

Jurassic – Early Cretaceous Reservoir and Seal Facies From the North Atlantic Margin Basins of Eastern Canada and South-Western Ireland

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ABSTRACT

There has been a significant upsurge in industry interest in the North Atlantic Margin basins that lie offshore eastern Canada and SW Ireland, as reflected in the success of recent licensing rounds. Although both margins have been subject to multiple phases of hydrocarbon exploration, major discoveries to date have been located mainly in the Jeanne d'Arc and Flemish Pass basins, offshore Newfoundland. The main focus of current industry effort is to increase geological knowledge of the region as a whole, in order to replicate the Newfoundland success elsewhere across the eastern Canadian margin and also into the conjugate basins offshore Ireland. Our objective has been to compare and contrast reservoir and seal facies on both sides of the margin through reservoir description and paleogeographic evaluation of the Porcupine, offshore Newfoundland, Scotian and Labrador Shelf basins. Construction of sedimentary logs for the full drilled succession in 90 offshore wells (in addition to 32 DSDP boreholes), combined with new detailed interpretation of >1800m core material in our study, has provided interesting insights into controls on sedimentation patterns in the region. In particular, detailed mapping of facies through twenty-six stratigraphically-defined depositional packages has allowed delineation of sediment transport pathways from basin margin sediment sources to basin depocentres through the Late Triassic to Late Tertiary evolution of the margin. Systematic well to well correlation has highlighted the presence of important structural features which, at certain stages of basin evolution, created highly segmented basins, resulting in marked lateral variations in preservation of reservoir, source and seal rock facies. This paper will focus on the Jurassic – Early Cretaceous rift phases when strong structural control led to development of a complex system of variably interconnected shallow and deepwater basins, with partly restricted marine circulation. Cored facies from the Mid-Late Jurassic include lake shales with gastropod/ostracod storm beds, organic-rich pyritic lagoonal shales, thin-bedded tidal shoreline red-bed and heterolithic sediments and a range of delta top distributary channel and delta front turbidite sandstones. Early Cretaceous facies include complex breccio-conglomerates interbedded with lower delta plain fluvial channel sandstones and rooted shales, passing upward into more uniform bioturbated shoreline sediments after the Mid Aptian.