UP 4: Poster: Atmosphäre und Klima

Zeit: Dienstag 16:30–19:00 Raum: Poster B1

UP 4.1 Di 16:30 Poster B1

Automatisierte Messungen von Treibhausgasen mittels bodengebundener FTIR-Spektrometrie — •Janina Messerschmidt, Justus Notholt, Christine Weinzierl und Thorsten Warneke — Institut für Umweltphysik (IUP), Bremen, Deutschland

Die langlebigen Treibhausgase CO2 und CH4 werden bisher nur mit In-Situ Methoden am Erdboden erfasst. Informationen über Quellen und Senken der Treibhausgase erhält man aus diesen Messungen mit Hilfe von inversen Modellen. Eine wesentliche Verbesserung des Verständnisses des CO2 Kreislaufes wird durch die Einbeziehung von Fernerkundungsmethoden zur Bestimmung der atmosphärischen Konzentrationen erwartet. Satellitengestützte Messungen liefern globale Informationen über die atmosphärischen Konzentrationen und bodengebundene Fernerkundungs-Messungen liefern die Kopplung der Satellitenmessungen an die In-Situ-Bodenmessungen. Solare Absorptionsspektrometrie ist zur Zeit die einzige bodengebundene Fernerkundungsmethode, die die Bestimmung der Treibhausgase mit ausreichender Genauigkeit erlaubt. Im Rahmen zweier EU-Projekte bauen wir zwei automatisierte Fernerkundungssyteme, die Treibhausgaskonzentrationen vom Boden aus mit hoher Genauigkeit bestimmen sollen. Diese Messsysteme sollen in das internationale Netzwerk TCCON integriert werden. Erste manuelle Messungen mit diesen Systemen und ein Vergleich mit TCCON * Messungen werden vorgestellt.

UP 4.2 Di 16:30 Poster B1

Transportprozesse polarer BrO-Events — •Mathias Begoin, Henning Kirk, Andreas Richter und John Burrows — Institut für Umweltphysik, Universität Bremen, Deutschland

Im polaren Frühjahr kommt es in Arktis und Antarktis in einigen Regionen der unteren Troposphäre zu einer extremen Abnahme der Ozonkonzentrationen. Bei diesen so genannten Ozone Depletion Events (ODE) spielen Halogene, deren Quelle das Meersalz ist, eine entscheidende Rolle. Besonders das Halogenoxid BrO ist hier von besonderer Bedeutung, da es auch für die Oxidation und Ablagerung von Quecksilber in dem empfindlichen polaren Ökosystem verantwortlich ist. BrO kann mittels Absorptionsspektroskopie von Satellitenmessgeräten, wie GOME, SCIAMACHY und GOME2 nachgewiesen werden. Der genaue Mechanismus, der für die Freisetzung des Bromoxids verantwortlich ist und welche Rolle Transportprozesse bei dessen Verteilung spielen ist noch nicht vollständig geklärt.

In dieser Studie werden BrO-Messungen von SCIAMACHY und GOME2 mit Trajektorienrechnungen verglichen, um Aufschluss über typische Entstehungsgebiete des BrO und seine Transportwege zu gewinnen. Der Schwerpunkt liegt dabei auf einzelnen, gut zu verfolgenden Ereignissen.

UP 4.3 Di 16:30 Poster B1

Halogen oxide measurements at Masaya volcano in Nicaragua using Differential Optical Absorption Spectroscopy — •Christoph Kern[1], Holger Sihler[1], Leif Vogel[1], Claudia Rivera[2], and Ulrich Platt[1] — [1]Institut für Umweltphysik, Universität Heidelberg, Heidelberg, Deutschland — [2]Chalmers University of Technology, Department of Radio and Space Science, Gothenburg, Sweden

Sulphur dioxide (SO_2) and halogen oxide emissions were measured at Masaya Volcano in Nicaragua in April 2007 using Differential Optical Absorption Spectroscopy (DOAS). Next to passive DOAS measurements using scattered sunlight, an active long-path DOAS system was operated for several days with the light beam crossing the crater of the volcano. These measurements for the first time give an insight into the night-time halogen chemistry occurring at volcanoes. While the passive DOAS instruments measured sulphur dioxide (SO_2) and bromine monoxide (BrO) in various viewing geometries and distances from the crater during daytime, the active instrument additionally allowed a quantification of chlorine monoxide (ClO) and chlorine dioxide (OClO), as well as being able to measure round-the-clock. The results of the field measurements are presented and their implications for halogen chemistry at volcanoes are discussed.

