Zircon thermometry and trace element signatures: implications on crustal growth of the western Dharwar craton, India.

ARIJIT PAHARI*, C. MANIKYAMBA

CSIR-National Geophysical Research Institute ,Uppal Road, Hyderabad -500007 , India
(*correspondence:arijitpahari@gmail.com, cmaningri@gmail.com)

The basement of Western Dharwar craton is dominated by Na-rich TTG and K-rich granite which is a part of peninsular gneissic complex. The U-Pb zircon age of the TTG is 3068+34 Ma whereas the intrusive granites were emplaced at 2936+23 Ma. The available geological, geochemical and geochronological data of this belt reflect that the crustal growth was initiated at ~3.0 Ga through partial melting of hydrated oceanic crust in an ocean-continent convergent zone. The granites were emplaced simultaneously at ~2.9 Ga through partial melting of TTG crust and subsequent fractional crystallization.The zircons from the TTG and granites exhibit typical internal zoning indicative of igneous origin supported by their upper intercept age. Zircons from TTG and granite contain higher abundances of Hf, ΣREE, Pb, Th and U. The chondrite-normalized REE patterns of zircons are characterized by HREE enrichment relative to

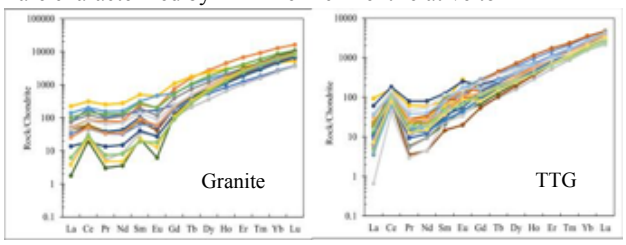

Fig1:Chondrite normalized zircon trace element pattern.

LREE and MREE with positive Ce and negative Eu anomalies endorsing their magmatic characteristics. The studied zircons from Kudremukh TTG showing a temperature range of ~ 682-1105^{0}C; average ~877^{0}C and the granites display a range of ~619-993^{0}C; average ~872^{0}C.This high temperature is an indicator of deep level of melting for both TTG and granite likely to be within the lower crust. The highest average concentration of Hf, Th, U, Y and REE in the granites of Kudremukh greenstone belt indicates the magma from which the granite formed was more evolved than the magma from which the TTG was formed. The zircons of TTG and granite exhibit continental crust signature and suggests their derivation by partial melting of an immature island arc crust. These observations are consistent with the whole-rock geochemical and geochronological study.