

Geochemical signatures of Phanerozoic shale/clay from the Gondwana Godavari Basin (India): Provenance and tectonics

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Introduction

The hydrocarbon and coal bearing Godavari Basin, situated on the eastern part of India and sandwiched between two prominent cratons (Bastar and Dharwar), has intimate relationship with the continental break-up and formation of east coast of India. It cuts across the Proterozoic Eastern Ghat Mobile Belt (EGMB), running along the eastern margin. The southern part of this basin is continuously exploited for the clay, coal and hydrocarbon deposits. In spite of its importance, the nature of sedimentation and its provenance remain a subject of intense debate.

Significant Results

In the present study, we make a detailed geochemical analysis of the entire Phanerozoic sequences of the clay/shale formations from representative stratigraphic horizons viz., Barakar, Raghavapuram and Rajahmundry, to understand the provenance and depositional environment based on relatively immobile major, trace and REE systematics. Computed Al_2O_3/TiO_2 ratio for the Barakar (Paleozoic), Raghavapuram (Mesozoic) and Rajahmundry (Cenozoic) formations varies respectively from 13-16, 11-22 and 13-22, which falls in the range of charnockites (17.78) and granulites (12.34) of the EGMB. Similarly, for such formations, La/Th ratios are found to be 2.85, 3.42, and 3.40 and La/Sc, 3.87, 3.67-5.22 and 4.32 respectively. This suggests that the sediments of Godavari Basin may have been derived directly from the denudation of EGMB as well as the adjacent Dharwar schist belt and granitic-gneissic terrain, indicating a mixed mode of sedimentation.