

Origin and Transport Pathways of Dissolved Methane in the German Bight

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Methane (CH_4) is a potent, short-lived greenhouse gas that contributes strongly to global warming. Dissolved CH_4 in the marine environment is largely controlled by sedimentary methanogenesis, intertidal dynamics, and riverine inputs. Aerobic and anaerobic oxidation can remove much of the CH_4 within pore waters and the water column; nevertheless, shallow nearshore waters can ventilate CH_4 to the atmosphere before full oxidation.

The German Bight lies in the southeastern North Sea and is a shallow shelf region with complex bathymetry, large tidal amplitudes, extensive Wadden Sea tidal flats and estuarine circulation influenced by major rivers such as the Elbe and Weser. Our observational dataset in this region covers four years of high spatial resolution of dissolved CH_4 concentrations and CH_4 oxidation rates. These data indicate that this area could serve as a significant source of methane released to the atmosphere.

In this study, we analyse the (i) CH_4 distribution in the marine environment of the German Bight and (ii) data on oxidation rates based on available measurements. In addition, we further examine habitat distributions and the associated methane fluxes.