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# Reconstruction of the thermal history across the Ringvassøy-Loppa Fault Complex, SW Barents Sea

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The Ringvassøy-Loppa Fault Complex (RLFC) is composed by a down-stepping N-S-oriented array of normal faults that separates the Hammerfest Basin and the Loppa High to the east from the Tromsø Basin to the west. In this structural context, the Hammerfest Basin is the most prolific area, mainly consisting of several underfilled gas fields, some of them showing residual oil. Most of the wells drilled in the RLFC show limited presence of hydrocarbons. Nevertheless, fluid inclusion analysis performed in well 7119/12-4 indicates high concentrations of markers for nearby oil accumulations.

With the aim of better understanding the exploration potential for oil in the area, a basin and petroleum systems model has been performed. Up to three rift-related thermal events have been identified in the burial history of the analyzed data: (1) Early Carboniferous (Mississippian), (2) Upper Permian-Lower Triassic and (3) Early Cretaceous. However, although the area is characterized by the presence of multiple source rocks, including the Triassic shales and the Jurassic Hekkingen Formation, hydrocarbon generation timing and charge history is not well understood.

The calibration of the model using bottomhole temperature measurements and maturity indicators at several well locations allows the reconstruction of the burial history across the RLFC and adjacent basins through geological time. Uncertainty analysis on maturity allows constraining hydrocarbon generation and its potential distribution at end-member scenarios in the study area. This analysis requires particular attention to key parameters that show significant control on the hydrocarbon maturity level and hydrocarbon charge: (1) the amount of missing overburden due to uplift and erosion at key time-steps, (2) the overburden and erosion associated to the glacial cycles, (3) the rift-related heat-flow evolution and (4) the complex tectonic evolution of the area (e.g., faults activity). With this regard, several scenarios have been computed to estimate their sensitivity.

The modeling results support a working petroleum system for oil in the RLFC and adjacent areas. Calibration to existing known accumulations (e.g., Alke Sør field) has also been done and will be further refined using 3D modeling.