Multicomponent interpretation: examples from the Marcellus Shale and Athabasca Oil Sands

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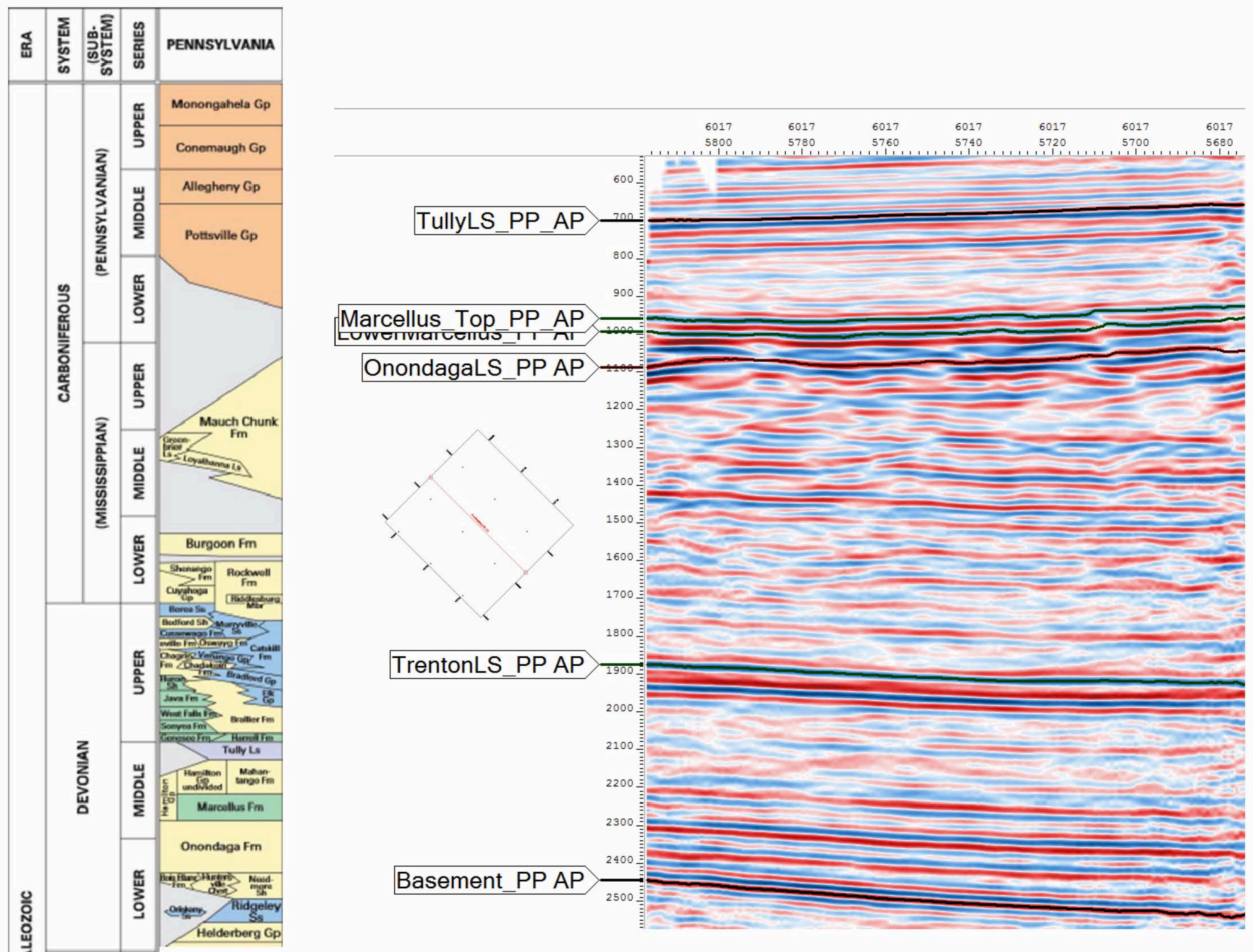
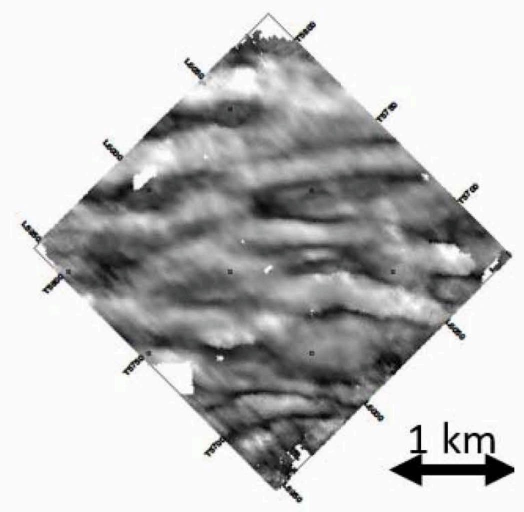
Marcellus Shale Project

