

A-type granites with Pan African affinities from Madurai granulite block, southern India

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The high-grade terrain of southern India is divided into northern Nilgiri granulite block and southern Madurai granulite block separated by the major Proterozoic Palghat - Cauvery shear zone. The Nilgiri block characterised by massif charnockites with minor metasediments represented high pressure granulites whereas the Madurai block composed of charnockite massifs and a high proportion of Proterozoic high grade metasediments represents low pressure granulites. The present study deals with the origin and evolution of granites from Madurai block comprising low-land swaths of Andipatti-Usilampatti-Madurai supracrustal belts. Prograde-retrograde charnockite-gneiss transformation is observed in these rocks. A clock-wise P-T path is depicted for the Madurai metapelitic granulites. The granites occurring as small isolated disconnected stock like bodies near Nagamalai are medium-grained and pink to grey in colour. They are characterised by hypidiomorphic textures. Qtz, or, per, plag, hb and bi are the major minerals with zircon, ap, sph, tour, mt and il as accessory minerals. The geochemical signatures in these rocks like high K_2O/Na_2O ratio (5.4 to 6.0), $Al_2O_3/CaO+Na_2O+K_2O$ ratio (1.0 to 1.1), LREE (304 to 508), Ga/Al (1.4 to 1.76), Zr/Ni (41 to 47.1), Rb/Sr (5.6 to 23.7), and Y/Sc (5 to 6.5) are quite similar to the A-type granite characteristics suggesting that these granites represent rift-related setting and emplacement along the NW-SE trending Nagamalai lineament. The high initial Sr ratio (0.7120) and Rb-Sr whole rock isochron age of 837 ± 34 Ma for these rocks are coeval with the Pan African orogeny and associated granite formation an event which is of a regional character, well documented also in Madagascar, mainland African Continent and southern India which were integral parts of the Eastern Gondwanaland.