Structural Origin of the Anadarko Basin

Molly Turko

The tectonic evolution of the Anadarko Basin began in the Precambrian during the breakup of Gondwana when one arm of a failed rift tore through southern Oklahoma as a large igneous province was emplaced. This event was followed by thermal post-rift subsidence as the Great American Carbonate Bank covered North America, resulting in thick carbonate deposition into the failed rift. During the Pennsylvanian Orogeny, intra-plate tectonics inverted the failed rift creating the Wichita Uplift and associated Anadarko foreland basin. A detailed study on structures in the Anadarko Basin and Wichita Uplift records the tectonic evolution of southern Oklahoma which included a rotation in regional stresses during the Late Pennsylvanian. This insight helps to understand the structural styles that developed in the basin and on the Anadarko Shelf with implications to timing of trap and hydrocarbon migration. Southern Oklahoma consists of large macroscopic structures related to the orogeny, while the Anadarko Shelf contains smaller scale structures, including significant sub-seismic stuctures. Many of these structures impact operations and production by acting as fluid conduits (leaky faults and fractures resulting in mud loss and well connectivity), or by acting as barriers (fault seals and reservoir compartmentalization). By understanding these structures, we can do a better job at predicting the impact on a play, such as identifying sweet spots or preparing for operational risks, but it all starts by looking at the system from the basement up and by knowing the structural origin of the basin.

BIO

Dr. Molly Turko has over 10 years of experience in the oil and gas industry and is a subject matter expert in structural geology. She has had the opportunity to work in multiple basins in the U.S including the Anadarko, Ardmore, Powder River, Appalachian, Onshore Gulf Coast, and Rocky Mountain Basins. She received both a B.Sc. (2009) and a M.Sc. (2011) in geology from the University of Tulsa followed by a Ph.D. (2019) from the University of Oklahoma where she studied under Dr. Shankar Mitra. Molly’s passion is mentoring and teaching, but her favorite role is leading structural geology field courses in Nevada and Southern Oklahoma. Molly is currently a team member of Applied Stratigraphix as their Structural Geology Expert along with consulting for Turko Tectonics and Structural Geology.