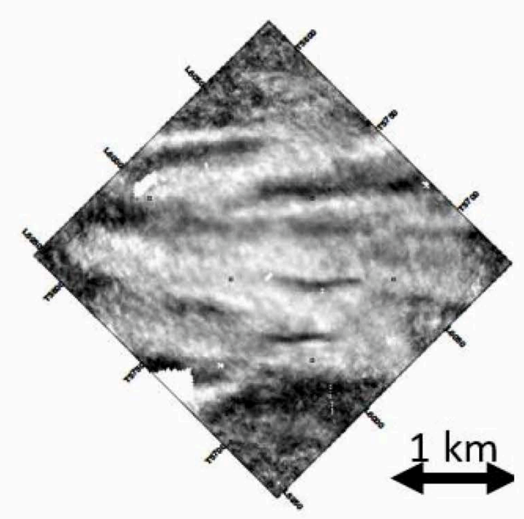
Geokinetics



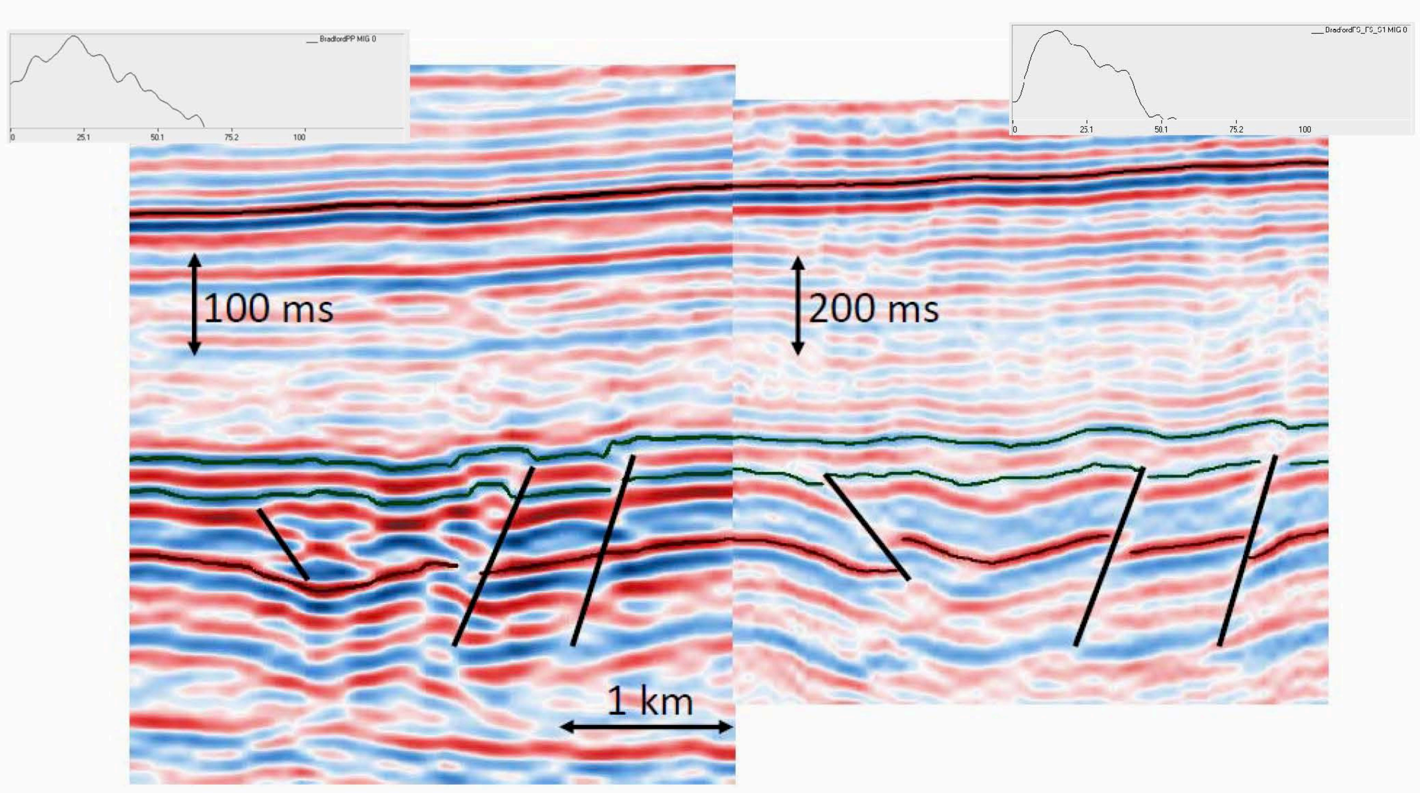
(left) Stratigraphy of the subsurface in Pennsylvania, note the location of the Marcellus Formation in the Middle Devonian. (right) Sample seismic line depicting 6 pervasive reflection events, note the fault at time 1000ms and crossline 5705.



