UP 11: Atmosphäre und Aerosole: Datenauswertung und Modellierung

Zeit: Donnerstag 11:00–11:45 Raum: 3B

UP 11.1 Do 11:00 3B

Aerosol Tracer Verfahren — •Eberhard Rosenthal[1], Philipp Lodomez[1], Bernd Diekmann[1] und Wolfgang Büscher[2] — [1]Physikalisches Institut der Universität Bonn, Nussallee 12, 53115 Bonn — [2]Institut für Landtechnik der Universität Bonn, Nussallee 5, 53115 Bonn

Die Simulation der Transmissionsvorgänge von Aerosolpartikeln stellt ein wichtiges Instrument der Immissionsprognostik dar. Neben der Entwicklung einer dynamischen Ausbreitungssimulation (STAR3D) werden am Physikalischen Institut, in Zusammenarbeit mit dem Institut für Landtechnik der Universität Bonn, Aerosol Tracer Verfahren entwickelt. Hierbei steht zum einen die Validierung von Ausbreitungssimulationen und zum anderen Einblicke in den eigentlichen Prozess der Transmission im Vordergrund. Aufgrund eines einheitlichen fluoreszierenden Tracer Staubes, der bei allen Verfahren Verwendung findet, wird eine vergleichende Überprüfung der Detektorsysteme ermöglicht. Im Vortrag werden zwei verschiedene Tracersysteme sowie erste Ergebnisse aus dem von der DFG geförderten Projekt vorgestellt.

UP 11.2 Do 11:15 3B

Ausbreitungssimulation polydisperser Aerosole — •Philipp Lodomez[1], Eberhard Rosenthal[1], Bernd Diekmann[1] und Wolfgang Büscher[2] — [1]Physikalisches Institut der Universität Bonn, Nussallee 12, 53115 Bonn — [2]Institut für Landtechnik der Universität Bonn, Nussallee 5, 53115 Bonn

Am Physikalischen Institut der Universität Bonn wurde in Zusammenarbeit mit dem Institut für Landtechnik der Universität Bonn der für die Transmission wichtige physikalische Effekt der Sedimentation für reale Staubpartikel eingehend untersucht. Mit Hilfe der hieraus gewonnenen Erkenntnisse wurde die Ausbreitungssimulationssoftware STAR3D (Simulated Transmission of Aerosols 3D) entwickelt. Diese ermöglicht eine dynamische Beschreibung der Partikelausbreitung. Gleichzeitig werden weitere für die Transmission der Partikel wichtige Effekte wie die Agglomeration, die Deposition und die Resuspension untersucht, um die Auswirkungen dieser Effekte ebenfalls in die Simulationssoftware einarbeiten zu können. Im Vortrag sollen die im Rahmen eines von der DFG geförderten Projektes entwickelte Software vorgestellt sowie das weitere Messprogramm dargestellt werden.

UP 11.3 Do 11:30 3B

Time-Resolved Profiling of Stratospheric Radical Species by Balloon-Borne Skylight Limb Observations — •Lena Kritten[1], Andre Butz[1], Marcel Dorf[2], Katja Grunow[3], Herman Oelhaf[4], Benjamin Simmes[2], Frank Weidner[2], Gerald Wetzel[4], and Klaus Pfeilsticker[2] — [1]SRON, Utrecht, Netherlands — [2]Institut für Umweltphysik, Universität Heidelberg, Heidelberg, Germany — [3]Meteorologisches Institut der Freien Universität Berlin, Berlin, Germany — [4]Institut für Meteorologie und Klima (IMK), Forschungszentrum Karlsruhe, Karlsruhe, Germany

A balloon-borne spectrometer performing skylight observations in limb geometry was deployed for the first time at low latitudes in north-eastern Brazil in June 2005. Absorption spectra of UV/vis absorbing trace gases were measured from different balloon platforms (LPMA/DOAS, MIPAS, LPMA/IASI) in the upper troposphere and lower stratosphere. The instrument provides time-resolved profile information of atmospheric trace-gas species such as O3, NO2, HONO, BrO, OClO, IO. The measured spectra are analysed applying the DOAS method. When combined with 3D radiative-transfer modelling and an optimal estimation inversion technique, stratospheric concentration profiles of the targeted trace-gases can be inferred for each limb scan [Weidner et al., 2005]. Comparing these measurements to 1-D photochemical modelling based on initialisation by trace-gas observations of the LPMA/DOAS and MIPAS payloads allows to draw conclusions for the photochemistry of radicals important for the tropical ozone layer.

