Precambrian Lithostratigraphy of Dharwar Craton and Adjoining Fold and Mobile Belts – K. V. S. Reddy, Director (Retd.), Geological Survey of India, Hyderabad.

Dharwar craton is divided into Western (geosynclinal) and Eastern (arc basins) Dharwar cratons (WDC, EDC), having comparable/correlatable litho-stratigraphic stages. The lithostratigraphy of WDC/EDC comprises older Sargur Group/Satyamangalam Group (~3100–3300 Ma), intruded by Hassan Gneiss/Kammuru (Bhavani) Gneiss (TTG-II, ~3000 Ma, ≡ Peninsular Gneiss – a misnomer in a cratonic extent), developed on a sialic basement of Gorur Gneiss (TTG-I, ~3300–3400 Ma); and younger Dharwar/Anantapur Supergroups comprising Bababudan and Chitradurga Groups (~2900–2550 Ma) / Mushtikovila (Katrimala / Parampur) Formation (≡ Bababudan), emplaced by Cherlopalle (domal) Gneiss (≡ Gundlupet Gneiss / Chikmagalur trondhjemitic – granodiorite / Halekote trondhjemitic, TTG – III, ~2800 Ma); and Marutla (Sakarsanahalli) – Kolar (Veligallu) – Hungund (Hutti) Groups (≡ Chitradurga, ~2750–2550 Ma), intruded by calc – alkaline Atmakuru Granodiorite (arc, I-type, ~2630–2580 Ma, ≡ J.N.Kote/Kanara/Bukkapatna etc.), Somravanlapalli (Kadungal) ultramafic – mafic ± anorthosite complex (≡ Usgaon / Hanumalapura), and Kuderu (Torangal/Patna/Perur/Gadag) Granite (collisional, S-type, ~2550–2510 Ma), resulted in the accretion and stabilization of Archaean continental crust. These litho-groups are intruded by a phase of anaerogenic alkaline granites (Venkatapuram, Gingee, Sholingar etc. ~2250 ± 50Ma) and mafic dyke swarms (Mahabubnagar, Agali-Anaikatti, MDS-I, ~2160 Ma) synchronous with development of failed – rift sedimentary basins.

Mesoproterozoic Cuddapah Supergroup of earlier workers is classified into Palaeoproterozoic Papaghni Supergroup: Gandhi Group – Gulcheru Quartzite, Vempalle Formation (~1900 Ma) and Kuppalapalle Formation (~1840 Ma); and upper Chitravati Group: Pulivendla Quartzite, Tadpatri Formation and Gandikota Quartzite; emplaced by Kondapuram ultramafic – mafic sills – ~1817 Ma (≡ Tirupati – Dharmapuri mafic dykes – MDS – II, ~1800–1750 Ma); and Mesoproterozoic Nallamalai Supergroup: Cheyair Group – Tirumala (Nagari / Bairenkonda) Quartzite, Pullampet (Cumbum) Formation and Mangampeta Formation; and upper Srisailem Quartzite (~1327 Ma). The Cheyair Group is intruded by Vellaturu Granite (associated basement mineralization – Agnigundala belt, ~1350–1400 Ma), alkaline syenites and subalkaline ferro-syenites (Racherla syenites), lamproites and ultra-potassic rocks (Jaggayyapeta Lamproites, ~1200–1300 Ma), and mafic sills / dykes (Tirupati / Tiptur, MDS – IV, ~1000–1100Ma). Later the Western part of EDC are emplaced by kimberlites and lamprophyres (Wajrakarur Kimberlites, ~1000–1100Ma). Both Papaghni (Palaeoproterozoic) and Nallamalai (Mesoproterozoic) basins / Supergroups are unconformably overlain by Neoproterozoic Kurnool Group of rocks in Kurnool and Palnad sub-basins.

The status of Mesoproterozoic Kaladgi Group – Lokapur and Simikere Subgroups of earlier workers is enhanced to Kaladgi Supergroup – Lokapur and Simikere Groups as per Stratigraphic norms; intruded by a phase of pegmatite/quartz veins and mafic dykes (≡ Tirupati – Tiptur, MDS-IV, ~1000–1100 Ma); and overlain unconformably by Neoproterozoic Badami Group (≡ Bhima Group). The correlation of Vengad Group (/Formation) with Ranibennurs may not be correct and may be equivalent to Kaladgis.

