The Tectonic and Metamorphic Perspective of Southern Granulite Terrane, India – K. Sajeed, Centre for Earth Sciences, Indian Institute of Science, Bangalore - 560 012, India (E: sajeed@iisc.ac.in)

The high-grade blocks to the south of Dharwar craton, southern India, are collectively grouped as southern granulite terrane (SGT). However, most researchers consider orthopyroxene isograd, also known as the Fermor line, as the northern boundary of SGT. Thus, the Archaean granulites (northern blocks: Coorg, Nilgiri, BR blocks, Shevory, Namakkal, and Madras) and Neoproterozoic granulites (Madurai, Trivandrum, and Nagarkovil) separated by the Palghat-Cauvery shear zone (PCSZ) system are the primary sub-divisions of this high-grade terrane.

The recent results from various Archaean granulite blocks have improved our understanding of its formation and evolution. The Coorg and the Karwar blocks situated to the west of Dharwar craton are the oldest blocks preserved in southern India. The Coorg block consists of granulites, part of SGT, while the Karwar block consists of low-grade rocks. Karwar and Coorg blocks and the associated Kumta-Mercara suture zone provided substantial evidence for the precise reconstruction of India with Madagascar during Mesoproterozoic.

The Archaean (ca. 2.5 Ga) Nilgiri block situated SE of Coorg is bounded by two major shear zones, the Moyar shear zone to the north and the Bhavani shear zone to the south. The Nilgiri block is a massive charnockite rich terrane with the northern part consisting of an east-west trending garnet-bearing meta-gabbro layer, websterite, amphibolite, Grt-Ky metasediment, metatuff, and banded iron formation. Previous studies considered Nilgiris as the deep-level rocks thrust onto the Dharwar craton. However, several new results presented by Samuel and others (2014, 2015) proposed a subduction-related setting during Archaean. Samuel and others proposed that in the late Neoproterozoic (2.6–2.5 Ga), the crustal growth process of Nilgiri happened through partial melting and melt differentiation followed by a magmatic arc process. These rocks subsequently underwent high-pressure granulite metamorphism during the Paleoproterozoic (2.45–2.5 Ga).

Several new results explained the crustal evolution and Meso-Neoproterozoic tectonics of the Biligirirangan (BR) block, southern India.

Recent results demonstrated various stages within the subduction processes, such as magma underplating (ca. 2.8–2.95/ Ga), arc magmatism (ca. 2.7–2.65/ Ga), and peak magmatism cogenetic with metamorphism (ca. 2.7–2.5/ Ga) from zircon geochronology. They proposed that the Moyar and the Kollegal suture zones are the regions of ocean closure along which the Nilgiri and BR blocks accreted onto the western Dharwar craton.

The Shevaroy block, situated to the east of BR Block, has been extensively investigated by several recent researchers. These results proposed that the Shevaroy block represents a lower late Archaean crust cross-section ranging from granulite-facies in the lower southern half (terminated by the Athur shear zone) to amphibolite-facies in the north after crossing an orthopyroxene-out isograd.

The Namakkal Block situated south of Shevaroy Block is bounded by the Athur shear zone in the north and the Cauvery shear zone to its south. Major rock types are similar to that of Nilgiri and BR hills. Recent results by George and others demonstrated that the crustal formation happened at ca. 2.55 Ga, followed by metamorphism at ca. 2.4 Ga. The eclogite bearing Archaean Sittampundi complex is situated to southwest of Namakkal block with no clear boundaries defined.

The Proterozoic terrain to the south of PCSZ consists of very high-grade granulites, especially to the central part of Madurai block. Neoproterozoic (ca. 550 Ma) sapphirine-bearing hydrous metamorphic rocks are present in the PCSZ region. However, central Madurai block is the only region with dry sapphirine-quartz bearing ultrahigh-temperature rocks. The Trivandrum Block is bounded north by the Achankovil shear zone (ACSZ) and in the south by the debated Nagercoil block. The dominant rock types are highly metamorphosed metapelites, charnockite, and calc-silicate rocks. The granulite facies metamorphism date Neoproterozoic–Cambrian associated with the final assembly of Gondwana supercontinent. Towards the south of Trivandrum block, several studies debated the existence and nonexistence of a massive charnockite body, commonly known as Nagercoil block.

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