UP 12: Satellitengestützte Messungen

Zeit: Donnerstag 11:45–13:00 Raum: 3B

UP 12.1 Do 11:45 3B

Analyse von Satellitenmessungen über Quellregionen des atmosphärischen Kohlenmonoxid — •Iryna G. Khlystova, Michael Buchwitz, Andreas Richter, Folkard Wittrock, Heinrich Bovensmann und John P. Burrows — Institut für Umweltphysik, Universität Bremen

Die Messungen des reflektierten und zurück gestreuten Sonnenlichts im ultravioletten, sichtbaren und nahinfraroten Spektralbereich von SCIAMACHY auf ENVISAT beinhalten Informationen über Kohlenmonoxid (CO) und andere wichtige Luftverschmutzungsgase, wie Formaldehyd (HCHO) und Stickstoffdioxid (NO2). An der Universität Bremen werden Algorithmen entwickelt, mit denen die Vertikalsäulen und/oder die troposphärischen Säulen dieser Gases aus den SCIAMACHY Nadirmessungen abgeleitet werden können. Mittels dieser Verfahren wurden mehrjährige Datensätze erstellt. Wir diskutieren schwerpunktmäßig den CO-Datensatz über wichtigen Quellregionen des CO, von Gebieten großflächiger Biomasseverbrennung bis hin zur Messung erhöhter CO Säulen über Städten. Wichtige Quellen für die genannten Gase sind Brände. Die relativen Verhältnisse von CO, HCHO und NO2 hängen vom Typ des Verbrennungsprozesses ab. Simultane Messungen alle drei Gase liefern daher Informationen über die Art der Brände. Wir analysieren die simultanen SCIAMACHY Messungen von CO, HCHO und NO2, um Informationen insbesondere über die Quellen von Kohlenmonoxid zu erhalten. Hierbei verwenden wir auch externe Datensätze, z.B. über Feuer (AATSR fire counts) und die Meteorologie (z.B. Windrichtung).

UP 12.2 Do 12:00 3B

Seasonal variations of IO above Antarctica observed in three years of satellite data — •Anja Schönhardt[1], Andreas Richter[1], Folkard Wittrock[1], Henning Kirk[1], Hilke Oetjen[2], and John P. Burrows[1] — [1]Institut für Umweltphysik, Bremen, Germany — [2]School of Chemistry, University of Leeds, UK

Halogen oxides play an important role in the Earth's atmosphere. Iodine species lead to destruction of tropospheric ozone, a reaction in which iodine monoxide (IO) is produced, and enhanced abundances of IO can result in the formation of fine particles. To gain more knowledge and understanding of its global importance, it is interesting to measure IO not only locally from the ground but also from satellite on a global scale. IO has strong differential absorption structures in the visible wavelength range making it a suitable trace gas for DOAS (Differential Optical Absorption Spectroscopy) measurements.

Nadir observations from the SCIAMACHY satellite instrument are analysed for a period of three full years. Apart from a discussion of the IO detection limit, our study concentrates on the retrieval of IO close to Antarctica. While enhanced amounts of IO and a seasonal variation can be seen there, no clear signal of enhanced IO is found in the Northern Hemisphere. In each of the three years under investigation, the seasonal variation above Antarctica is repeated in the same form with highest values in polar spring, slightly decreasing values during summertime and again rising amounts towards autumn. In winter, no clearly enhanced values are detected. These findings alongside with first suggestions for the interpretation are presented.

