

Facies and facies associations of flood-dominated Delta-front Sandstone Lobes from Selected Examples of Southern Pyrenees Eocene Strata Reservoir Analogs

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Abstract

This final master project is in summa oriented to define in detail the primary facies types and facies associations, according to their readily observable macroscopic characteristics observed in the field in different areas of Ebro Basin. The deposits have been interpreted as having formed in a fluvial-dominated river delta environment that generated highly sediment-concentrated sustained flow (hyperpycnal flow). The facies association analysis indicate channel distributary/interdistributary, mouth bar and hyperpycnal shelf lobe associations. The facies are clearly related to delta front hyperpycnal-flood deposits, according with the readily observable diagnostic features manifested in all the study cases. The facies tract identified is related to the progressive downstream dilution of high-density flows of fluvial origin (hyperpycnal flow) once these flows enter a shallow marine environment. Especially, hyperpycnal shelf lobe deposits are represented by the different type of hummocky sandstone structures and composite parallel laminated sandstone beds with inverse grading laminae indicating the waxing stage, massive interval indicating the peak-flood stage and normal grading laminae indicating the waning flood stage. Inverse to normal graded beds and wax-wane stratification sequences indicate deposition from sustained hyperpycnal flows. The aggradational and progradational stacking pattern has been recognized in the studied cases and in some cases the stacking pattern is interrupted by retrogradational stacking pattern, associated probably to the decrease of flood events probably during which the mouth bar system has transgressed far landward. Hyperpycnal deposits are characterized by high-frequency cyclicity expressed by the repetition of flood facies sequences. Tectonics, autocyclicity, eustatic sea-level fluctuations, and climate are mechanisms that likely influenced the depositional stacking patterns in the studied areas. Their relative influence is difficult to evaluate and no conclusive links have been found in this study, and additional work would be required to adequately address the relative significance of these mechanisms.