

Exploration of the Chidley Basin, offshore Newfoundland and Labrador, Canada

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The underexplored Chidley Basin off the Labrador coast of Newfoundland and Labrador, Canada, is being investigated for oil and gas prospectivity with the acquisition of new 2D seismic data in 2011–2015. Presented here are the results of the integration of the geological and geophysical data into a comprehensive 3D stratigraphic model. The basin assessment workflow includes: (1) regional geodynamic and tectonic setting definition; (2) analysis of the gross depositional environment and reservoir characteristics combining sedimentology and sequence and seismic stratigraphy; (3) forward stratigraphic modeling of Cretaceous and Cenozoic sequences; (4) source rock assessment, potential and regional extents; (5) play definition; and (6) testing of the play elements of a potential petroleum system.

Regional geodynamic interpretation (structural fault pattern and timing and oceanic chronos) and seismic sequence stratigraphic work facilitated the understanding of the basin architecture and infilling through the Labrador Sea opening and transform fault zone activities. This tectonostratigraphic framework provided the inputs of gross depositional environment maps that ultimately enabled building a forward stratigraphic model (DionisosFlow™).

This forward numerical model simulates the stratigraphic record of the basin through forward simulation of sediment influxes under reconstructed paleobathymetric conditions. The model is calibrated against well record (lithologies, facies and paleoenvironment interpretations) and integrates seismic data (structural and depositional thickness of main packages). The model helps to resolve the extension of known, hypothetical, and/or speculative source rocks, reservoirs quality and distribution, carrier beds, and seals at the basin scale. Based on this comprehensive regional stratigraphic understanding, seven hydrocarbon plays were identified in the basin, defining a complete petroleum system that will be the focus of upcoming exploration license rounds.