



Architecture of hyperextended rift basins in relation with pre-kinematic salt: The example of Late Jurassic to Early Cretaceous peri-Iberian basins

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Hyperextended rift basins and passive margins are often associated with evaporite/salt deposition before, during or after the main rift event. Although widely observed, the consequences of the occurrence of salt during hyperextension remain poorly understood.

This contribution aims to investigate the evolution of hyperextended rift basins in relation with pre-kinematic salt and how this controls the crustal and stratigraphic basin architecture. We focus on some of the Late Jurassic to Early Cretaceous rift basins documented within and around Iberia (Western Europe). Many of these rift basins underwent hyperextension processes and are characterized by the presence of locally very thick evaporitic successions deposited during the Late Triassic time. Most of these rift basins were later inverted and at least partly incorporated in orogens (e.g. the North-Pyrenean Basins). A few others, such as the Parentis and Columbrets Basins located offshore of the Iberia Peninsula, are relatively well preserved and benefit from a good seismic imaging coverage and local drilling control.

The Parentis and Columbrets Basins, although spatially disconnected, share remarkably similar first-order architecture. As a general feature, both basins show a "syncline" shape of the supra-salt sedimentary cover (pre- to post-rift sediments) above an extremely thin continental basement. In addition, typical syn-rift geometries such as sedimentary wedges are hardly observed. As a result, these basins present a discrepancy between the observed crustal thinning and the amount of extension that can be deduced from recognized extensional faulting.

Our results show that the first-order syncline-shape architecture of these basins can be explained by the presence of pre-kinematic salt acting as a decoupling horizon. This decoupling layer might have triggered a partitioning of the deformation between the supra-salt Mesozoic cover and the underlying basement. The thin-skinned dismembering of the pre-rift Mesozoic cover during extension is observed at the margins of the hyperextended basins whereas the main crustal thinning is located at its centre where the thickest Late Jurassic to Early Cretaceous sediments are present.

We show the importance of pre-kinematic salt and more generally of intra- basement or pre-rift decoupling levels in partitioning extensional deformation and controlling the architecture of rift basins. We suggest that this deformation style may explain the absence of typical syn-rift geometries in the sedimentary cover. More generally, our results may help to understand the apparent discrepancy observed between crustal thinning and overlying deformation in the sedimentary cover.