Complex Structural Geometries & "Unusual" Seismic Images Related To Transverse Ramps in Southern Canadian Foothills

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ABSTRACT

The Southern Canadian Foothills involve eastward tapering wedges of Mesozoic and Paleozoic strata that are deformed by numerous, predominantly NE-directed, imbricate thrust faults. Some of these thrust structures form significant hydrocarbon traps, including Waterton, Turner Valley, Jumping Pound West, and Limestone Fields. Thrust structures are disrupted by or offset along numerous transverse ramps that create complex structural geometries. The geometries can be explained through a better 3-dimensional understanding of ramps in the Foothills.

Careful integrated examination of surface geological maps, well data, and 2D and 3D seismic coverage in the Foothills has lead to recognition of numerous transverse ramps both at surface and in subsurface. These form lateral terminations of simple and complex thrust structures regionally, and appear to be responsible for separations and compartmentalization within producing fields.

Construction of 3D physical models has revealed various seismic criteria for interpreting transverse ramp features imaged on 3D seismic, and provide a basis for attempting to unravel some extremely complex, "unusual" 2D manifestations of 3D structures on 2D seismic.

Recognition of the existence of transverse ramps in thrust and fold belts offers new perspectives on the interpretation process, on displacement variations along and transfer among faults, on continuity of structures along trend, and on trap configurations. An integrated 3D, regional, balanced approach, incorporating prospective and non-prospective units, provides a critical framework for better structural interpretation of the subsurface.