Neoarchaean magmatism through arc and lithosphere melting: evidence from Eastern Dharwar Craton

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Neoarchaean is characterized by changes of fundamental geodynamic setting where tectonic regime and the cause of rapid crustal growth, both are still controversial. Neoarchaean crustal growth and actual geodynamic setting in eastern Dharwar craton is debatable. Different granitoid bodies associated with Tsundupalle greenstone belt can provide important information about Neoarchaean crustal evolution in eastern Dharwar craton. A very common association of least studied sodic granodiorite, TTG, biotite granite and alkalifeldspar granite is present together with gabbro, syenite, migmatite, metavolcanics and metapelite in the Neoarchaean Tsundupalle greenstone belt at the eastern fringe of eastern Dharwar craton (EDC). Sodic granodiorite have relatively low SiO_2 content with high Mg#, Na_2O, CaO, ferromagnesian elements, fractionated LREE and slightly fractionated to flat HREE and negative Nb, Ta and Ti anomalies; generated probably due to melting of arc crust at shallow depth. TTG are rich in SiO_2 and Na_2O with low Cr, Ni and depleted HREE. This TTG is a product of high pressure melting of thick crust where garnet in the residue. K_2O enriched biotite granite is depleted in Mg#, Sr/Y and probably generated due to partial melting of older TTG. K_2O, Na_2O rich silicic alkalifeldspar granite have total low REE with strong negative Eu anomalies and almost flat HREE. This rock generated by high temperature, shallow crustal melting of calc-alkaline granitoids. Gabbro has relatively lower Mg#, Cr, Ni and Ti/Y and almost flat REE pattern with slight LREE enrichment with negative Nb, Ti anomalies. This low-Ti gabbro may be the product of partial melting of enriched sub-lithospheric mantle at spinel stability field.