

Core-Calibrated 3D Seismic Attribute Analysis for the Characterization of the South Brae Field, UK North Sea

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ABSTRACT

The South Brae Field is located in the UK North Sea, 166 miles off the coast of Aberdeen, Scotland. The Upper Jurassic Brae submarine fan complex deposits are the primary hydrocarbon reservoirs within blocks 16/07a and 16/07b. This field is composed of siliciclastic deposits from debris flows and turbidity currents that occurred during the Late Kimmeridgian to Middle Volgian time—the end of which is marked by the deposition of the overlying, regionally-extensive Kimmeridge Clay Formation. These deposits lie adjacent to the western margin of the South Viking Graben, which formed as a result of Permo-Triassic rifting and additional Middle to Late Jurassic rifting events.

This study uses various seismic and geologic tools and techniques to characterize the distribution and internal geometry of deep-water channel-fan facies. Small scale characterization was conducted using well logs calibrated to a 410-foot core by matching process energies interpreted from the core to well log characters. The facies identified in the core could not be directly calibrated to the seismic volume due to the limited resolution of the volume at subsurface depths exceeding 13,000 feet subsea true vertical depth (SSTVD). Preliminary seismic analysis conducted using a wedge model indicated a tuning thickness of 145 feet. However, a temporal reconstruction of the basin floor using sequence stratigraphic techniques combined with fairway and geomorphological analyses allowed for facies predictions to be made. Fairways were identified using spectral attributes (such as peak frequency and magnitude) and geometries were identified using multi-trace attributes (such as dip, coherence, and curvature). Consequently, this was used to construct a suitably accurate geologic model of internal architectural elements.

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