Petrology, Geochronology and Radiogenic Isotope Systematics of Distinct Proterozoic Mafic Dyke Swarms Emplaced within the Dharwar Craton: Implications for the Recognition of Large Igneous Provinces (LIPs) and Paleocontinental Reconstruction

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Proterozoic Mafic dyke swarms preserved in Archean cratons represent the enduring erosional remnants of continental large igneous provinces (LIPs), and may be genetically linked with major episodes of continental rifting and supercontinent breakup, eruption of continental flood basalts (CFBs), and mantle plume activity. The Indian shield is transected by numerous, crosscutting Precambrian mafic dyke swarms. Such distinct Proterozoic mafic dyke swarms of different orientations are well exposed within the Dharwar craton. Studies on such dyke rocks are conducted during the last two decades have contributed to our understanding of field, petrographic and geochemical characteristics; however, most of the studies mainly focused on the dolerite dykes of southern high grade terrain, southwestern margin of Cuddapah basin, southern Karnataka, etc. Currently there is a complete lack of robust geochronological information available for the age of emplacement of any mafic dyke swarm except few recent U-Pb dates. Besides U-Pb geochronological work it is also important to carryout radiogenic isotopic (particularly Sm-Nd) studies on the different mafic dyke swarms. This integrated study will help in (i) identification of discrete mafic magmatism present in the region, (ii) understand role of crust during the emplacement of mafic magmas, (iii) recognizing source region from which the magma was extracted, (iv) Paleocontinental reconstruction of supercontinents that existed since Archaean times and recognition of large igneous provinces, and (v) in totality this work would help in proposing a viable model for evolution of sub-continental lithosphere of the Dharwar craton.