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CH₄ emission preprocessing for high resolution modelling of concentrations with the ICON-ART model

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Linking reported anthropogenic emissions of greenhouse gases, as, e.g., methane, to observed concentrations requires the appropriate modelling of the meteorological transport. Starting from spatially highly resolved emissions provided by Copernicus and TNO for Europe as well as the emissions from Germany provided by Germany's central environmental authority (UBA) we employ the DWD's **Icosahedral Nonhydrostatic (ICON)** model with its transport scheme **ART (Aerosols and Reactive Trace gases)** extension for forward modelling of methane concentrations.

This requires a preprocessing, i.e., mapping of point sources and area sources to the target ICON grid, and considering the resulting uncertainties appropriately. We investigate the scales of the various tiers of government for Germany, namely counties and federal states of Germany. On one hand, this is the inherent spatial resolution with which emissions are reported for some sectors. On the other hand, this is the scale where interpretation of modelling results are of interest for subsequent objective verification of inventories and demonstration of success of mitigation measures. In this work, we discuss the uncertainties arising from preprocessing reported methane emissions for various sectors and compare to the uncertainty inherent in the spatial resolution of the inventories.

The results show our preprocessing is useful for simulating the CH₄ atmospheric concentrations at a regional scale.

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