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Poster
Space-based observations of methane have the potential to significantly increase our understanding of the distribution of atmospheric methane as well as the magnitude and variability of its sources and sinks at high latitudes. In this work, we report on ongoing work towards benchmarking total-column methane datasets in the Arctic and boreal regions.

First, we evaluate satellite observations from both GOSAT (UoL-PR v9 product) and TROPOMI (OPER rpro and WFMD v1.8) using ground-based reference measurements from the Total Carbon Column Observing Network (TCCON) and Collaborative Carbon Column Observing Network (COCCON) high-latitude sites as well as AirCore profile measurements in Sodankylä, Finland. The results are used to reflect the reliability of satellite observations at high latitudes. Second, we compare satellite observations of methane to the optimized concentration fields from an increasing suite of atmospheric inverse modelling products that assimilate in-situ measurements and are resampled spatiotemporally to correspond to the satellite observations (including Carbon Tracker Europe-CH4 and CAMS, complemented with other products). We explore the variability in the total-column methane between the inverse models, and quantify their differences to the satellite products. Our focus regions are different permafrost types (continuous, discontinuous, sporadic) as well as wetlands. We evaluate differences in seasonal variability, trends, and larger spatial features.

This work presents a parallel avenue for the evaluation of inverse modelling products far from ground-based measurements of methane at high latitudes. The work contributes to the Esa-Nasa Arctic Methane and Permafrost Challenge (AMPAC) initiative.
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