

# **Seismic Interpretation and Physical Analog Modelling of a Sub-Surface Lateral Ramp in the Southern Canadian Rockies (Crownsnest Pass Area, S.W. Alberta)**

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## **ABSTRACT**

Seismic interpretation of a 3-D seismic data set from the Crownsnest Pass area reveals an unnamed thrust fault that contains a lateral ramp system (two offset frontal ramps connected by a lateral ramp) in the footwall of the Livingstone Thrust. The hanging wall of this thrust fault contains Mississippian carbonate strata in the configuration of an antiformal stack duplex. The duplex conforms to the northwest dipping lateral ramp in the thrust surface as a hanging wall monocline. The Livingstone thrust sheet overlies, but does not conform to the hanging-wall monocline, indicating that the Livingstone Thrust was coeval with, or post-dates, the formation of the duplex structure.

The structural evolution of the lateral ramp system and associated structures has been investigated by scaled physical analog modelling using the centrifuge technique. Models were constructed based on the 3-D seismic interpretation and the naturally occurring mechanical-stratigraphic column of the study area, with a pre-cut discontinuity simulating the lateral ramp system. The models developed hanging-wall structures that are similar to those interpreted in the seismic data set. The mechanical unit analogous to the Mississippian strata was thrust over the lateral ramp system and formed a hanging-wall monocline. Other structures produced in the hanging wall provide analogs for the types of geological structures that may occur in the northeastern portion of the data set where poor data quality precludes reliable seismic interpretations.

The models shed light on the nature of structures to be expected in association with lateral ramps, and have implications for reservoir compartmentalization.