



## **Geometry of fracturing linked to extensional processes and basin formation: example from the Maestrat basin (Eastern Iberian Chain, Spain)**

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The Maestrat basin is one of the most important Mesozoic basins within the Iberian plate. This basin was inverted during the Tertiary compression, allowing for the pre-rift and the syn-rift sequences to be exposed at surface. Analysis of fracturing at the macro- and meso-structural scales near the depocenter of the basin (Salzedella area) indicates the existence of two pervasive fracture directions: W-E and NNE-SSW.

The W-E fracture system is linked to the major normal faults limiting the main subsiding areas. These faults can be characterised as presenting listric geometry, with roll-over anticlines developed in the sin-rift sequences located in their hanging walls. They show in general southward dips and geometrical reconstructions indicate that they become sub-horizontal at relatively shallow depths (above 5 km). Small-scale fractures linked to this fracture stage are very penetrative at the outcrop scale and consist of open fractures and calcite-filled veins. Average spacing between fractures ranges between 2cm and 500cm and their orientation changes from the westernmost outcrops, where they show N060E orientation, to the easternmost outcrops where they strike N120E.

The NNE-SSW fracture direction is also represented throughout the studied area both at the macro- and meso-structural scale. At the macro-structural scale this fault system do not seem to control the main changes in thickness of the Cretaceous syn-rift sequence. Nevertheless, this fault system was re-activated during the Late Tertiary and the Quaternary, forming a horst-and-graben system parallel to the Mediterranean

coast, and defining the main topographic features of the studied area. These faults are the responsible for tilting of monoclinical panels with NNE-SSW strikes. From the analysis of seismic profiles and the geometry of hanging wall strata in normal faults a deeper detachment (in mid-crustal levels) can be inferred for these faults. At the out-crop scale this fault system is represented by pervasive fractures, many of them open and filled with sediments.

The interaction between the two fracture systems gives a complicated pattern probably linked to the margins of the Iberian basin during the Cretaceous.

**Key words:** sedimentary basin, fracturing, Early Cretaceous, Iberian Chain