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Modeling methane from the North Sea region with ICON-ART

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Methane (CH_4) is the second most important greenhouse gas after CO_2 affecting global warming. Various sources (e.g. fossil fuel production, agriculture and waste, biomass burning and natural wetlands) and sinks (the reaction with the OH-radical as the main sink contributes to tropospheric ozone production) determine the methane budget. Due to its long lifetime in the atmosphere methane can be transported over long distances.

Disused and active offshore platforms can emit methane, the amount being difficult to quantify. In addition, explorations of the sea floor in the North Sea showed a release of methane near the boreholes of both, oil and gas producing platforms. The basis of this study is the established emission data base EDGAR (Emission Database for Global Atmospheric Research), an inventory that includes methane emission fluxes in the North Sea region. While methane emission fluxes in the EDGAR inventory and platform locations are matching for most of the oil platforms almost all of the gas platform sources are missing in the database. We develop a method for estimating the missing sources based on the EDGAR emission inventory.

In this study the global model ICON-ART (ICOsahedral Nonhydrostatic model - Aerosols and Reactive Trace gases) will be used. ART is an online-coupled model extension for ICON that includes chemical gases and aerosols. One aim of the model is the simulation of interactions between the trace substances and the state of the atmosphere by coupling the spatiotemporal evolution of tracers with atmospheric processes. ICON-ART sensitivity simulations are performed with inserted and adjusted sources to access their influence on the methane and OH-radical distribution on regional (North Sea) and global scales.