The External Eastern Prebetics: Paper of Basement Faults in an Inverted Salt-Bearing Passive Margin

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Abstract

The Prebetic of Jumilla (SE Spain) is located in the outermost part of the Betic Chain, in the junction between the internal and external Prebetic Zone and the Albacete Domain (Iberian Massif). This area represents the most external part of the foreland fold-and-thrust belt of the Betic Cordilleras, where a sedimentary cover of Mesozoic to Cenozoic age is detached from the Variscan basement along Triassic evaporites and clays. A detailed cartography supported with structural cross sections through the Prebetic of Jumilla zone including salt driven structures is presented in this research. A multidisciplinary analysis (structural, sedimentological, borehole and 2D seismic data) depict that the area is affected by a lower thick-skinned and upper thin-skinned deformation separated each other by the Upper Triassic evaporites. The thick-skinned deformation is represented by NE-SW trending basement extensional faults interacting with orthogonal NNW-SSE basement extensional faults. Whereas the thin-skinned deformation is represented by inverted listric extensional faults linked in the Upper Triassic evaporites. Two main tectonic episodes have been stablished: a first extensional stage (Late Jurassic-Early Paleocene) developing a lower salt-bearing passive margin sequence and a subsequent contractional stage (Neogene) with the inversion of the preexisting structures generating a foreland fold-and-thrust belt. On one hand, during the rifting stage the area was dominated by basinward-dipping NE-SW faults with associated salt rollers and local diapirs. During this episode, the dominant control for the extensional kinematics was the dip towards the basin of the salt detachment, controlling the dip of the main structures. While the major faults controlled a thick-skinned extension style, the salt layer favored the development of a thin-skinned extension. Consequence of that, raft tectonics developed with the subsequent salt evacuation creating primary salt welds. On the other hand, during contraction, salt or equivalent welds acted as a detachment allowing the inversion of the previous extensional structures. The result of that was the generation of narrow anticlines and synclines and the squeezing of the salt structures (rollers and diapirs).