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Extreme Mesozoic crustal thinning in Eastern Iberia margin: The example of the Columbrets Basin (Valencia Trough)

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Eastern Iberia preserves a complex succession of Mesozoic rifts partly or completely inverted during the Late Cretaceous to Cenozoic in relation with Africa-Eurasia convergence. Due to this inversion, the initial rift-related architecture if often difficult to decipher. Notably, the Valencia Trough, classically viewed as part of the Cenozoic West Mediterranean basins, preserves in its southwestern part a thick Mesozoic succession (locally 10km thick) over a highly thinned continental crust (locally only 3,5km thick). This sub-basin referred to as the Columbrets Basin, represents a Late Jurassic-Early Cretaceous hyper-extended rift basin weakly overprinted by subsequent events and therefore preserving its initial configuration. This study aims to unravel the 3D architecture of the Columbrets Basin in the frame of the Mesozoic evolution of Eastern Iberia. The Columbrets basin benefits from an extensive dataset combining high resolution reflection seismic profiles, drill holes, refraction seismic data and Expanding Spread Profiles (ESP). The general Mesozoic architecture of this basin is controlled by interactions between extensional deformation and halokinesis involving the Upper Triassic (Keuper) salt level. The SE-margin of the basin is characterized by a large detachment fault acting at crustal scale and interacting locally with the Keuper detachment level. The net result is the stretching of the Mesozoic cover, which is locally dismembered. These extensional structures accommodate the exhumation of the continental basement and part of the crustal thinning. We interpret the Mesozoic Columbrets basin as a well preserved supra-detachment basin recording the late stages of a hyperextensional event occurring during the Early Cretaceous (i.e. Neocomian).This basin is then integrated in the frame of the Mesozoic evolution of the Eastern Iberian margin. Finally, our results highlight the critical interactions between hyperextension and salt related structures for the deformation style and sedimentary architecture.