KINEMATICS AND GROWTH OF SUPRASALT FAULT SYSTEMS: A FIELD AND SUBSURFACE ANALYSIS

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Abstract

The Paradox Basin in Utah and Colorado is an asymmetric foreland basin that developed during the Ancestral Rocky Mountains (ARM). This basin is characterized by a vast volume of evaporite cyclothems that were deposited within the subsiding footwall fault block of the Uncompahgre Uplift. This salt was subsequently remobilized into a variety of salt structures (pillows, diapirs, and salt walls).

Mobilized evaporites play a strong role in the structural development, stratigraphic facies distribution and overall architecture of salt basins. Studying the role of evaporites in evolving systems through outcrop analog studies is a powerful tool that can aid in understanding subsurface petroleum exploration.

Using three-dimensional seismic reflection and field data, we aim to characterize the role that mobile evaporites played in the nucleation and growth of individual faults and the array as a whole. The studied fault array, located within the northern Paradox Basin, is 40 km long, trending parallel and detaching downward onto the NW-SE-trending Salt Valley salt wall. The suprasalt fault array is comprised of a series of overlapping fault segments up to 12.5 km long. These faults display throws of hundreds of meters and define a series of graben and half-graben fault blocks. Along the strike of the fault array, there are notable changes in the dip direction of the half-graben master faults. These changes are interpreted to reflect heterogeneities in the salt wall geometry as well as provide insight into deformation mechanisms responsible for the initiation and fault-slip kinematic evolution of the exposed fault system.

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