Gudur Group – Chaganam and Malakonda Formations (Archaean); Udayagiri Group – Dirsavancha and Nandavaram Formations (Cuddapah cover); and Bairenkonda Quartzite (Mesoproterozoic) of earlier workers constituting the Nellore fold (schist) belt is classified

into lower Vinjamuru Group – Saidapuram, Chaganam and Malakonda Formations; and upper Udayagiri Group – Duttaluru, Sitarampur Formations and Kondamidapalli Quartzite, clubbed under Nellore Supergroup (Palaeoproterozoic, ≡ Papaghni Supergroup), intruded by Pamur/Vinukonda Granite (~1615 ± 25 Ma) and mica pegmatites and quartz veins (~1630 ± 100 Ma) and mafic dykes (Anantapur – Karimnagar – Tiruvannamalai, MDS-III (~1600–1650 Ma). The Supracrustal rocks of Khammam Schist belt – Khammam Group are equivalent to Vinjamuru Group of Nellore Supergroup.

Eastern Ghats Supergroup – Khondalite, Charnockite and Migmatite Groups (Archaean to Palaeoproterozoic, G.S.I, 2015) comprising the EGMB is classified into Palaeoproterozoic Eastern Ghats Group – Koraput (Khondalite) Subgroup and Ongole (mafic granulites) Subgroup; intruded by Jeypore Charnockite (Phase-I, ~1700 Ma, 1640 Ma); later by ultramafic – mafic ± anorthosite/gabbro – anorthosite complexes/ gabbro / anorthosites (Kondapalli (≡ Chimalpahad) / Chimakurti etc); Prakasam alkaline complex (Kunavaram, Elchuru, Khariyar, Koraput etc., nepheline syenites (~1500–1240 Ma) and nonfeldspathoidal alkaline granites and syenites (Kanigiri, Podile, Darsi etc.) and Bobbili Charnockite (Rapakivi, Orbicular, Phase-II, ~1000–1100Ma); and Bolangir, Turkel, Chilka Lake etc., anorthosite complexes (<950–800 Ma). It may be equivalent to Nellore Supergroup, forming paired – metamorphic belts.

Pakhal Supergroup-Mallampalli and Mulug (Venkatapuram) Groups, constituting the Pakhal fold belt, correlated with Papaghni – Chitravati Groups and Nallamalai Group of Cuddapah Supergroup respectively may not be correct; and is equivalent to Mesoproterozoic Nallamalai / Kaladgi Supergroups.

The litho-ensemble (two volcano – sedimentary cycles) of Pandyan mobile belt (PMB) are tentatively classified under Pandyan Supergroup – Dindigul Group (arenite dominant – Madurai Block), and Nanguneri Group (Pelite dominant – Trivandrum Block), emplaced by Kodaikanal (Nagercoil) Charnockite (Phase-I); later by Sittampundi, Bhavani etc., ultramafic – mafic ± anorthosite complexes in the marginal zone (≡ Chimalpahad); and Kadavur, Oddanchatram, Manapparai gabbro-anorthosite complexes in PMB (Mesoproterozoic); and alkaline granites and syenites ± carbonatites in the marginal zone and PMB (Neoproterozoic – Pan African). Pandyan Supergroup may be equivalent to Palaeoproterozoic Papaghni/Nellore/Eastern Ghats Supergroup/Group.

The tectonic scenario in the Dharwar craton and adjoining fold and mobile belts is controlled by two distinct orogenies – Dharwar and Eastern Ghats, separated by Eparchaean unconformity (~2500 to 2200 Ma). The former comprises Sargur (~3000 Ma), Bababudan (~2800 Ma) and Chitradurga (~2600–2500 Ma) deformations, whereas the latter by Nellore (I Papaghni, ~1700–1600 Ma), Nallamalai (~1400–1350 Ma) and Kurnool (/Dharmapuri <1000–500 Ma) deformations.

Early dominant pure shear regime (~3400–2600 Ma) followed by transpressive shear regime (~2600–2500 Ma) of Dharwar orogeny, resulted in the accretion and stabilization of Archaean continental crust (~2500 Ma). Eparchaean unconformity (~2500–2200 Ma) represents Archaean Proterozoic Structural Inversion - APSI i.e. Archaean transpressive shear regime taken over by Proterozoic transtensional shear regime (~2200–500 Ma) leading supercontinental accretion and their agglomeration with cratonic areas – Eastern Ghats Orogeny.

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