

Evidence of Eoarchaeon crust in the Bastar Craton and new zircon U-Pb SHRIMP geochronology for the 1.4 to 0.51 Ga Purana Basin (Khariar), Eastern Indian Peninsula

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The Eastern part of Indian Peninsula consists of both Archaean Cratons and Proterozoic Mobile Belts, juxtaposed along shear zones. The tectonic margin of the Eastern Ghats Mobile Belt with surrounding Cratons namely Singbhum, Bhandara-Bastar, Dharwar is demarcated by a Terrain Boundary Shear Zone (TBSZ). The shear zone shows a curvilinear geometry with a WNW-ESE strike in the north with strike slip character and NNE-SSW strike in the west with thrust slip character. The dominant structural trend of the Eastern Ghats is NNE-SSW with both westerly and easterly dip resulting from the earliest folding; the belt is affected by multiple phases of folding and shearing. The NW front of the EGMB exhibit a fold thrust belt consisting of several nappes, lateral ramp, and windows; the TBSZ represents the decollement of the fold-thrust belt. The Eastern Ghats Mobile Belt consisting of granulite facies rocks that has been intruded by several phases of granite, anorthosite, and nepheline syenite. The Craton consists of basement rocks of ca 3.5 Ga tonalite-trondjemite gneisses (TTG) intruded by ca 2.5 Ga old potassic granite. Overlying this is the Purana basin dominated by sandstone, shale. The Craton is further intruded by dykes ranging in compositions from acidic to basic namely rhyolite, trachyte, dolerite, and gabbro and feldspar porphyry. These are called Lakhna dyke swarm. Most of them are nearly N-S, NNE-SSW trends and some of the E-W; WNW-ESE show cross cut relationships with the N-S dykes. Dolerites occur in N-S as well as WNW-ESE trend, both are medium grained rock with major minerals are plagioclase, olivine, and augite in thin section. Rhyolite is a pink coloured rock with alkali feldspar phenocrysts, amoeboid quartz grains and euhedral orthoclase phenocrysts are seen under microscope having been embedded in a fine grained equigranular quartzo-feldspathic matrix, at places showing micrographic texture; magnetite and green biotite occur as accessories and spherulitic and replacement textures are common. Trachyte is light greenish coloured with well developed foliation due to the presence of flow layers which are defined by needle shaped alkali feldspar grains, glomeroporphyritic texture are developed due to segregation of multiple feldspar phenocrysts. Medium to coarse grained feldspar porphyry dykes occur with bounty alkali feldspar phenocrysts within fine to medium grained matrix. The matrix show dark colour due to presence of fine grained amphiboles. These are quartz poor and rich in plagioclase and orthoclase and lie in basaltic andesite field in TAS diagram. Alkali gabbro dyke carries alkali feldspar in addition to plagioclase and augite and olivine. The dykes have been dated using zircon U-Pb SHRIMP method. The ages are rhyolite 1450 ± 22 Ma, trachyte 1453 ± 19 Ma and gabbro 1442 ± 30 Ma. Suggesting 1.4 Ga magmatic events in Bastar Craton in a continental anorogenic setting. The Purana sequence of rock which has been deposited in several basins within Bastar Craton probably continued upto 517 Ma; the age of over thrusting of Eastern Ghats Mobile Belt on Bastar Craton.