

A Super-Regional Study of Canadian & European Conjugate Margin Petroleum Systems

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ABSTRACT

Following its exploration success offshore Newfoundland in 2013, Statoil re-evaluated the Mesozoic prospectivity of the North Atlantic Conjugate Margins. The aim was not only to chase the proven Upper Jurassic play along and across the margins, but also to refine the understanding of all known petroleum systems and identify possible new plays. The starting point of the project was the plate reconstruction, which forms the basis and template for all the palaeogeography, source rock and reservoir distribution maps that follow. For the Late Jurassic interval there are several conflicting published reconstructions, with one end-member placing Porcupine Basin as an extension of the Iberian margin in the Tithonian, and others placing it contiguous with Flemish Pass/East Orphan basins. These end-members have huge implications for petroleum system models in the whole of the region, particularly for continuity of source rock and reservoir fairways, and thus the understanding and reconstruction of those margins has particular significance for the whole region. To reduce uncertainty in the plate reconstructions, the approach taken was to identify and incorporate data at all scales that could provide constraints to the models, such as: Seismic data to compare seismic stratigraphy, structural domains and structural histories of the Canadian and Irish margins; Published data to compare stratigraphy, structural events and reservoir rocks between basins; Geochemical data to compare source rock characteristics and depositional environments; Heavy mineral data to constrain locations of sediment sources and sinks. These methods revealed large similarities between Newfoundland's Flemish Pass/East Orphan basins and Ireland's Porcupine Basin in terms of structural styles, geochemistry and sediment provenance which can support a close spatial and/or genetic relationship in the Late Jurassic, perhaps favouring the second end-member plate model described above. Lower data density in other basins resulted in lower confidence in petroleum system analysis and identified gaps in our knowledge that need to be filled if other frontier basins along the North Atlantic conjugate margin region are to be understood and tested successfully in a new wave of exploration.