
Multidisciplinary Biofacies Analysis of the Khafji and Safaniya Members of the Wasia Formation (Cretaceous) of Saudi Arabia

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Conventional biostratigraphy based on palynology and nannofossils provides broadly spaced datums for age control within the Aptian – Albian deltaic sequences represented by the Khafji and Safaniya members of the Wasia Formation. Higher resolution stratigraphy is achieved by using multidisciplinary biofacies that contribute to recognition of higher order marine flooding events, associated with within the world's largest offshore oilfield reservoirs of Saudi Arabia. Integration with sedimentology is an ongoing part of this project.

The intervals between biostratigraphic datums based on the appearances of elaterate palynomorphs (late Albian), pollen, dinoflagellate cysts and selected nannofossil control (late Albian and Aptian) are characterized by diversity/abundance peaks of dinoflagellate cysts, fresh water algae, foraminifera, coccolith and ascidian spicule nannofossils.

Benthic agglutinating foraminifera define the upper and lower estuarine and marine settings. This control has been developed from Recent assemblages from the Sedili River, Malaysia where foram assemblages were calibrated to ebb and flood salinities from the South China Sea to 32 km upstream. These Recent assemblages form the basis for understanding paleoecology of *Trochammina*, *Ammobaculites* and *Orbitolina* biofacies of the Khafji and Safaniya members. Dinocysts also show similar patterns to the foraminifera responding to salinity, of which *Subtilisphaera* dominates brackish environments with assemblages diversifying with increasing salinity. Pteridophyte spores dominate the terrestrial successions. The integrated biofacies display isolated but distinct evidence of marine flooding events of variable extent within a depositionally complex thick succession Khafji and Safaniya deltaic sediments.
