Phytoecological Reconstructions of Eocene-Pliocene Sediments, Niger Delta

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Application of sequence stratigraphic analysis and high-resolution biostratigraphy has significantly impacted routine stratigraphic studies. Enhancing both applications is the recognition of variable distribution of microfossils through time, linked to changes in eustacy, climate, orography, edaphic conditions, salinity and depositional settings. This paper studies the relative changes observed in palynomorph (pollen and spore) distributions from Eocene to Pliocene sediments across the Niger Delta.

An assessment of relative abundance of key phytoecological associations suggests that evolution of parent plants does not happen in isolation. Changes are associated with prevailing conditions influencing local ecosystems. These changes can be mapped to temporal (stratigraphic) reference points associated with the deposition of the Niger Delta complex through time.

Eocene to Pliocene strata of the Niger Delta are characterised by diverse assemblages of low latitude pollen and pteridophyte spores, along with minor influxes of dinoflagellates, fungal hyphae, fresh and brackish water algae, leiosphaerid and sphaeromorph acritarchs. During the latest Eocene - mid Oligocene, Northern Delta Depobelt wells suggest generic cooler climate inferences. This period marks the onset of a marine regression and relative shift of the shoreline basinwards. A signifcant phytoecological change is observed associated with latest Oligocene - mid Miocene sequences in the Greater Ughelli Depobelt. This indicates a gradual rise in the sea level and landward shift of shoreline. The Coastal Swamp and Shallow Offshore depobelts demonstrate similar phytoecological trends during the earliest Serravallian to latest Tortonian (Middle - Late Miocene).

Hinterland group decline during the latest Messinian - Zanclean epochs (latest Miocene - earliest Pliocene) is the most abrupt and lasting change. It signifies a lasting reduction of the coastal and mangrove fringe vegetation and a permanent cooling of regional climate. Phytoecological applications can therefore be used to refine existing depositional models for the Niger Delta, notionally linked to traditional biostratigraphic techniques, namely foraminifera and calcareous nannoplankton productivity trends.