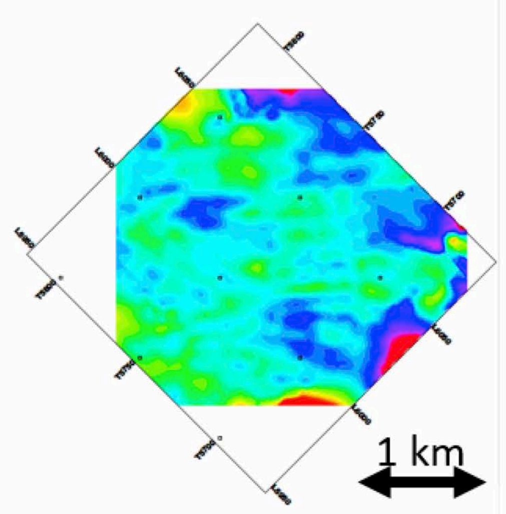
PP Lower Marcellus RMS amplitude



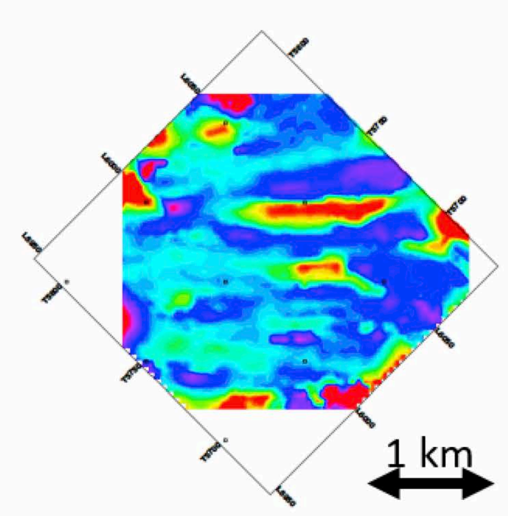
PS1 Lower Marcellus RMS amplitude



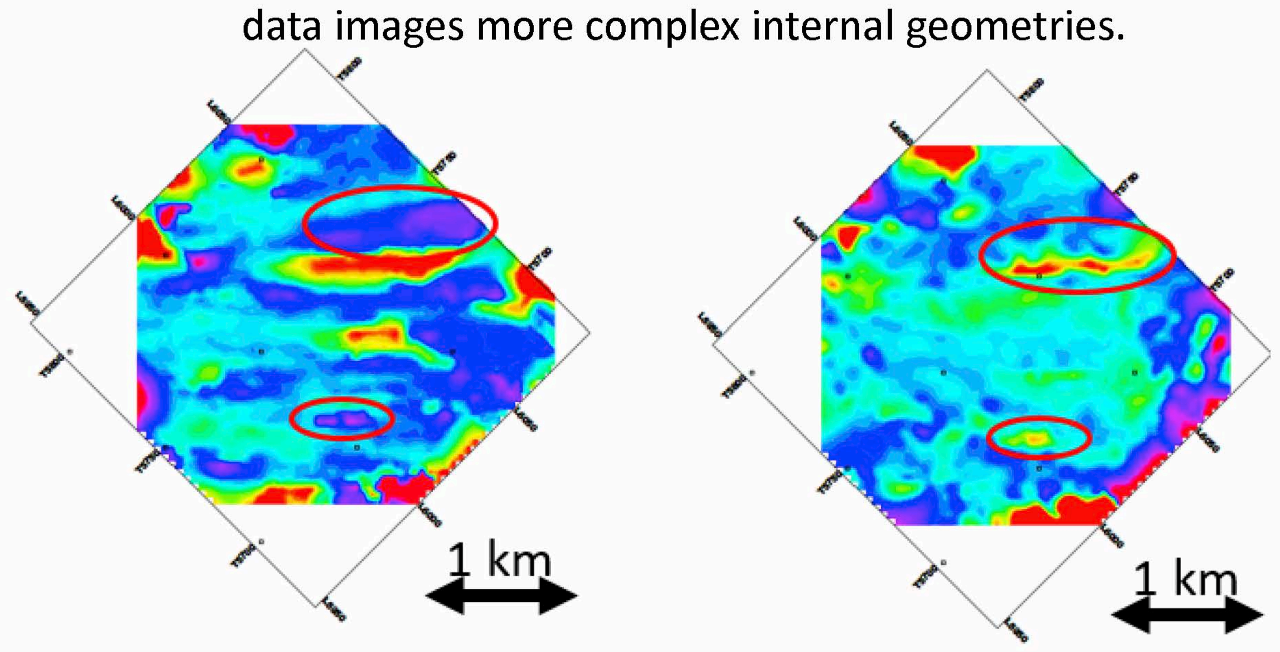
(left) PP seismic data. (right) Linearly stretched PS1 seismic data. Phase and polarity appears fairly consistent between datasets. Some intervals have higher PS1 frequency than PP and vice versa. PS data highlights major structures whereas PP data images more complex internal geometries.



