UP 6: Poster

Time: Wednesday 17:30–19:00 Location: HSZ OG1

UP 6.1 Wed 17:30 HSZ OG1

Straylight characterization of airborne imaging remote sensing instruments of the MAMAP2D family for greenhouse gas observations — •Oke Huhs, Konstantin Gerilowski, Sven Krautwurst, Jakob Borchardt, Heinrich Bovensmann, and John P. Burrows — University of Bremen, Institute of Environmental Physics, Otto-Hahn-Allee 1, 28359 Bremen, Germany

Airborne measurements of atmospheric column enhancements of methane (CH_4) and carbon dioxide (CO_2) from anthropogenic point sources were performed with the Methane Airborne MAPer (MAMAP) since 2007, which delivers 1D spatial data by measuring the spectrum of backscattered solar radiation. To measure 2D spatial data from a single overflight, a new generation of passive airborne imaging remote sensing grating spectrometers is being developed and built by IUP Bremen. The MAMAP2D-Light instrument was already successfully flown during the COMET 2.0 Arctic campaign in Canada in summer 2022 measuring CO_2 and CH_4 enhancements in a short-wave infrared band around 1.6 μm. The MAMAP2D instrument, which has an additional near-infrared O2A-band channel and a higher spectral resolution, has delivered measurement data in a laboratory environment. For the characterization of remote sensing instruments, straylight is one important quantity. Straylight occurs due to reflections and scattering within the spectrometer and must be characterized well to establish a straylight correction. Therefore, straylight was characterized down to 7 orders of magnitude below the integrated incident illumination level for MAMAP2D and MAMAP2D-Light.

UP 6.2 Wed 17:30 HSZ OG1

Calibration of an Air Data Probe to complement airborne in-situ Flux Measurements — •Josua Schindewolf — Institut für Umweltphysik, Universität Bremen, Deutschland

Airborne in-situ measurements of greenhouse gases (GHG) contribute to the increasingly important task of monitoring the changing greenhouse gas emissions and attribution of the sources. For the quantification of GHG sources, not only observations of precise atmospheric concertation gradients are needed, but also accurate measurements of the corresponding wind fields. This is because, the computation of the emissions and their uncertainties have linear dependencies on wind speed and direction. In 2022 we installed and calibrated a new turbulence probe to the underwing pod of the research aircraft of the Jade University Wilhelmshaven to complement future airborne flux measurements with high accuracy wind data. A series of flights were conducted to carry out the in-flight calibration procedure recommended by the manufacturer. Additionally, a meteorological observation tower was used for a series of fly-by manoeuvres, providing ground-based reference wind data. The calibration exhibits a mean difference in wind speed of 0.3 m/s and in wind direction of 4° over ten such calibration flights. The tower comparison showed a mean difference in wind speed of 0.5 m/s and in wind direction of 20°. In summary, the results indicate that more calibration flights are required for a further evaluation, which will focus on the comparison with the ground based met tower observations. This is challenging, because of the high variability of the wind fields at low flight altitudes.

UP 6.3 Wed 17:30 HSZ OG1

On the twilight phenomenon of the green band — •Anna Lange[1], Alexei Rozanov[2], and Christian von Savigny[1] — [1]Institute of Physics, University of Greifswald, Germany — [2]Institute of Environmental Physics, University of Bremen, Germany

The twilight sky is usually characterised by the well-known reddish/orange colours close to the horizon and the blue colours above. However, in many cases a green or greenish band forms between the blue and reddish parts of the sky, and it is essentially not documented in the literature. In this study, the green band phenomenon is simulated using the radiative transfer model SCIATRAN and subsequent colour modelling based on the CIE colour matching functions and chromaticity values. Different parameters and processes that have a potential influence are investigated. In addition, a possible contribution by airglow emissions is discussed. The simulations show that it requires just the right intensities in the blue, green, and long-wave spectral regions to produce a green colour. The total ozone column has the comparatively largest influence. This study is, to the best of our knowledge, the first detailed investigation of the green band phenomenon.

UP 6.4 Wed 17:30 HSZ OG1

Investigation of a method to analyse OH(3-1) Mesopause temperature and two-dimensional imager data of the OH-airglow layer — •Lukas Depenthal[1], Christian von Savigny[1], Christoph Hoffmann[1], and Philipp Mattern[2] — [1]Institute of Physics, University of Greifswald, Greifswald, Germany — [2]Leibniz Institute for Plasma Science and Technology, Greifswald, Germany

The University of Greifswald operates two instruments to measure airglow emissions at an altitude of about 87 km. The Andor Shamrock SR-163 Infrared spectrometer is used to detect OH-Meinel bands at 1500 nm - 1600 nm as OH(3-1) rotational-vibrational spectroscopy. Based on the relative intensities of the OH(3-1)-lines, conclusions about the mesopause temperature are drawn and examined with regard to their variability. Based on these investigations, dynamic processes in the mesopause can be investigated. Since the spectrometer has a temporal resolution of 15 s, variations with periods of about 5-20 minutes can be determined. The ongoing measurements started in 2015.

In addition, a Xenics Cheetah 640CL infrared camera is used as an OH airglow imager to visualize spatial structures and gravity wave signatures within the OH airglow layer. With a resolution of 640 x 512 pixels, wavelengths of several kilometers can be observed. These measurements started in August 2020 and have continued since then. Using principal component analysis, it is possible to determine periods of about 5-20 minutes, as in the spectrometer data. Due to the side by side installation of the instruments, the data can be compared with each other.