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Montney & Duvernay Petroleum Systems: Regional Geology and Resource Assessment of the Western Canadian Sedimentary Basin's Two Premier Unconventional Plays

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The Western Canadian Sedimentary Basin (WCSB) hosts two of North America's most significant unconventional resource plays: the Triassic Montney and the Devonian Duvernay. Despite sharing a common foreland-basin setting, these formations represent fundamentally different petroleum systems — one a migrated hybrid play, the other a self-contained source-rock system — and that distinction shapes their stratigraphy, fluid behavior, and remaining prospectivity in very different ways.

This talk presents an integrated regional evaluation combining petrophysical log interpretation, source-rock geochemistry, and basin-scale mapping across both formations. The Montney, though the shallower unit, is characterized as a hybrid play: its upper, middle, and lower siltstone-sandstone intervals, deposited in a deltaic system, host hydrocarbons largely migrated in from deeper in the basin rather than generated in place, producing drier, more thermally mature gas. Depth, resource density, and GOR trends across the three subunits are mapped to show how the Upper Montney's dry-gas window remains comparatively undrilled relative to its resource density. The Duvernay, by contrast, is evaluated as a pure source-rock play, with oil and gas generated and retained in situ. Maturity modeling and TOC transformation-ratio analysis are compared against petrophysically-derived in-place volumes to test whether generated hydrocarbons can account for observed reservoir saturations across areas like Kaybob, Simonette, Willesden Green, and the Westerdale/Ghost Pine Embayment's.

Together, these analyses offer a basin-wide picture of how depositional setting, thermal maturity, and fluid origin combine to control resource distribution in the WCSB's two flagship unconventional systems.

Biography

Callum Thurley is a Senior Geoscientist at Kimmeridge, supporting the investment team through subsurface evaluation and exploration concept development across the firm's portfolio, specifically in the Rockies region. Mr. Thurley has over 11 years of experience across the upstream energy sector in exploration, operations, and investment-focused technical roles.

Prior to joining Kimmeridge, Mr. Thurley served as a Senior Exploration Geologist at Sharjah National Oil Corporation and Crescent Petroleum in the United Arab Emirates, where he led prospect generation, well delivery, and the drilling of high-impact exploration and appraisal prospects across conventional plays in the Middle East focused on the Oman

Mountains and Kurdish Zagros Fold Belt. Earlier in his career, he gained regional screening and unconventional exploration experience with Equinor in Norway and Kimmeridge in London.

Callum holds an MSc in Earth Geoscience from Royal Holloway, University of London, and a BSc in Geology from Durham University, UK.