UP 12.3 Do 12:15 3B

Stratosphärische Wasserstoffperoxid Retrievals mit MIPAS/Envisat während des Solar Proton Events im Oktober 2003 — •Stefan Versick, Norbert Glatthor, Gabrielle Stiller, Thomas Reddmann, Roland Ruhnke, Thomas von Clarmann, Michael Hoepfner, Michael Kiefer, Andrea Linden, Sylvia Kellmann und Udo Grabowski — Institut fuer Meteorologie und Klimaforschung, Karlsruhe, Deutschland

Waehrend eines Solaren Protonen Events (SPE) wird die HOx Chemie in der Stratosphaere durch Ionisation stark beeinflusst. Stark verwandt mit HOx ist Wasserstoffperoxid (H2O2), das in photochemischem Gleichgewicht mit HOx steht. Gezeigt werden erste Retrie-

vals fuer H2O2, die einen deutlichen Anstieg der H2O2-Konzentration waehrend des SPEs zeigen. Dieses und einige weitere Gase werden mit den Ergebnissen eines CTM (KASIMA) verglichen.

UP 12.4 Do 12:30 3B

Evaluating cloud fraction modelling with satellite observations — •Swen Metzger[1] and Ruediger Lang[2] — [1]Max-Planck-Institute fuer Chemie, Abt. Chemie der Atmosphaere, D-55128 Mainz — [2]EUMETSAT, Am Kavallerisand 31, D-64295 Darmstadt

We apply the new concept of Metzger and Lelieveld (ACP, 2007) to model the cloud cover / cloud fractions (CFR) in a regional weather forecast model (COSMO-DE) and a global chemical-climate model (ECHAM5/MESSy). In contrast to the empirical approaches that are currently applied, the CFR is calculated here for the first time consistently from the total of aerosol water, cloud water/ice and precipitation. Various model simulations are evaluated against satellite and ground based observations. First results of the comparison indicate that this new approach improves indeed CFR calculations.

Metzger, S. and J. Lelieveld, Reformulating atmospheric aerosol thermodynamics and hygroscopic growth into fog, haze and clouds, Atmos. Chem. Phys., 7, 3163-3193, http://www.atmos-chem-phys.net/7/3163/2007/acp-7-3163-2007.html, 2007.

UP 12.5 Do 12:45 3B

Sensitivity study of SO_2 AMF and a special case study about SO_2 emissions from Norilsk Smelter — •Mohammad Fahim Khokar[1,2], Ulrich Platt[1], Claire Granier[2], Katey Law[2], and Thomas Wagner[1,3] — [1]Institute for Environmental physics, Heidelberg, Germany — [2]Service d'Aéronomie, Université Pierre and Marie Curie, Paris, France — [3]Max-Planck Institut for Chemistry, Mainz, Germany

Radiative transfer modelling is best tool to convert slant column densities into vertically integrated columns. In this Study, TRACY II model is used for SO_2 AMF calculation for different scenarios. SO_2 AMF exhibited high dependency towards surface albedo, SO_2 vertical profile, SZA, wavelength, clouds and aerosol.

Most of the non-ferrous metal ores contain sulfide and this is emitted as SO_2 during the smelting process. Satellite observations of atmospheric sulfur dioxide (SO_2) emitted from heavy metal smelting industry in Siberia, Russia is presented. Global Ozone Monitoring Experiment (GOME) data for the years 1996 to 2002 is analyzed using a DOAS-based algorithm with the aim of retrieving SO_2 column amounts. Besides, decreasing trends in the atmospheric SO_2 observed by GOME, these point sources are still a dominant source of anthropogenic SO_2 emissions in the region. Enhanced SO_2 column amounts are clearly identified from GOME and SCIAMACHY observations over the Siberian region.

