

The Genetic Evolution of the Petroleum Systems of Canada – An Overview

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The sedimentary basins of Canada are diverse in their modes of genesis and also in their volumes of hydrocarbons. The mode of basin genesis and fill controls the development and destruction of petroleum systems within these basins.

The Canadian Shield is a controlling influence on basin development due to its 60km thick core of well-annealed, highly buoyant continental crust. During the Paleozoic platformal sediments accumulated around the flanks of the craton with the low oxygen atmosphere facilitating the accumulation of organic-rich rocks of Ordovician, Silurian, Devonian and Carboniferous age.

Foreland basins developed on the eastern and northern flanks of the craton at the end of the Paleozoic and on the western flank during the cretaceous and tertiary. Rift basins developed on the East Coast as the Atlantic began to open and to the north assisted by back-arc stress associated with the laramide collision. The foreland basins are characterized by long distance migration, stratigraphic traps and significant basin margin accumulations with a risk for biodegradation.

The ongoing collisional tectonics of the west coast present a very destructive environment for hydrocarbon accumulation with interior collapse basins and transtensional pull-aparts all presenting poor targets for exploration. Tertiary draining of the North American continent produced the Mackenzie Delta in the Canada Basin, which entered an inside corner of the transform rift margin and has been constantly 'forced' by ongoing Cordilleran tectonics resulting in some trap rupture and leakage.