
Palaeozoic Petroleum Systems of Southern Norway

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Traces of petroleum generated from Lower Palaeozoic marine type II source rocks are known from numerous locations onshore Norway and Sweden. Oil stains occur in fractured granitic basement rocks and Ordovician carbonate mounds in Sweden, and pyro-bitumen and oil are found in Palaeozoic rocks in the Oslo Graben, Norway. Oil residue found in Permian sediments in a Norwegian North Sea well, together with migrated oil and gas in a Permian volcanic intrusion cutting through the offshore Palaeozoic Skagerrak Graben, may originate from offshore Palaeozoic source rocks.

This organic geochemical study examines Palaeozoic sediments and petroleum from outcrops and wells both on - and offshore Scandinavia, in order to better understand and evaluate the potential Palaeozoic petroleum system(s) of this region. Source rocks are found among Cambrian/Ordovician marine shales, Carboniferous coals and Permian marine shales. We also suggest, from studying well samples from Norwegian and Danish offshore wells, that good reservoir and cap rocks are present in the Permian section offshore southern Norway.

In our proposed model of a Palaeozoic petroleum system offshore southern Norway, the critical moment is related to the timing of petroleum expulsion and migration, i.e. if structures and/or cap rocks were formed in time to trap petroleum expelled from Palaeozoic source rocks. Peak oil generation from Lower Palaeozoic source rocks was probably during the Carboniferous, while Upper Palaeozoic source rocks matured rapidly during the Lower Triassic. The results from this survey may be beneficial for petroleum exploration for deep prospects offshore southern Norway.
