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# Unraveling the hydrocarbon charge potential of the Nordkapp Basin, Barents Sea: An integrated approach to reduce exploration risk in complex salt basins

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The Nordkapp Basin, Barents Sea, is an intra-continental syn-rift basin containing many complex salt structures. The salt is late-Carboniferous to Early Permian in age, with regional extension in the Triassic initiating the salt movement resulting in formation of sub- and mini-basins with significant subsidence (especially in the northeastern part of the basin). Subsequent tectonic phases allowed growth and distortion of salt diapirs that were later affected by uplift and erosion during Tertiary resulting in the formation of salt-related traps in Triassic and Lower Jurassic strata. During Plio-Pleistocene, glacial erosion removed additional Mesozoic and Cenozoic strata.
This basin is regarded as a frontier salt province. A small hydrocarbon discovery (Pandora well) in the southwestern part of the basin points to the presence several functioning petroleum systems. The primary play type is related to salt traps below overhangs. Such structures are however, very difficult to image with conventional seismic techniques due to i) generation of multiples from sea floor and top of shallow salt bodies and ii) seismic shadow zones within the salt (possibly resulting from shale and carbonate stringers) which cause severe diffractions so that prospective areas adjacent to the salt remain elusive.
Arctic exploration is expensive and the ability to focus on the highest potential targets is essential. A unique solution to this challenging subsurface Arctic environment was developed by integrating petroleum system modeling with full azimuth broadband seismic acquisition and processing. This integrated approach allows intelligent location of seismic surveys over structures which have the maximum chance of success of hydrocarbon charge.
Petroleum system modeling was conducted for four seismic sections. Salt was reconstructed according to the diapiric evolution presented in Nilsen et al. (1995) and Koyi et al. (1995). Episodes of major erosion were assigned to Tertiary (tectonic) and Pleistocene (glacial). The models have been thermally calibrated. Consideration of Pleistocene glacial/interglacial cycles was required for thermal calibration as well as to better understand and predict the hydrocarbon phase behavior.

References:
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