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Low-amplitude, Synsedimentary Folding of a Deltaic Complex: Roda Sandstone (Lower Eocene), South-Pyrenean Foreland Basin

The South-Pyrenean Foreland Basin is a sedimentary trough developed during Paleogene times in response Pyrenean orogenesis. The structural development of the chain progressively involved the foreland basin deposits resulting in synsedimentary thrusting and growth of folds through the basin.

The Lower Eocene Roda Sandstone, a well-known deltaic complex widely studied as reservoir analog, was deposited in a shallow-marine environment whose topography (bathymetry) was modified by a growing series of gentle folds. This synsedimentary folding is evidenced in the field by: 1) thickening of sedimentary units above synclinal structures and thinning over anticlines; 2) carbonate platform deposits growing on top of anticlines; 3) the areal distribution of benthic foraminifera in transgressive facies assemblages determined by an irregular, fold-influenced paleobathymetry; 4) variation of sandstone palaeocurrents related to the presence of a sedimentary trough formed by the synsedimentary growth of a syncline. In addition, synsedimentary folding has been documented from seismic data.

In the Roda Sandstone example, the growth of gentle folds occurred in an area with high sedimentation rates ($\sim 0.21 \pm 0.06$ mm/y). Due to the high sedimentation rates, exceeding the folds uplift rate ($\sim 0.10 \pm 0.01$ mm/y), there are no noticeable unconformities in the growth strata at outcrop scale. However, the effects on the sedimentation are very significant because the sediments were deposited close to sea level, and thus were very sensitive to fauna and facies distribution.

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