

Petroleum Systems in Volcanic Rifted Margins: an Analogue from the Hreppar Formation, Iceland

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ABSTRACT

Hydrocarbon exploration within frontier basins such as the Faroe-Shetland Basin (FSB) of the NE Atlantic Margin, is problematic due to the significant extent of subaerial lavas impeding seismic imaging (Poppitt et al., 2016). The FSB has proven large oil and gas discoveries, including the significant Rosebank Field. Rosebank was discovered in 2004 and the main reservoir intervals are fluvial clastic sequences, which are interbedded with basaltic lavas, hyaloclastites, and volcanoclastic sedimentary units (Schofield and Jolley 2013; Poppitt et al., 2016). Such sequences record the complex interaction of competing volcanic and sedimentary systems but these facies remain very poorly understood. Predicting the geometry and continuity of clastic units within lava-dominated sequences in volcanic margin settings is problematic as they are typically laterally discontinuous, relatively thin, and often poorly imaged in the subsurface. Although such sequences are well known, detailed studies of their lithofacies architecture are rare and poorly constrained, which results in major challenges to hydrocarbon exploration. Using a field analogue in conjunction with remote sensing tools (seismic imaging, petrophysical data) is fundamental to understanding these complicated systems. This work uses the Hreppar Formation (HF), Iceland, as an analogue to understand elements of petroleum systems to reduce the challenges and risk associated with hydrocarbon exploration within volcanic-dominated basins.