

The Hydrocarbon Potential of the Queen Charlotte Basin, British Columbia, Canada

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The Queen Charlotte Basin north of Vancouver Island is bound by the North American Plate boundary in the west and the Coast Mountains in the east. It consists of a network of strike-slip basins with up to 6.5 km of syn- and post-rift sedimentary infill and constitutes one of Canada's hydrocarbon frontier basins. Oil shows have been encountered in one of the offshore wells and in several onshore oil seeps on the Queen Charlotte Islands. Thermally mature Lower Jurassic organic-rich shales occur on the Queen Charlotte Islands and the northern tip of Vancouver island.

Geochemical information is used in combination with multi-channel reflection seismic data and offshore wells drilled by Shell Canada to evaluate hydrocarbon potential of Hecate Strait in central Queen Charlotte Basin. The 1D and 2D Petroleum Systems Modeling incorporates the variable tectonic evolution and subsidence of individual strike-slip basins. These basins show variable sediment distribution, compaction and erosion, as well as thermal history.

Modeling the thermal history of individual basins accounts for a period of elevated heat flow related to an Oligocene / Miocene extensional period, correlated to widely distributed volcanic rocks. It leads to an estimation for maturation of potential oil prone source rocks from the pre-rift Jurassic Kunga / Maude and the Cretaceous Queen Charlotte Group, and gas prone source rocks from the post-rift Tertiary Skonun Formation. The 2D approach enables us to predict migration pathways and locate individual hydrocarbon concentrations originated from the distinct source rocks.
