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Arctic thermogenic gas-hydrate provinces fuelled by deep-hydrocarbon venting

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Arctic submarine gas hydrates may receive thermogenic gas through leakage systems from hydrocarbon provinces. Our research concentrates on high latitudes in a region where the on average 300 m deep Barents Sea covers an area of about 1.3 million km2. Since the greatest gas discovery in the Norwegian economic zone so far (Snøhvit in 1984), the petroleum industry requested several 3D seismic surveys to be carried out in the area in addition to 2D seismic lines. The data allow an assessment of fluid flow from a gas reservoir to the gas hydrate stability zone. The two main objectives are: a) detecting where and how fluids migrate from greater depth to the seabed and 2) identifying shallow acoustic anomalies and their relationship to fluid migration pathways. We will show that fluids are migrating through the whole stratigraphic column to the seafloor but that they are also trapped in specific horizons as for example the gas hydrate stability zone. The geophysically inferred fluid migration occurs over a vertical distance of Ĩ700 m where the time involved remains unknown. At the seafloor, pockmarks or seabed craters exists depending on the dynamics of the involved processes. Fluids and gas that reach the seafloor can rapidly escape to the hydrosphere and, because of the shallow water depth, may contribute to greenhouse gas concentrations in the atmosphere. The total volumes of gas that may leave the chimneys are unknown but may be of importance in terms of glacial-interglacial methane cycles. The Barents Sea area may have experienced significant cycles of fluid expulsion and natural hydrocarbon leakage due to major episodes of sediment erosion and pressure changes driven by ice ages.