

Late Archaean tholeiitic basalts from the southern Bastar craton, Central India

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The geology of the Bastar craton of central India is dominated by granitoids, supracrustal sequences, mafic extrusives and intrusives, and unmetamorphosed sedimentary basins. Mainly two types of mafic intrusives, viz. meta-basalts with spinifex texture and meta-basalts with other igneous textures, are widely exposed. Metamorphosed recrystallized (amphibolitic in composition) variety is also exposed at places. No geochronological data is available for these mafic extrusives, but their field relationships and association with the rocks of Archaean Bengpal group suggest Late Archaean age for studied extrusives. Geochemically they are tholeiitic in nature and classified as sub-alkaline basalts and/or andesitic basalts. All basalts fall in the island-arc tholeiitic field on a number of discrimination diagrams. On the basis of distinct geochemical characteristics and Jensen's cation classification, these basalts are grouped into the three types, viz. high-magnesian tholeiitic basalts (HMTB), high-iron tholeiitic basalts (HITB), and siliceous high-magnesian basalts (SHMB). These sub-divisions are corroborated on primordial-mantle normalized multi-elements spidergrams and chondrite-normalized rare-earth element patterns. HMTB and SHMB show enriched LREE and flat HREE patterns, whereas, HITB shows almost flat REE patterns. Further geochemical modeling suggests presence of heterogeneous mantle in the Bastar craton. Probably two mantle sources, viz. Iherzolite and harzburgite, and three magma types, viz. high-Mg tholeiitic, high-Fe tholeiitic, and noritic, were involved in the genesis of these basalts.