



# Palynology of the Upper Gondwana deposits from the Chintalapudi Sub-basin, South India: Insights into age and palaeodepositional settings

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## ABSTRACT

Palynological data were analyzed to determine the age and depositional settings of the Jangareddygudem area in Godavari Graben, South India. The abundance of coniferous pollen grains (*Araucariacites* spp., *Podocarpidites* spp., and *Callialasporites* spp.) as well as pteridophytic and bryophytic trilete spore characterizes the palynofloral assemblage. The First Occurrences (FOs) of biostratigraphically significant palynomorphs taxa have been identified, which allowed us to assign the studied stratigraphic sequence to the upper Aptian–lower Albian. Recovered palynoassemblages are compared with other contemporaneous assemblages from different Gondwana continents. Palynofacies research supports hetero-lithic shelf (proximal shelf) rock formation with gradual and continuous sediment input under dysoxic to anoxic conditions. The recovered palynomorphs consistently suggest cool and humid climates during rock deposition, favoring the formation and development of a dense canopy of luxurious coniferous forests near the coast.

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## 1. Introduction

Godavari Graben is one of the five largest Gondwana basins and represents the sole coal-producing source in South India. The basin preserves almost a complete Gondwana sequence, ranging from the lower Permian to the Lower Cretaceous. The Permian sequence is represented by Talchir, Barakar, Barren Measures, and Raniganj Formation (*sensu* Ramanamurty and Madhusudan, 1996; Jha and Srivastava, 1996). Higher up in the sedimentary sequence, deposits from the Mesozoic are encompassed the Kamthi, Maleri, Kota, and Gangapur/Chikiala formations (Lakshminarayana, 1996). The Upper Gondwana sequences in the basin have been largely overlooked due to the lack of palynological data. A review of previously published literature indicates that palynological studies have been limited to a handful of reports, primarily based on surface samples. The Upper Gondwana sequences of the Godavari Graben ranging Jurassic–Cretaceous in peninsular India were palynologically explored in the Adilabad district (Ramanujam and Rao, 1979; Rao and Ramanujam, 1979; Ramakrishna et al., 1985;

Ramakrishna and Ramanujam, 1987). It is therefore imperative to further investigate these overlooked deposits, especially utilizing subsurface data. The core section MJR-11 was drilled by the Singareni Collieries Company Limited (SCCL), Telangana State to locate the coal resources in the Jangareddygudem area. The current study primarily focuses on palynology, stratigraphic correlation, depositional settings, palaeoecology, and palaeovegetation. Over the past few decades, palynofacies studies have emerged as a significant tool for both biostratigraphic and non-biostratigraphic research. The importance of this field is understood by the needs of the petroleum industry, which uses these studies to locate and determine the source rock potential and to assess the composition of sedimentary organic matter. Palynofacies can also serve as a primary analytical proxy to determine the prevailed palaeoclimatic conditions, and this data can be integrated with geochemical and geophysical measures (Mueller et al., 2014; Zhang et al., 2015a, 2015b).

The study and identification of palynomorphs taking into account with their preferred climatic conditions and the nature of palynofacies, is a well-established approach to enhance the accuracy and reliability of reconstructions in palaeoecology, palaeophytogeography, and palaeoclimatology (Modie, 2007; Césari and Colombi, 2016; Lindström et al., 2016). In both terrestrial and

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