Geometry and Kinematic Evolution of Moose Mountain Area, Southern Alberta Foothills: Implication for the Development of Naturally Fractured Reservoirs

Jean-Sébastien Marcil* and Donna Kirkwood
Universite Laval, Quebec City, Canada
junex@junex.ca

The Moose Mountain Culmination, located 50 km west of Calgary in the Southern Alberta Foothills, has been a productive oil and gas area for the last twenty years. In order to gain more insight on structurally complex hydrocarbon reservoirs situated at depth and to better understand the complex geometry of this Turner Valley bearing hydrocarbon pool we used an integrated method combining 2.5-D photogrammetric mapping with various classical geological methods such as field mapping, balanced cross-sections and surface contouring techniques over the course of a two year period. The rugged surface exposures offer topographic reliefs of 800 m that enabled the creation of a 2.5D model with which we were able to extrapolate geological elements laterally and explore the 3D continuity of folds, faults and fractures throughout the study area.

Work done during the Moose Mountain project reveals the importance of backthrusts in the Moose Mountain area. Backthrusts affected detachment folds at all scales and played a significant role in the compartmentalization of the structural reservoir. Highly fractured zones are mainly located along the frontlimbs of detachment folds and are genetically related to folding and backthrusting. These structures represent good analogues for the actual productive reservoir at depth. Regionally, large-scale backthrusts accommodate displacement along a hinterland-directed upper detachment of a triangle zone that once marked the frontal edge of the deformed belt.