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Geology and Geochemistry of Mafic-Ultramafic Dyke Swarms in the environs of Chattisgarh and Indravati basins, Bastar Craton, Central India: Implications for Proterozoic Crustal Evolution

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The Precambrian of Central India has received renewed attention in recent years and occurrence of two Cratonic blocks on either side of the Central Indian Tectonic Zone, the Bundelkhand Craton in the north and Bastar Craton in the South. The Archaean crust was cratonised ~2.5Ga. Proterozoic volcano-sedimentary sequence in Bastar Craton evolved in pericratonic fold belts and epicratonic basins (Chattisgarh, Indravati). Four different suites of mafic dykes of metadolerites, metagabbros, metapyroxenites and amphibolites are recognized in the SE margin of the Chattisgarh Basin (CB). REE patterns of these suites show complementary patterns with moderate enrichment in LREE, flat HREE, derived from an oceanic plateau crust that was added earlier to subcontinental lithosphere. Boninitic dykes (Mesoproterozoic) have been recently found in the W and S-C margins of CB having diagnostic petrological and geochemical characteristics. These rocks were derived from metasomatised depleted mantle sources. The E margin of CB is characterized by the presence of abundant meta-ultramafic dykes showing enriched LREE patterns with negative Eu anomalies and flat HREE. The mafic dyke swarms of this region have unfractionated REE patterns with La/Yb_N =0.972–1.34 ratios indicating primitive nature of the mantle sources. Younger within basin basic dykes (Neoproterozoic) occurs in Raipur and Raigarh areas. They show distinct trace/REE geochemistry and exhibit geochemical characteristics similar to CFB reflecting a plume environment. The Indravati (IB) is the largest basin after Chattisgarh basin in Bastar Craton. Ultramafic/Ultrapotassic intrusive bodies occur inside and outside the basin. The Tokapal kimberlite is rich in crustal xenoliths and composed of macro and microcrysts of altered olivine without kimberlite indicator minerals. Cr and Ni show high concentrations and positive correlation. LREE enrichment, HREE depletion with high LREE/HREE ratios ~18.05 suggesting their derivation from evolved mantle sources in a plume magmatic environment. The mafic dyke swarms occurring in SW margin of the IB with E-W trends, show near flat REE patterns indicating primitive nature of the mantle source. The metaultramafic dykes intruding the basin show very high concentrations of Ni & Cr. The intraplate mafic-ultramafic magmatic rocks in Chattisgarh and Indravati regions were probably generated from heterogeneous mantle sources and most probably related to a mantle plume source similar to the mafic dykes of northern Bundelkhand Craton.