0.7026) and high ϵNd (+4.7 to +7.8) implying their source is a juvenile oceanic crust. These geochemical compositions suggest that the granites were originated from high pressure partial melting of a subducting slab. Both the metavolcanic and the associated granitic intrusions are suggested to have been formed in a fore-arc setting.

Biography:

Ghebsha has been working as a lecturer in the Department of Earth Sciences at Eritrea Institute of Technology, Eritrea since 2009 and is a member of Geological Survey of Eritrea.

Ghebsha has been awarded degrees, a Bachelor of Science in Geology from University of Asmara, Eritrea and Master of Science in Mining Engineering from Wuhan University of Technology, China. Currently, Ghebsha is a PhD student in Geochemistry at China University of Geosciences (Wuhan), P.R. of China. His areas of research interest include Precambrian geology and mineral deposit geochemistry.