



New Master Thesis Topic

Title: Satellite Remote Sensing of the ‘forgotten’ greenhouse gas nitrous oxide

Nitrous oxide (N_2O) is a potent greenhouse gas, 300 times more powerful than carbon dioxide. Albeit its importance for climate, N_2O has gained little attention in international treaties and global emissions continue to increase. Over two-thirds of N_2O emissions are from agriculture (nitrogen-based fertilizer and manure) and the rest is mainly from the chemical industry.

One challenge is that N_2O emissions are difficult to monitor. Owing to the long lifetime of N_2O , atmospheric signals from emissions sources are very small and most emissions are from diffusive sources that are hard to observe. Space-based observations of N_2O are possible and they offer a possibility for constraining N_2O emissions globally. However, remote sensing of N_2O is difficult and tropospheric N_2O signals (where emissions are) are very small and masked by the larger stratospheric variability.

In this project, we will assess the characteristics of available N_2O satellite datasets from the GOSAT-2 satellite using reflected sunlight and from IASI in the thermal-infrared. We will study their seasonal and latitudinal behaviour and contrast trends against model data from the Copernicus CAMS system. We will investigate methods for removing/correcting of stratospheric signals and evaluate resulting tropospheric N_2O columns

Skills needed:

Good Python knowledge and an understanding of Earth Observation and Remote Sensing concepts and methods

This thesis will be hosted by the Department of Physics and Chemistry of the Atmosphere. The Department has a major focus on satellite remote sensing of atmospheric trace gases, cloud and aerosols.

Topic for students of

- ☒ M.Sc. Environmental Physics
- ☒ M.Sc. Space Sciences and Technologies

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