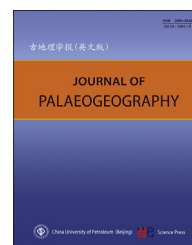


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Palaeobiogeography

Palaeodepositional environment, implications of *Glossopteris* flora, and organic matter characteristics from the Lower Permian, Karo Open Cast Mine, East Bokaro Coalfield, Damodar Basin, India

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Abstract The present study deals with the Early Permian floral diversity, palaeoenvironment, palaeoclimate and depositional setting using a multiproxy approach that includes morphotaxonomy, palynology, and organic geochemistry of Karo OCM (Open Cast Mine), East Bokaro Coalfield, Damodar Gondwana Basin, India. The Permian sediments of Peninsular India are widely regarded as fluvial, along with some marine incursions. The macroplant fossil assemblage exhibits the presence of Glossopteridales, comprising *Glossopteris*, *Gangamopteris*, and *Vertebraria*, as well as Coniferales, which includes *Noeggerathiopsis*. The palynological assemblage encompasses the dominance of the striate bisaccate pollen *Faunipollenites* sp. and the subdominance of the non-striate bisaccate pollen *Scheuringipollenites* sp. with glossopterid affinities. The megafloral and palynofloral assemblage confirms the biostratigraphical age to be Late Barakar palynoflora of Kungurian affinity. The studied morphological characteristics, including small to large *Glossopteris* leaves exhibiting a lanceolate shape, acute apices, and acute cuneate or tapering bases, as well as entire margins with narrower lamina and narrow meshes, suggest the existence of a dense forest with the prevalence of a warm and humid climate during their deposition. The organic geochemical characterization based on functional group and biomarker analyses reveals the diagenetic effects on organic matter. Aliphatic symmetric ($\sim 2865\text{--}2855\text{ cm}^{-1}$) and asymmetric stretching ($\sim 2930\text{--}2910\text{ cm}^{-1}$) peaks are identifiable in coal samples, whereas they are absent in carbonaceous shale. The A-factor vs. C-factor plot suggests that the kerogen type is

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