UP 5 Atmosphärische Spurengase und Aerosole: Instrumentelles

Zeit: Dienstag 10:00–11:00 Raum: E

Hauptvortrag

UP 5.1 Di 10:00 E

SCIAMACHY global carbon gas measurements: methane, carbon dioxide, and carbon monoxide — •Michael Buchwitz, Rüdiger de Beek, Stefan Noel, Heinrich Bovensmann, and John Burrows — Institute of Environmental Physics (IUP), University of Bremen FB1, Otto Hahn Allee 1, 28334 Bremen, Germany

The near-infrared nadir spectra of reflected solar radiation measured by SCIAMACHY on-board ENVISAT contain information on the vertical columns of important atmospheric trace gases such as the greenhouse gases carbon dioxide (CO_2) and methane (CH_4) and the air pollutant carbon monoxide (CO). The scientific algorithm WFM-DOAS has been used to retrieve this information. For CH_4 and CO_2 our main data products are column averaged mixing ratios (XCH_4 and XCO_2) determined by simultaneous measurements of the dry air mass (obtained from, e.g., O_2). Our CO data product is the CO vertical column. The SCIAMACHY data set is unique because of the high sensitivity of the near-infrared measurements with respect to concentration changes in the atmospheric boundary layer. This is a pre-requisite to get detailed information on regional surface sources and sinks which are currently poorly constrained on the global scale. In this context SCIAMACHY can be regarded as a predecessor of future dedicated satellite carbon missions such as OCO (USA) and GOSAT (Japan). We present the latest results of the data products for CO_2, CO, and CH_4.

Fachvortrag

UP 5.2 Di 10:30 E

Inverse modelling of aerosol properties using Multi-Axis DOAS measurements — •Udo Friess[1], Paul S. Monks[1], John J. Remedios[1], Thomas Wagner[2], Alexej Rozanov[3], and Ulrich Platt[2] — [1]Space Research Centre, University of Leicester, United Kingdom — [2]Institut für Umweltphysik, Universität Heidelberg — [3]Institut für Umweltphysik, Universität Bremen

A retrieval algorithm for the determination of aerosol properties using Multi-AXis Differential Optical Absorption Spectroscopy (MAX-DOAS) measurements based on non-linear optimal estimation is presented. Based on simulated MAX-DOAS measurements of the optical depth of the oxygen dimer O_4 as well as on the variation of the intensity of diffuse skylight measured at different viewing directions and wavelengths, the capability of this measurement technique to derive the aerosol extinction profile as well as information on the phase function and single scattering albedo will be demonstrated. The information content, vertical resolution and retrieval errors under various atmospheric conditions will be discussed. The results of this model study suggest that the accuracy of MAX-DOAS measurements of the aerosol total optical depth is comparable with established methods of aerosol detection by Sun photometers (e.g. within the AERONET network) over a wide range of atmospheric conditions. Moreover, MAX-DOAS measurements contain information on the vertical profile of the aerosol extinction, and can be performed with a relatively simple, robust and self-calibrating instrumentation.

Fachvortrag

UP 5.3 Di 10:45 E

Konvektiver Transport von Schwefeldioxid in die obere Troposhäre über Brasilien — •Tanja Schuck[1], Frank Arnold[1], Rainer Nau[1], Verena Fiedler[1,2], Hans Schlager[2], Andreas Stohl[3] und Liisa Pirjola[4] — [1]Max Planck Institut für Kernphysik, Atmosphärenphysik, Heidelberg — [2]DLR, Institut für Physik der Atmosphäre, Oberpfaffenhofen — [3]Norsk institutt for luftforskning, Kjeller, Norwegen — [4]Helsinki Polytechnical Institute, Helsinki, Finnland

Mit einem flugzeuggetragenen Massenspektrometer wurden Messungen von troposphärischem Schwefeldioxid im Südosten von Brasilien durchgeführt. Die in der freien Troposphäre gemessenen Molfraktionen zeigen eine große räumliche Variabilität. In Höhen zwischen 4 und 10 km befanden sich ausgeprägte SO_2-reiche Schichten, in denen die SO_2-Molfraktionen ähnlich hoch waren wie in der Grenzschicht. SO_2 aus bodennahen Emissionen wird durch Konvektion effektiv in große Höhen transportiert. Rechnungen mit dem Transportmodell FLEXPART weisen außerdem auf Ferntransport quer über den südamerikanischen Kontinent hin.

SO_2 hat als Vorläufer atmosphärischer Schwefelsäure einen großen Einfluss auf die Bildung von Aerosolen. Die gemessenen Werte sind ausreichend, um Partikelneubildung und Wachstum bis zur Größe von Wolkenkondensationskernen auszulösen.