Tully-Marcellus interval Vp/Vs ratio



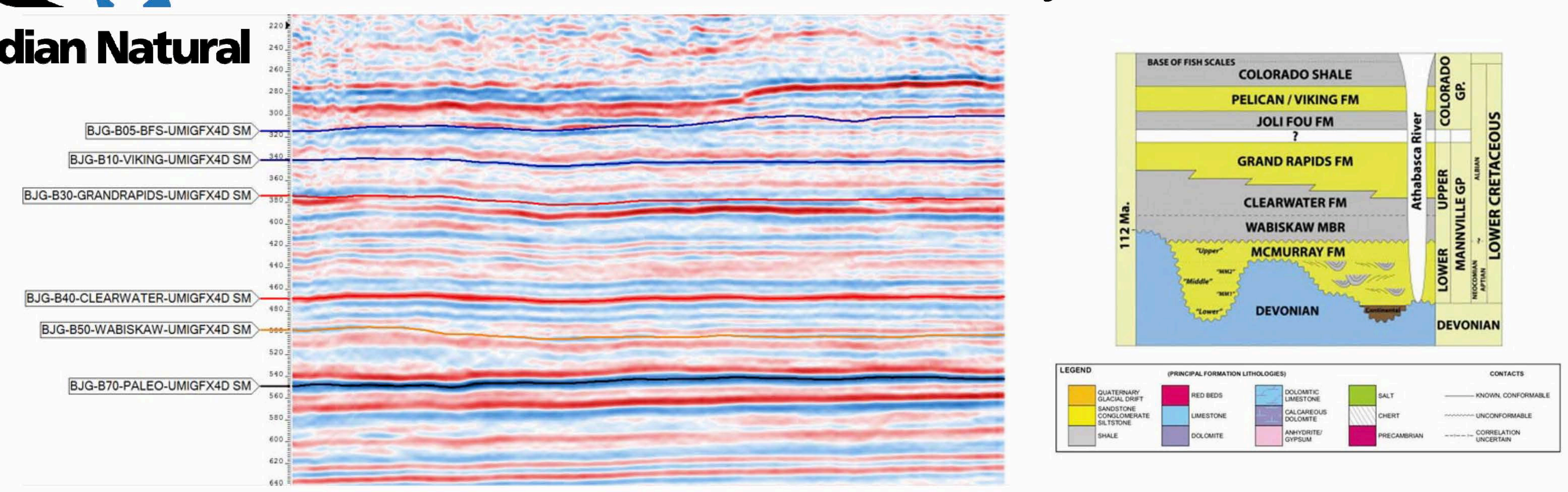
Marcellus-Onondaga interval Vp/Vs ratio



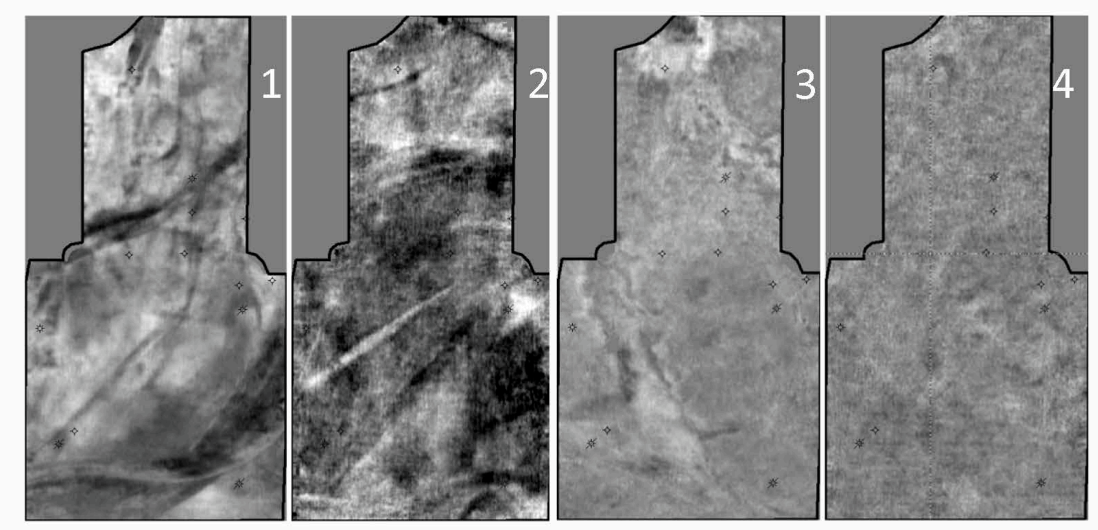
(left) Marcellus-Onondaga interval V_p/V_s ratio. (right) Marcellus-Onondaga PS1 to PS2 isochron difference.

