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Structure of the Bóixols - Sant Corneli anticline (SE Pyrenees): Fractures and Fluid Flow

The Bóixols-Sant Corneli coupled anticline formed by basin inversion during Pyrenean compression. The Bóixols anticline forms a south-directed asymmetric fault-propagation fold, constituted by lower Cretaceous syn-rift and upper Cretaceous post-rift deposits separated by an unconformity at the base of the Cenomanian limestones. The Sant Corneli anticline to the west is characterized by upper Cretaceous post-rift followed by upper Cretaceous-Paleocene growth strata related to its development. The Sant Corneli anticline plunges towards the west and is limited to the east by a set of normal faults trending NNW-SSE, which change trend to E-W towards the east along the axis of the Bóixols anticline. These faults accommodate the relatively abrupt reduction of structural relief of the Sant Corneli anticline. The progressive younging of outcropping carbonate rocks towards the west permits the study of related fractures as well as of fluid circulation through both normal faults and thrusts. Three sets of joints commonly developed during folding are recognized. Longitudinal joints initially developed perpendicular to bedding are dominant and subhorizontal on the forelimb of the Bóixols anticline. The best-developed joints on the backlimb are oblique joints trending NW-SE and NE-SW, whereas the density of cross fold joints trending N-S is more important in the hinge zone. Isotope composition and fluid inclusion studies of precipitates enables the interpretation of fluid evolution from extensional to compressional regimes. This example constitutes an excellent analogue of basin inversion structures in buried tectonic settings and their control on fluid evolution in similar reservoir situations.