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Large and small scale structural evolution of salt controlled minibasin in a fold and thrust belt setting: the case of the Sivas Basin, Turkey.

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The Sivas Basin in the Central Anatolian Plateau (Turkey) is a foreland fold-and-thrust belt, showing a core composed by a typical wall and basin structure (WABS), where the quality of reservoir rocks is governed primarily by the fracture and matrix damage, in relation to the macroscopic structure. Based on extensive fieldwork including detailed mapping of minibasins contacts, along with interpretation of a 2D regional seismic line, provide evidence for the development of a canopy separating two generations of MBs. The quality of reservoir rocks in these minibasins framed by evaporites is studied through (1) the characterization of the fracture network in two mini-basins, where 40 sites have been acquired, and (2) the magnetic fabric of 135 samples from sandstones to siltstones rocks from both Emirhan and Karayun mini-basins.

The Late Eocene-early Oligocene evaporite level was remobilized during the northward migration of the sedimentary load during propagation of the foreland FTB. Evaporites occur at the base of several MBs, overlain by formations younger than those filling the initial generation of MBs. This support a second generation of MBs developped over an allochthonous evaporite level. The wavelength of tectonic structures increases away from the WABS domain and suggests a deepening of the decollement level. The polygonal pattern of the WABS influences the growing FTB system during the late stage of secondary MBs development, acting as a transfer zone between a forelandward thrust sheet propagating to the west and a triangular zone with hinterlandward thrusts to the east. The shortening is accommodated within the WABS by squeezed walls and diapirs, and by the translation/rotation of MBs, recorded by strike-slip fault zones.

Considering the reservoir scale damage, both mini-basins display similar fracture network of pre-tilt fractures. In both mini-basins, we observed an early N-S fracture network, bed-perpendicular and parallel to the shortening. It is followed by a second set of E-W fractures, expressed preferentially in the border of the mini-basin, associated with the halokinetic-sequence formation.
At the matrix scale, AMS provides an average image of petrofabric. In the Karayün mini-basin, where bedding is gently dipping ($\sim$30°), the magnetic fabric reveals a prevalence of sedimentary fabrics, with few indications of strain imprint, mainly related primarily to depositional and burial processes. In contrast, the magnetic fabric from the Emirhan mini-basin reveals a pre-tilt horizontal N-S compaction. In some occurrences, the magnetic foliation develops perpendicular to the bedding. We assume therefore that the pore network in the Emirhan mini-basin is controlled both by vertical compaction (burial) and by horizontal tectonic compaction prior to tilting.
The comparison of meso-scale and micro-scale elements suggests that the two mini-basins behave differently. While both mini-basins record pre-tilting fracture, only the 90° tilted Emirhan mini-basin record significant lateral compaction expressed by matrix damage.