Athabasca Oil Sands Project

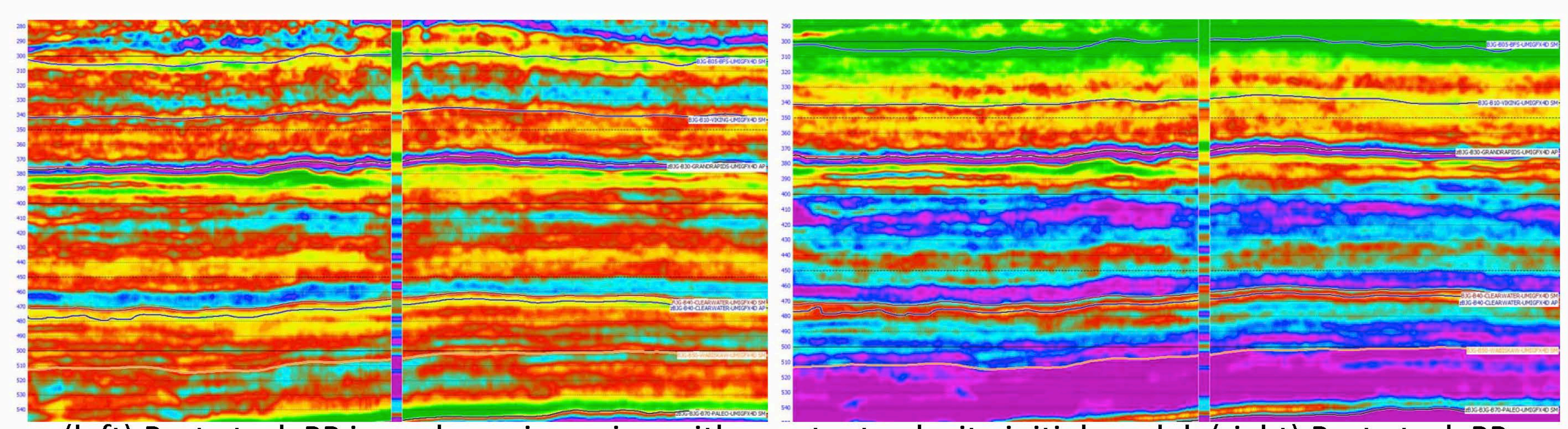
Canadian Natural



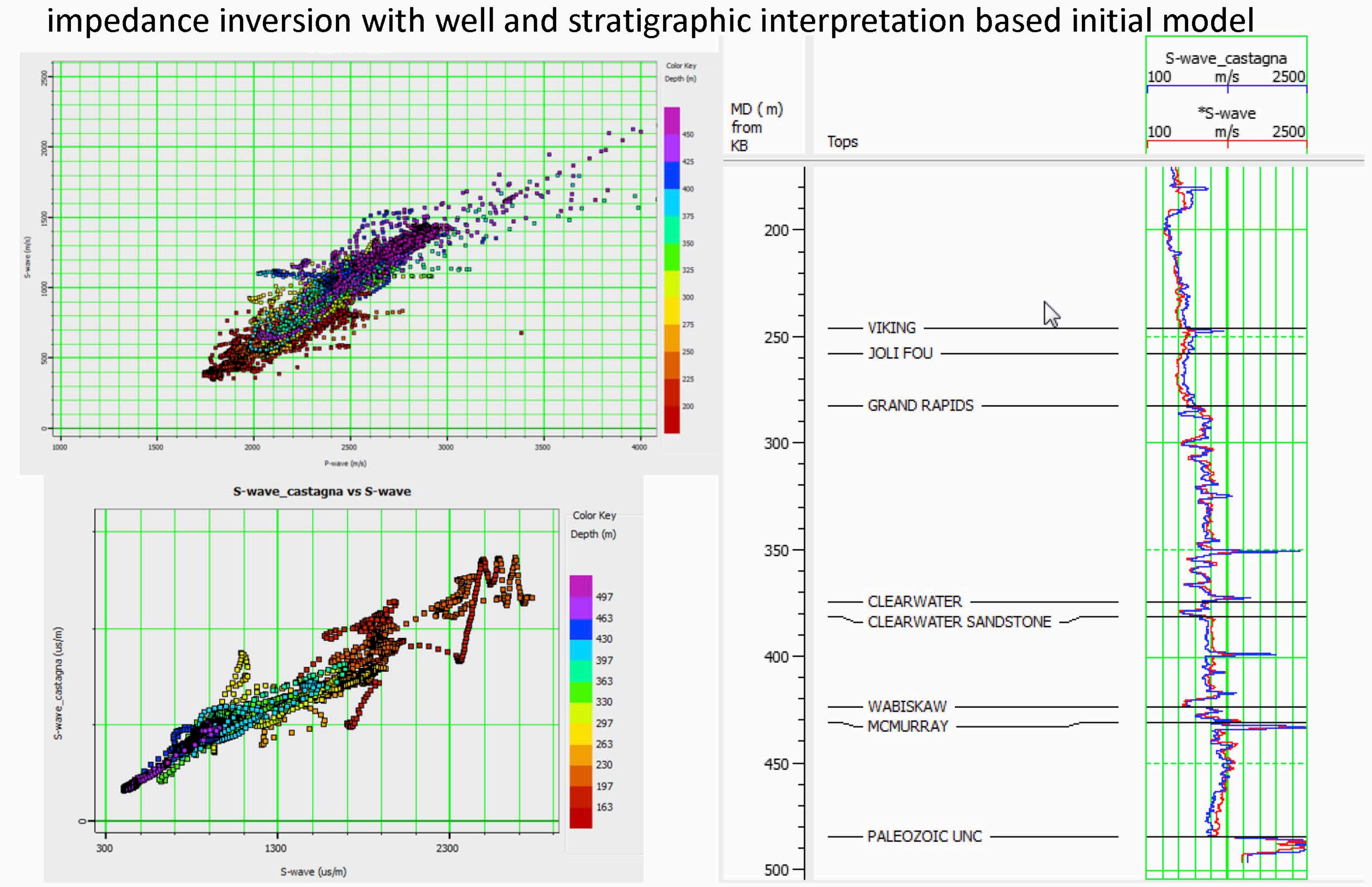
(left) Sample seismic cross section with several interpreted reflection horizons. (right) Cretaceous stratigraphy in the Athabasca region.



(1) Upper Grand Rapids stratal slice.
(2) Middle McMurray stratal slice.
(3) Base Fish Scales time slice.
(4) Joli Fou time slice



(left) Post-stack PP impedance inversion with constant velocity initial model. (right) Post-stack PP impedance inversion with well and stratigraphic interpretation based initial model



(left upper) V_s versus V_p for dipole sonic logs in project area. (left lower) Castagna's predicted shear sonic versus dipole logged sonic for a single well. (right) Castagna's sonic and dipole sonic plotted on same track.