



## Fracturing stages in foreland fold and thrust belts

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Many of the most prolific hydrocarbon systems of the world are hosted in foreland fold and thrust belts, where oil migration is frequently ensured by the sub-seismic fracture network and oil accumulation occurs in km-scale anticlines associated with major thrust-faults. The existence of this well known hydrocarbon play, where oil fields development requires reconstructing the deformation pattern at depth, is one of the reasons that have promoted an impressive number of meso-structural studies in foreland fold and thrust belts and in the adjacent foreland basins since the late 60's. These works point out that thrust-related anticlines are characterised by almost unique deformation patterns out of which a common deformation pathway can be identified. In particular, in most thrust belts developing above subducting forelands, five stages of deformation can be recorded by meso-structures affecting pre- and syn-kinematic sedimentary rocks. These stages are: (i) foreland flexuring, taking place in the peripheral bulge and in the outermost sectors of the foredeep; (ii) along-strike stretching, occurring in the foredeep; (iii) layer-parallel shortening, which may occur both in the innermost sectors of the foredeep and in the thrust-and fold belt during the first stages of fold growth (pre to early-folding); (iv) syn-folding sensu-stricto fracturing, occurring during the growth of thrust-related anticlines; (v) unloading-related fracturing, which affects mostly mountain front anticlines during their later exhumation stage.

In this work we provide a review of the typical meso-structural assemblages occurring during the above mentioned deformation stages, with the purpose of placing constraints to stress and strain fields evolution before and during thrusting, and consider the behaviour of each developed meso-structural assemblage during the subsequent deformation stages.