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# New insights into the crustal configuration of the Olga Basin from deep seismic and geochemistry data

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The Norwegian Barents Sea, as the westernmost part of the Arctic Eurasian shelf, is located between the Proterozoic East-European Craton in the south and Cenozoic passive margins in the north and the west. This region has experienced multiple changes of the stress regime including Paleozoic continental collision, multi-stage late Paleozoic to Mesozoic rifting and Pliocene/Pleistocene uplift and erosion.
Particularly the southwestern Barents Sea is in focus of academic as well as industry-driven studies since decades due to its hydrocarbon potential. This contributed to a comprehensive database and the corresponding petroleum systems are well understood. Opposed to that, potential petroleum systems of the northern Barents Sea are only poorly investigated. It is widely agreed that late Cenozoic uplift and erosion episodes were more pronounced to the north. As a consequence, potential Triassic source rocks are covered only locally by Jurassic strata but by a thin layer of Quaternary deposits.
One objective of our Arctic activities is to shed new light on the evolution of potential petroleum systems in the northern Barents Sea. Therefore, geophysical and geological data were acquired southeast of Svalbard in the area of the Olga Basin in 2015. The obtained data include ∼1750 km of 2D multi-channel seismic lines, ∼350 km of wide angle seismic lines by means of sonobuoys, sediment echosounder data, multi-beam data and potential field data.
First interpretation of the seismic profiles reveals a locally dense network of Triassic normal faults bordering the Olga basin and partly reaching as deep as to the acoustic basement. In particular, north of the Olga Basin this Triassic fault system seems to have experienced post-glacial reactivation as indicated by sediment echosounder data.
Surface sediments were sampled by use of gravity and multi coring. Low concentrations of methane in the adsorbed fraction of hydrocarbon gases within the center of the Olga Basin imply that the Jurassic strata is impermeable and could act a potential seal for hydrocarbons. Elevated methane concentrations on the other hand have been determined at the basin edge where Jurassic sediments crop out and additionally, above a reactivated fault, which suggests that these faults are potential pathways for hydrocarbon escape.