

The Depositional Response to Changes in Sediment Supply and Accommodation Space within a River-Dominated Deltaic System: An Example from the Pyrenees Member, WA-12-R, Exmouth Sub-Basin, Western Australia

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The late Jurassic (Berriasian) Pyrenees Member comprises ~200m of fluviially dominated strata, deposited within 3 unconformably bounded 4th order sequences spanning <2.0Ma. Sequence boundaries are typed by a change in chemostratigraphic signature, variations in siderite cementation and correlate with 'deepwater' lowstand clinofolds mapped to the northeast. This paper illustrates the responses of the transgressive (TST) and highstand (HST) systems tracts to variations in sediment supply and accommodation space development.

Sequence one is dominated by highstand deposition, with a thin shelfal transgressive succession overlain by a series of shoaling shelf to shoreface parasequences. Minor flooding surfaces are laterally continuous and the shoreline architecture is relatively linear, oriented in a northwest to southeast direction. Reduction in accommodation space during late highstand resulted in repeated tidal channel incisions, reducing the lateral continuity of flooding surfaces. Minor flooding of the system at the end of the highstand, resulting in an increase in tidal influence, was in response to progressive abandonment and reduction in sediment supply.

Late lowstand to early transgressive deposition within Sequence 2 was dominated by a coarse-grained anastomosing fluvial system with sediment dispersal towards the north-east. The maximum flooding surface varies from a minor cemented sandstone horizon within fluvial deposits in the southwest, to a bioturbated zone within argillaceous shoreface deposits towards the northeast. Limited accommodation space during the subsequent highstand forced the system to shoal towards the NE with a transition into lower delta plain strata.

Deposits of the TST, comprising a series of retrogradational parasequences bound by laterally continuous flooding surfaces, directly overly Sequence Boundary/Transgressive Surface 3. A marked increase in tide- and wave-influenced sub-environments is evident, associated with a marked increase in accommodation space and reduction in sediment supply. Tidally influenced sub-environments are moderately to highly bioturbated. The uppermost highstand deposits are truncated by the inter-Hauterivian unconformity.