Geochemical Characteristics of Mafic Magmas from the Ophiolites of Palgaht-cauvery Suture Zone, South India: A Possible Evidence for Proterozoic Ocean Plate Stratigraphy within Gondwana Suture

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Ophiolites, representing the remnants of oceanic lithosphere, develop in different environments and have been classified as mid-ocean ridge basalts (MORB)-type and suprasubduction zone (SSZ)-types (Pearce et al., 1984). Tectonic and geochemical studies of these ancient obducted fragments of oceanic lithosphere are important in identifying the structure and evolution of oceanic crust formed in ancient spreading centers and in interpreting the tectonic history of accreted terranes (Shervais, 2001; Pearce, 2003). The Palgaht-Cauvery Suture Zone (PCSZ) in Southern India has been described as a remnant of the Neoproterozoic Mozambique Ocean suture (Collins, et al., 2007; Santosh et al., 2009). The geochemical characteristics of an ophiolite complex at Manamedu within the PCSZ were recently reported by Yellappa et al. (2010). Here, we present field and geochemical data on similar newly discovered complexes around Devanur, Thuraiyur and Vadavattur within the PCSZ. The lithologies in these localities occur as dismembered fragments showing typical oceanic sequences/ophiolite stratigraphy consisting of ultramfic-mafic rocks overlain by pelagic sediments. The rock types include pyroxenites, acitnolite-hornbelndites, gabbros, anorothosites, amphibolite dykes, plagiogranites, and thin layers of ferruginous cherts. The units show varied lateral extension form 500m to 5km with a width of few meters to several hundred meters. The field and petrographic studies indicate that these lithologies are highly altered, sheared and metamorphosed. The geochemistry of the mafic dykes in this complexes show basalitic-andesitic type magmas with calc-alkaline to tholeiitic signatures. Cr vs Y, V vs Cr, Ti vs Zr, TiO2-MnO-P2O5 and Fe2O3- Na2O+K2O-MgO plots of the mafic dyke assemblages show that these are related to Island Arc Tholeities (IAT). REE and MORB normalized multi-element patterns display very less fractionation and prominent negative Nb anomalies with enrichment of LIL/LFSE and depletion in HREE. The results reveal that, these lithologies developed under suprasubduction zone tectonic setting with island arc affinities during the Proterozoic subduction process. We interpret these rocks as the remnants of Proterozoic ocean stratigraphy of Mozambique Ocean developed during Rodinia breakup and later its imbrication with in the accretionary complex of the suture associated with the continental collision tectonics attending the final assembly of the Rodinia super continent.

Key words: Gondwana suture; Palghat-Cauvery Suture Zone; Suprasubduction zone ophiolites;

Mozambique Ocean; Rodinia breakup.

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