

# **Oil Migration Pathways, Reservoir Filling History and Timing of Hydrocarbon Alteration In Cretaceous Reservoirs in South East Alberta and South West Saskatchewan**

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## **ABSTRACT**

Several families of oils with different source rocks occur in Mississippian-Cretaceous aged reservoirs in south eastern Alberta and south western Saskatchewan. Many of these oils have been affected to varying degrees by biodegradation and thus are now heavy. In some cases, a second charge of unbiodegraded oil entered the reservoir and thus increased the oils quality. After charging with oil, some reservoirs were affected by thermal metamorphism due to igneous activity thought to be related to the Sweetgrass Hills intrusions. We have delineated the geographic and stratigraphic occurrence of oils derived from different source rocks and determined their level of biodegradation, whether there has been mixing with unbiodegraded hydrocarbons and which reservoirs have been affected by igneous intrusions. These findings indicate the migration pathways taken by different families of oils changed through time. Some of the changes in migration pathways can be attributed to the emergence of the Sweetgrass Arch. The multiple charges of oil observed in some reservoirs imply a more complicated geological and fluid flow history than is assumed by most models for this part of the Western Canada Sedimentary Basin. Our studies thus show that detailed petroleum geochemical studies can provide unique constraints on the understanding of the thermal, stratigraphic and structural development of petroliferous regimes.