UP 13: Joint-Session with the European Physical Society (EPS) - Environmental Physics Division: "Energy and Environment"

Zeit: Donnerstag 15:00–19:00 Raum: 3B

UP 13.1 Do 15:00 3B

Introduction — •Thomas Hamacher — IPP Garching

UP 13.2 Do 15:15 3B

Global measurement of greenhouse gases and related air pollutants — •John P. Burrows — Institute of Environmental Physics and Remote Sensing, University of Bremen, Germany

In order to improve our understanding of the feedbacks within the earth atmosphere system, which determine the magnitude of global climate change, global measurement is required of greenhouse constituents at adequate spatial and temporal sampling scale. One of the holy grails of Earth Observation is the measurements of tropospheric constituents from space. In this context the determination of the loading of greenhouse gases such as Carbon Dioxide, CO_2, and Methane, CH_4, in the boundary layer and lower troposphere at a precision capable of testing our understanding of their sources and sinks is challenging. SCIAMACHY (the Scanning Imaging Absorption spectroMeter for Atmospheric CHartographY), which flies aboard ENVISAT is the first Earth Observation instrument to attempt this. It is the forerunner of the missions OCO (Orbiting Carbon Observatory, from NASA and GOSAT, Greenhouse gases Observing SATellite, from JAXA. This presentation will discuss the measurements of natural and anthropogenic greenhouse constituents and related pollutants from space.

UP 13.3 Do 15:40 3B

Climate Chemistry Interaction — •Adrian Tuck — NOAA, Boulder, US

The state of the atmosphere is considered from a molecular dynamics perspective, from which vorticity, winds and temperature are produced following the absorption of solar photons. Via the scaling exponents H, C and alpha , describing respectively the conservation, intermittency and fractality, we consider evidence that the atmosphere is never at equilibrium on any time or space scale and that accordingly Maxwell-Boltzmann distributions of molecular speeds cannot occur. The viewpoint has been expounded in book form, available from January 2008, at http://www.oup.com/uk/catalogue/? ci=9780199236534

UP 13.4 Do 16:05 3B

The impact of a nuclear renaissance on the environment — •Herwig Paretzke — GSF, Deutschland

With roughly 400 nuclear power plants in operation, nuclear power covers 17 % of the global electricity production and 6 % of the global primary energy production. A considerable increase in nuclear power capacity will reduce greenhouse gas emissions and save fossil resources. But what would be the environmental impact of a massive nuclear power based economy? No system is completely leak tight; therefore one must face the risk of radioactive material being dispersed in the environment. What would be the expected impact on human health and bio-systems?

UP 13.5 Do 16:30 3B

The Industry response to Climate Change — •RWE Power AG — Germany

Environmental concerns have become a major factor in the shaping of future power production systems. New regulations and the introduction of emission trading have a severe impact on the competitiveness of power generating companies. Research needs for future electricity production includes the entire chain of efficiency, storage, transport, production and waste treatment. RWE is interested in science dialogue and collaboration on environmental issues.

UP 13.6 Do 16:55 3B

Environmental issues in urban agglomerations — •Peter Suppan — IMK-FZK

Urbanisation is likely to continue and urban areas will be affected by climate change. Large cities are subject to special climate conditions with higher temperatures compared with the surrounding country side compounded by high pollution levels. Local emissions from traffic, heating and cooking systems produce high concentrations of pollutants like ozone, NOx and particulates. Managing climate change and reducing air pollution requires a holistic research approach to guide large urban areas into a sustainable future.

UP 13.7 Do 17:20 3B

A global monitoring system for climate and environment — •Frank Baier — DLR Oberpfaffenhofen

It has been recognisedby many governments, notably the EU, that there is a need for timely and good quality information on the state of the atmosphere at different scales from global to regional to local. This is necessary for environmental policy monitoring and verification. The GMES programme run by the EC and ESA is directed at this goal and is the European contribution to the international GEO programme. The project PROMOTE responds to these needs by delivering a service for ozone and UV monitoring and forecast, air pollution monitoring and forecast and climate monitoring and emission retrieval. The service is based on satellite and ground measurements and occasional airborne measurements. The data are integrated into models by