



Mackenzie Delta (Canada): Influence of depositional history on organic facies variations and petroleum formation predictions

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Predicting and modelling petroleum composition and generation on a regional scale requires the robust definition of organic facies. On the one hand, the sedimentary facies being closely linked to the quality of the organic matter and so to the petroleum potential, lateral and vertical variations of the source rock commonly observed augur similar variations of the distribution of the petroleum types. On the other hand, the increasing analytical sophistications enable fine-tuned studies and encourage to take a step forward in the resolution of the simulation of the geologic elements and processes that are involved in petroleum generation.

In the Mackenzie Delta, organic facies variations related to depositional environment within the Upper Cretaceous and Tertiary sequences have a strong impact on petroleum formation predictions. Fluctuating sea level during the deposition of the Kugmallit sequence results in a shift of the petroleum potential of the delta plain and delta front sediments from low-wax to high-wax oil, and also in a shallowing of the oil window up to 1500 m. Estuarine/lagoonal episodes in the Taglu sequence contrast with gas-prone terrestrial episodes by the strong "lacustrine/marine" character of the organic facies showing a potential for oil and a narrow distribution of the Ea. The direct consequence is a deepening of the oil window up to 2500 m between estuarine and terrestrial facies from the Taglu sequence.

This approach has allowed not only a regional model of petroleum generation to be

built but also possible source(s) of gas for gas hydrates layers to be identified.