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Diagenetic Processes Controlling the Quality of Potential Clastic Reservoirs in a Continental Rift Basin: Western Cameros Basin, Spain

The western sector of the Cameros rift basin was filled up during Late Jurassic - Lower Cretaceous by a succession of seven depositional sequences of fluviatile-lacustrine origin. This succession consists of detrital deposits (conglomerates, sandstones and shales) occasionally overlaid by lacustrine carbonates at top of the sequence. In this sector the thickness of the succession varies from 300 m to more than 900 m northeastward, representing a significant potential clastic reservoir. Depositional sequences can be grouped in two megasequences with different provenance. Both megasequences (MS1 and MS2) initiate by a depositional sequence derived from the erosion of Triassic and marine Jurassic sedimentary cover. MS1 follows by deposition of clastic material from low grade metamorphic terrains, while MS2 is characterized by arkosic deposits provided by coarse crystalline rocks. Early carbonate cements are very common in sandstones (18%) from the initial depositional sequences in both megasequences, inhibiting later compaction. Cements in the rest of depositional sequences are mainly quartz (8%) and clay minerals (4%). Total porosity is low (1.5%) in MS1 sandstones, but significant in MS2 sandstones (6.4%). This is due to the rigidity of arkosic framework preserving primary porosity. In addition, dissolution of K-feldspar generated secondary porosity. COPL (compactional porosity loss) progressively increases toward the top of the succession (from 20.6% to 26.4%), while CEPL (cementational porosity loss) decreases from 19% to 11%. Diagenetic paths provide a model that could be applied in real oil reservoirs from equivalent units in small marginal basins situated in the north of Cameros Basin.