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De-risking reservoir presence in frontier exploration – an example from the Late Barremian of the Fingerdjupet Sub-basin, Norwegian Barents Sea

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A clinoform complex has been mapped in the Barremian succession of the Fingerdjupet Sub-basin and western part of the Bjarmeland Platform, Norwegian Barents Sea. The Barremian Fingerdjupet – Bjarmeland Clinoform Complex (FBCC) can be divided into two main pulses of regression with climaxes in the Early Barremian and the Late Barremian. The first pulse starts with steep clinoforms that built out on a ramp. Eventually, a shelf profile evolved and even steeper clinoforms started to build out from the shelf edge along a falling trajectory. These have been interpreted as sandy shelf-edge deltas deposited during forced regression, and they may or may not be genetically linked to the Helvetiafjellet Fm on Svalbard. The Early Barremian forced regression deposits were flooded and a period of normal regression with the development of large shelf profiles followed. A new period of forced regression started in the Late Barremian. Repeated erosion in the uplifted areas and rapid progradation of thick clastic wedges in the basin suggest that the event was triggered by regional tilting, probably related to the uplift of a High Arctic Large Igneous Province (HALIP). Pulsed tectonic induced regressions in the latest Barremian is proposed as a mechanism for reservoir development in the most distal part of the FBCC. The combination of shallow burial and seismic data with high frequency content has offered a rare opportunity to study clinoforms ranging from typical shelf-prism to delta scale. Quantitative characterisation of the clinoforms, in combination with analyses of seismic-reflector termination styles and shelf-edge trajectories, suggested that deltas and subaqueous deltas may have evolved at the shelf edge during the Late Barremian. Direct hydrocarbon indicators (DHIs) in the top sets deposited during maximum regression further suggested that these strata are, at seismic scale, more permeable than overlying and underlying stratigraphy. An exploration well will be drilled through the distal end of the FBCC to test the clinoforms with associated DHI. The result will be a blind test of the methodology for prediction of a possible sandstone reservoir which has so far not been drilled by any wells in the Barents Sea.