

Thin- and Thick-skinned Thrusting in the Humber Zone of Quebec and Newfoundland: Implications for Hydrocarbon Exploration

Mark Cooper, Marian Warren, and Janet Porter-Chaudhry
PanCanadian Energy, 150 9th Ave SW, Calgary, T2J 4A1
Mark_cooper@pcenergy.com
Marian_warren@pcenergy.com
Janet_porter-chaudhry@pcenergy.com

The Humber Zone is the most external zone of the Appalachian orogen in Western Newfoundland and Quebec and records multiphase deformation of the Cambro-Ordovician passive margin. The major orogenic events are the mid-Ordovician Taconic, the Silurian Salinic and the late Devonian Acadian events.

Traditional models of the Humber Zone in the Canadian Appalachians invoke large displacement thin-skinned thrusting to explain structural and stratigraphic relationships between the platformal and basinal facies. Recent hydrocarbon exploration activities have revealed an important component of thick-skinned inversion of extensional faults in Western Newfoundland that deformed the Cambro-Ordovician carbonate platform and the thin-skinned Taconic allochthon. This structural model has been applied throughout the Humber Zone in Western Newfoundland.

Structural and stratigraphic relationships in the Humber Zone of Quebec are not as well constrained due to older, poorer-quality seismic data, paucity of fossils in the Taconic allochthons and lack of well data east of Quebec City. However, the available well, surface and seismic data do support a model of thick-skinned thrusting following thin-skinned emplacement of the Taconic allochthons. The St. Flavien gas field is in the hangingwall of a thick-skinned thrust fault. Seismic data elsewhere show extensional faults that cut inferred platform strata at depth; some of these faults may have been inverted but are not well imaged.

Along strike changes in structural style in the Humber Zone are illustrated by regional cross-sections which suggest that significant traps with hydrocarbon potential are only developed in the southern and central parts of Western Newfoundland and to the SW of Quebec City.