

WELLFATE: Understanding Fluid Migration Processes at Offshore Well Sites

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The Norwegian Continental Shelf is a vast petroleum province with about 8000 wells (nearly 2,000 exploration and almost 6000 development wells), which have either been plugged and abandoned (P&A) or are heading for decommissioning. The integrity of these wells has been recently questioned, with suspected methane seeps at several well sites raising serious implications for the environment and climate. However, the current paucity of direct observations and gas samples at these wells limits our confidence to constrain emission fluxes, fingerprint the origin of the methane and ultimately prevent us to correlate geology and well design to associated seepage. The goal of this contribution is to present the project WELLFATE and its current status. WELLFATE aims to understand the processes of fluid migration near offshore wells. Our multidisciplinary approach is to characterize wells associated with methane seeps by integrating direct seafloor observations, geophysical, geochemical, and geological data with well configuration and P&A data. We have so far conducted a first survey in 2024 and a second in 2025. During the latest, we used the Aurora ROV (RevOcean) for direct observations, gas sampling and flux measurements. In addition, we deployed a seabed observatory to monitor variations in methane concentration from July 2025 to spring/summer 2026. This strategy will allow us to confidently interpret fluid migration pathways, define the origin of the fluids, date the onset of leakage, and relate the system's dynamics with well configuration and geology to identify critical wells and predict possible locations of fluid escape. Ultimately, the project results can be used to develop guidelines and best practices to optimize well-decommissioning protocols and/or implement early drilling strategies to prevent lateral fracturing in sensitive sedimentary units and propose possible solutions to mitigate seeps associated with wells.