

Seismic reservoir characterization of Duvernay shale with quantitative interpretation and induced seismicity considerations – a case study

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Summary

The Devonian Duvernay Formation in northwest central Alberta, Canada has become a hot play in the last few years due to its richness in both liquid and gaseous hydrocarbon resources. The oil and gas generation in this shale formation made it the source rock for many oil and gas fields in its vicinity. This case study attempts to showcase the characterization of Duvernay Formation by using 3D multicomponent seismic data, and integrating it with the available well log and other relevant data. This has been done by deriving rock physics parameters (Young's modulus, Poisson's ratio, etc.) through deterministic simultaneous and joint impedance inversion, with appropriate quantitative interpretation. In particular, we determine the brittleness of the Duvernay interval which helps us determine the sweet spots therein. The scope of this characterization exercise was extended to explore the induced seismicity observed in the area (i.e. earthquakes of magnitude >3M), that is perceived to be associated with hydraulic fracture stimulation of the Duvernay. This has been a cause of media coverage lately. We attempt to integrate our results with the induced seismicity data available in the public domain, and elaborate on our learning experience gained so far.