

Seminar “Ocean, Ice and Atmosphere”,
Institute of Environmental Physics (IUP), Univ. Bremen
Date: 17-Dec-2024, 12:15
Place: Building NW1, Room S1360

TROPOMI methane and carbon monoxide: applications and latest developments

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Methane is the second most important greenhouse gas released by anthropogenic activity after carbon dioxide. Comprehensive knowledge of the source and sink processes of methane is essential for a reliable prediction of future climate. Carbon monoxide has a dual role as both an air pollutant and a crucial component of atmospheric chemistry. It is well-suited for tracing the transport of pollutants and can potentially be used as a proxy for simultaneously emitted carbon dioxide. Satellite retrievals of atmospheric methane and carbon monoxide are used to answer important questions related to the climate system, air quality, and atmospheric transport. Since the launch of the Sentinel-5 Precursor (S5P) satellite with its TROPOMI instrument, significant progress has been made in this field of research due to its unique ability to combine observations at relatively high spatial resolution with global coverage on a daily basis.

Selected applications of the high-quality methane and carbon monoxide data products generated with the scientific TROPOMI/WFMD algorithm developed at the University of Bremen are presented. These include the automated detection of regions with persistently enhanced methane concentrations, the quantification of emission sources, an analysis of carbon monoxide enhancements originating from German steel plants, and a discussion of the possibility of using carbon monoxide as a proxy for carbon dioxide emissions from the steel industry. In addition, the latest developments in generating an even better data product are discussed, e.g. with the aim of improving the data yield by further optimising the quality filter based on machine learning.