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Salt tectonics in the Sivas basin, Turkey, mini basin development, halokinetic sequences, and fracturation.

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Sedimentary rock deposited in mini basin records the interaction between the evolution (growth, collapse, weld) of salt structure (diapir, weld, glacier) and sedimentation, forming halokinetic sequences. They are intensively strained along the diapir. At smaller scale, understanding the relationship between local halokinetic sequence, regional stresses acting on basin boundaries, and fracturation is a key to better predict geometry and quality of reservoir facies within mini basins.

The Sivas basin, in the central Anatolian plateau of Turkey, contains an exceptional open-air collection of salt tectonic structures. This elongated E-W Oligo-Miocene basin developed above the Taurus-Pontides suture in an overall orogenic context. After deposition of the thick Hafik gypsum formation during the tectonically quiet mid Oligocene period, the mini basins recorded sedimentary sequences from the mid Oligocene to early Miocene, composed of red silts and fluvial sandstones, marls and lacustrine to marine limestones. Concomitenly to the mini basin formation, compression resumed in mid Miocene time and was responsible for mini basin capsizing and an increase of gypsum emission.

The core of our study is focused on several minibasins (10 to 16 km2) separated by vertical allochtonous evaporitic walls and partially covered by remnant of gypsum glacier, in the central part of the basin, near the town of Sivas. The major minibasins have been carefully analyzed through geological field mapping and sampling, fracturation and microtectonic data sorting (stereogram), and aerial and satellite images interpretation.

Two of them, Emirhan and Karayün, strongly tilted, present spectacular strongly deformed halokinetic succession along the contact with evaporitic bodies. They exhibit locally completely refolded and overturned sequences associated to several phase of gypsum extrusion. Such geometries have been reproduced in sandbox models and imaged on seismic lines in the Gulf of Mexico. Halokinetic sequences present an asymmetric geometry between edges of the same minibasin showing a diachronic growth of diapirs.

At smaller scale, the associated fracture network have been characterized in fluvial sandstone in the center, and along the edges, of the minibasins. The network is dominated by a N-S family, likely associated to early lithification of the sediment in the regional compressive stress regime. Subsequent younger families show complex association to bed tilting and folding during mini-basin down building.