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Electric and elastic properties of diatomaceous mudstone from the Norwegian North Sea

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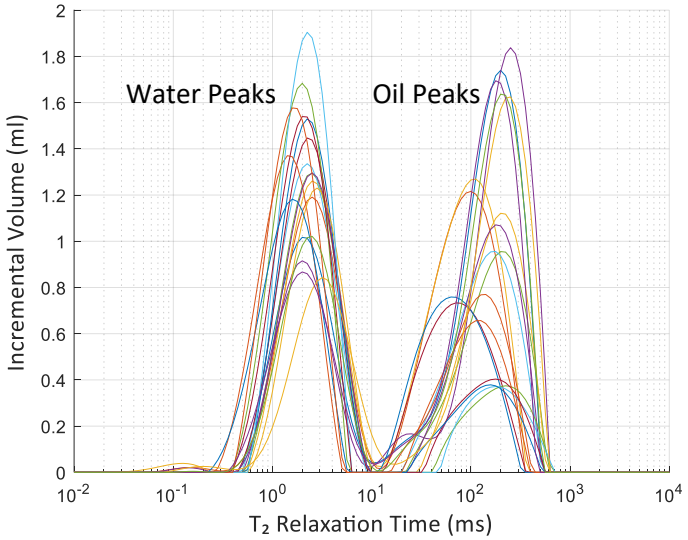
Managing reservoirs with lower-quality rock, effective subsurface CO_2 storage, and hydrocarbon field abandonment are critical considerations for the future of the energy industry. For these focus areas, it is key to understand the petrophysical and elastic properties of tight rocks to assess production potential and prevent leakage. This knowledge is relevant for sealing properties in relation to well abandonment, well integrity, CO_2 storage, and evaluation of hydrocarbon prospects.

This project focuses on formation evaluation and understanding the flow potential of unconventional, low-permeability Miocene Lark Formation diatomaceous sedimentary rocks, using data derived from rock samples and borehole logging measurements taken from the Valhall and West Hod structures on the Norwegian Shelf. Oil has leaked from the underlying chalk formation into the overburden, where the 200-meter-thick diatomaceous formation lies approximately 1,000 meters above the chalk. Oil has accumulated in these tight rocks, as indicated by the oil peaks observed in NMR results from core samples (see Figure). To manage this oil accumulation effectively, it is essential to characterize the properties of the reservoir. This research seeks to provide new insights into how the unique properties of diatomite control fluid flow, ultimately contributing to more accurate assessments of flow potential in these challenging reservoirs.

The project aims to advance our understanding of the petrophysical properties, including permeability, derived from electrical properties, as well as the rock mechanical and rock physical properties of these low-mobility rocks with high specific surface area. The surface area will be predicted using electrical conductivity measurements, and the Kozeny equation will be applied to estimate permeability. Geomechanical tests are conducted on core samples while recording ultrasonic wave velocities to determine stiffness and strength properties.



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