UP 4.4 Di 16:30 Poster B1

Observations of tropical water vapor using a ground-based microwave sensor — •Harry Küllmann[1], Bing Tan[2], Thorsten Warneke[1], Justus Notholt[1], Christian Mätzler[3], and Niklaus Kämpfer[3] — [1]Institute of Environmental Physics, University of Bremen, Germany — [2]Faculty of technology, University of Suriname, Suriname — [3]Institute of Applied Physics, University of Bern, Switzerland

This study presents first results of ground-based measurements of the tropical water vapor content derived from microwave data. The portable TRARA radiometer of the Institute of Applied Physics is operated at the Anton de Kom University of Suriname in Paramaribo and measures continuously since mid of December 2006. The sensor consists of two channels at frequencies of 21 and 35 GHz to observe the integrated water vapor content of the troposphere. The tropospheric opacity is derived from tipping curve calibrations. High variability of water vapor has been found and the results are compared to relative humidity data of radiosonde measurements which are launched about every other week at Paramaribo. In addition, the two-channel radiometer allows the study of the integrated liquid water.

UP 4.5 Di 16:30 Poster B1

Airborne Imaging DOAS — •David Walter[1], Klaus-Peter Heue[1], Stephen Broccardo[2], Stuart Piketh[2], Kristy Ross[3], and Ulrich Platt[1] — [1]Institute of Environmental Physics (IUP), University of Heidelberg, Heidelberg, Germany — [2]Climatology Research Group, University of the Witwatersrand, Johannesburg, South Africa — [3]Research and Innovation Department, Eskom, South Africa

In order to map the 2D distribution of a series of relevant trace gases, we built an instrument for airborne measurements, based on Imaging Differential Optical Absorption Spectroscopy (I-DOAS).

An imaging spectrometer combined with a CCD camera analyses sun-light backscattered from the earth's surface. The CCD camera records the spectral information in one dimension and spatial information (perpendicular to the aircraft's flight direction) in the other dimension. Due to the forward motion of the aircraft we get 2D-maps of the trace gas slant column densities (SCDs) along the light path. The spatial resolution is given by the instrument characteristics, the flight altitude and the speed. Typical values are in the order of 150 m longitudinal and 50 m perpendicular to the flight direction.

The results have applications for enforcement of air-quality legislation and investigation of plume chemistry and dispersion. A measurement campaign in August 2007 in the Highveld (South Africa) showed strong variations of NO_2 column densities in immediate vicinity of various sources e.g. power plants, steel works and highways. Flights in the surveillance area of satellites (e.g. SCIAMACHY) were realized to validate the satellite retrievals on a regional scale.

UP 4.6 Di 16:30 Poster B1

High precision column measurements of CO_2 and CH_4 derived from mid IR and near IR FTS at Permanent Ground-Truthing Facility Zugspitze/Garmisch — •Ralf Sussmann, Frank Forster, Tobias Borsdorff, and Markus Rettinger — Research Center Karlsruhe, IMK-IFU, Kreuzeckbahnstr. 19, 82467 Garmisch-Partenkirchen,Germany

The Permanent Ground-Truthing Facility at Garmisch is operating a near IR high-resolution FTS (47.42° N, 10.98° E, 744m a.s.l) and is part of the global Total Carbon Column Observing Network (TCCON). From these spectra, accurate and precise column-averaged mixing ratios of CO_2/O_2 and CH_4/O_2 are retrieved. These observations used to validate measurements of the NASA Orbiting Carbon Observatory (OCO) satellite missions will also provide input data for the inverse modeling of sources and sinks. Due to the high atmospheric background concentration of CO_2 and CH_4 high requirements are put on the measurement precision, i.e., a single-column-measurement precision of less than 0.1% is required. The Permanent Ground-Truthing at the Zugspitze is operating also a mid IR high-resolution FTS (47.42° N, 10.98° E, 2964m a.s.l) which is part of the Network for the Detection of Atmospheric Composition Change (NDACC). From these spectra, accurate and precise partial column profiles of CH4 are retrieved. The retrieval from these partial column observations is optimized for validation of satellite measurements from ENVISAT/SCIAMACHY.