Near Field Potential in the North Sea Viking Graben – Derisking Injectites Using Broadband Dual-Sensor Seismic Data

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ABSTRACT

Tertiary injected sand bodies have proven to hold a significant amount of hydrocarbons in the North Sea Viking Graben such as the Maclure and Volund producing fields. Injectites are formed by remobilisation of unconsolidated sands. The fluid carrying the grains travels through existing fractures and is injected into a new stratigraphic interval. Injectites can be characterised by their saucer shape, the presence of "wings" and a feeder conduit. Such structures can sometimes be difficult to interpret on seismic data due to their small scale and local extent. Geophysical limitations have in the past made injectites difficult to target mainly due to the lack of seismic resolution inducing the presence of high energy side lobes. This study shows that broadband dual-sensor seismic data brings to light known injectites such as the Volund and Maclure fields and reveals additional hydrocarbon opportunities. Lithological and fluid classifications have been performed using pre-stack seismic information (relative acoustic impedance and relative velocity ratio). Similar methods were used to reveal overlooked Paleocene hydrocarbon sandstones close to the Beryl field. Finally, pre-stack depth migrated data with compensation for amplitude loss and phase distortion helped to identify leads otherwise missed by several drilling campaigns that targeted deeper reservoirs close to the Bøyla discovery (South Viking Graben). This work demonstrates the value of using broadband dual-sensor data to provide reliable pre-stack seismic information and uncover remaining near-field hydrocarbon potential.