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Sediment Routing and Storage During the Messinian and Pliocene in a Tectonically Active Setting: The Sorbas Basin, Southeast Spain

Tectonically active basins preserve complex erosional and depositional histories and present geoscientists with fundamental problems in predicting the distribution and geometry of potential reservoir units. Tectono-stratigraphic models highlight the importance of relative sea-level change and rates of tectonic deformation on the evolution of sedimentary successions. The Messinian-Pliocene evolution of the Sorbas Basin, SE Spain, highlights the critical role of uplifted strata on subsequent basin-scale architectures, the distribution of sedimentary facies and architectural elements, and the routing and storage of sediments of different provenance and calibre.

Within the Sorbas Basin a Messinian fringing reef unit exerted a primary control on the basin-fill history by creating a topographic barrier. This intrabasinal boundary 1) controlled the geometry of younger depocentres and 2) suppressed the reworking of uplifted source areas. The restricted flux of siliciclastic sediment into the basin allowed the accumulation of thick evaporitic and hypersaline shoreface deposits. In the late Messinian, the protective carbonate fringe was breached and an influx of relatively mature coarse-grained siliciclastic material entered into the basin. A complex non-marine succession was then established. Locally, syn-sedimentary strike-slip faults influenced sediment storage (small sag basins) and routing (between periclinal highs) within the sequence. It is anticipated that when the protective carbonate rim is fully eroded that rapid expansion of modern drainage networks by headward erosion will connect other, currently isolated, endoheric Neogene basins along the Western Iberian margin. The resulting enhanced sediment flux will not require significant changes in allocyclic controls such as climate or relative sea level.