Proterozoic Magmatism in the Nallamalai Fold Belt and Adjoining Nellore Schist Belt, Eastern Dharwar Craton: Tectonic implications – V. V. Sessa Sai, Geological Survey of India, Central Region, Nagpur – 440 006 (E: seshu1967@gmail.com)

The abstract presents the succinct details pertaining to the petrogenesis of two major events of Proterozoic granite magmatism along the eastern margin of Nallamalai Fold Belt (NFB) and the adjoining Neoarchaeoan Nellore Schist Belt (NSB) in Southern India. Systematic field, petrological, mineral chemistry and geochemical studies of these Proterozoic granites that are disposed along the eastern margin of Dharwar Craton paved way to decipher their petrogenetic aspects. The eastern suite is represented by a number of isolated granite plutons that are disposed in a curvilinear emplacement along the western margin of the NSB and are termed as Terrain boundary Tectonic Zone (TBTZ) granites. Vellaturu-Ipuru-Nakerikallu (VIN) granites form the western suite and are along north eastern fringes of NFB. Field and laboratory studies of these granites resulted in understanding the prevailing tectonic setting along a major terrain boundary in the Eastern Dharwar Craton (EDC). Interestingly, both the VIN and TBTZ granites are deformed along their margins and preserve evidences of their intrusive nature in the form of sharp contacts and enclaves of preexisting lithounits.

The biotite ± hornblende bearing VIN granites of NFB mineralogically vary from granodiorite to granite. These are spatially emplaced along a NNE-SSW axis in the north eastern fringes of NFB and form a major zone of early Mesoproterozoic feldspathic magmatism in the south eastern part of the peninsular India. Geochemically, the VIN granites exhibit magnesian feldspathic character. Trace element studies indicate the presence of conspicuous Nb and Ti negative anomaly in VIN granites indicating their emplacement in an arc magmatic tectonic setting close to the vicinity of the NFB orogenic belt and adjoining Precambrian accretionary terrain in the northern part of NSB. TBTZ granites of NSB are intermittently exposed along the eastern margin of NFB. These Mesoproterozoic felsic intrusives occur over a stretch of 350 km from Vinukonda in north to south of Rapur and are disposed along a curvilinear zone along the western margin of NSB. Compositionally, TBTZ granites are fluorite bearing and vary from alkali feldspar granite to granite. Some of the potash rich plutons are of quartz syenite composition. Most of the TBTZ granites are of Mesoproterozoic age. Geochemically the TBTZ granitoids are calc-alkaline, display remarkable iron enrichment indicating their ferroan feldspathic nature and are essentially emplaced in late-orogenic to anorogenic tectonic setting.

Vinukonda granite is of early Mesoproterozoic age and is the oldest among the TBTZ suite and spatially juxtaposed to the Vellaturu granitoid of VIN suite. Interestingly, the Vinukonda granite displays collisional zone tectonic character and might represent the connecting link of a coexisting magmatic arc-extensional tectonic setting between the EDC and Eastern Ghat Mobile Belt (EGMB) during Mesoproterozoic.

Considering that the VIN granites of NFB and TBTZ granites of NSB form two major axes of distinct felsic magmatism, their disposition in a complex geological accretionary domain along the eastern margin of Dharwar Craton and the adjoining EGMB, attains regional geological significance in understanding the tectonic setting of their emplacement.

The Mesoproterozoic VIN magnesian granites of NFB and TBTZ

Fig.1. Position of VIN granites and TBTZ granites of EDC in the FeO/(FeO+MgO) vs SiO₂ diagram (after Frost and Frost, 2008, Jour. Petrol., v.49 (11), pp.1955-1969)

ferroan granitoids of NSB (Fig.1) represent two significant events of felsic magmatism emplaced in arc magmatic and extensional arc settings respectively. They further represent the culminatory events of growth of the Precambrian continental crust along the eastern margin of EDC in a curvilinear subduction zone setting that is spatially cited at the interface of the Proterozoic Nallamalai Fold Belt and Neoarchaeoan Nellore accretionary terrain in Southern India.

Abstract of Lecture delivered at the Virtual Monthly Meeting of the Society on 09.12.2020

DOI: 10.1007/s12594-021-1656-8