# UP 26 Atmosphäre und Aerosole: Datenauswertung und Modellierung

Zeit: Mittwoch 14:30–15:45 Raum: E

## Fachvortrag

UP 26.1 Mi 14:30 E

**Model sensitivity studies on atmospheric iodine chemistry and coastal nucleation events** — •Susanne Pechtl and Roland von Glasow — Institut für Umweltphysik, Universität Heidelberg, Im Neuenheimer Feld 229, D-69120 Heidelberg, Germany

We perform sensitivity studies regarding atmospheric iodine chemistry, and the possible role of iodine oxides in atmospheric new particle formation. We use the one-dimensional marine boundary layer model MISTRA, which includes chemistry in the gas and aerosol phase as well as aerosol microphysics. The chemical reaction set focuses on halogen (Cl-Br-I) chemistry. We considered both ternary sulfuric acid - ammonia - water nucleation and homomolecular homogeneous OIO nucleation. For the latter, we derived a parameterization based on combined laboratory - model studies. According to these sensitivity studies, in the clean marine background atmosphere OIO can be responsible for both homogeneous nuclei formation and the subsequent growth of the clusters to detectable sizes. In contrast to this, in the continental case with its higher levels of pollutants nucleation rates are significantly lower. Compared to ternary H2SO4-NH3-H2O nucleation, homogeneous OIO nucleation can be neglected for new particle formation in this case, but OIO can contribute to early particle growth. In general, we found OIO to be more important for the growth of newly formed particles than for the formation of new nuclei itself. There are still considerable uncertainties regarding iodine chemistry in the atmosphere as well as the exact mechanism of new particle formation via iodine oxides. We discuss sensitivity studies adressing some of these uncertainties.

## Fachvortrag

UP 26.2 Mi 14:45 E

**Comparison of measured and modelled stratospheric BrO profiles: The need for short-lived bromo-organic source gases** — •Marcel Dorf[1], Harmut Bösch[1], Andre Butz[1,2], Claude Camy-Peyret[2], Martyn Chipperfield[3], Katja Grunow[4], Lena Kritten[1], Benjamin Simmes[1], Frank Weidner[1], and Klaus Pfeilsticker[1] — [1]Institut für Umweltphysik, Universität Heidelberg, Heidelberg, Germany — [2]Laboratoire Physique Moléculaire pour l*Atmosphère et l*Astrophysique (LPMAA), Université Pierre et Marie Curie, Paris, France — [3]Institute for Atmospheric Science, School of Earth and Environment, University of Leeds, Leeds, UK — [4]Meteorologisches Institut, Freie Universität Berlin, Berlin, Germany

Since 1996 stratospheric BrO measurements have been performed on the LPMA / DOAS balloon gondola at mid- and high-latitudes during different seasons and in the tropics. From the UV/vis/near IR solar occultation measurements, vertical profiles of O3, NO, NO2, HNO3, BrO, ClONO2, OClO ... and of some source gases (N2O and CH4) can simultaneously be inferred. The present understanding of the stratospheric BrO photochemistry, with an emphasis on the lowermost stratosphere, and the total Bry budget are tested by comparing measured with photochemically modelled BrO slant column amounts and profiles. The comparison with the model indicates that in addition to the known trend of organic bromine source gases (CH3Br and halons) in the troposphere, short lived bromo-oganic source gases with a lifetime $< 0.5$ years contribute to total reactive bromine (3.5 to 5 pptv) and mid-latitudinal ozone loss.

## Fachvortrag

UP 26.3 Mi 15:00 E

**SCIAMACHY Limb Messungen von NO2, BrO und OClO** — •Sven Kühl[1], Janis Pukite[1,2], Walburga Wilms-Grabe[1], Ulrich Platt[1] und Thomas Wagner[1] — [1]Institut für Umweltphysik, Im Neuenheimer Feld 229, 69120 Heidelberg — [2]Institute of Atomic Physics and Spectroscopy, University of Latvia, Riga

Der Scanning Imaging Absorption Spectrometer for Atmospheric Chartography (SCIAMACHY) auf dem europäischen Umweltsatelliten ENVISAT misst Radianzen des gestreuten Sonnenlichtes auch in der Limb Geometrie (tangential zur Erdatmosphäre). Daraus können durch Inversionsverfahren Vertikal-Profile von atmosphärischen Spurengasen bestimmt werden. Erste Ergebnisse zu Profil-Messungen von NO2, BrO und OClO werden präsentiert. Zur Bestimmung der Profile wenden wir ein Zwei-Schritt Verfahren an: Zunächst werden differential Slant Column Densities (dSCDs) der jeweiligen Absorber im UV/VIS-Bereich durch DOAS bestimmt. Inversion der SCDs (als Funktion der Tangentenhöhe) ergibt Vertikal-Profile der Spurengas Konzentration (als Funktion der Höhe). Hierzu benutzen wir eine Optimal Estimation Methode, wobei box air mass Faktoren, berechnet durch das voll-sphärische Monte Carlo Strahlungstransport-Modell TRACY, als weighting functions angewandt werden. Der Einfluss verschiedener Parameter auf die Qualität des Profil-Retrievals sowie die Übereinstimmung mit anderen Satelliten gestützten Messungen von stratosphärischen Spurengasprofilen (SMR-ODIN, MLS-AURA) wird untersucht.

## Fachvortrag

UP 26.4 Mi 15:15 E

**Retrieval of mesopheric Mg/Mg$^+$ from SCIAMACHY limb data** — •Marco Scharringhausen[1], Art C. Aikin[2], John P. Burrows[1], Justus Notholt[1], Christian von Savigny[1], Nadine Wieters[1], and Miriam Sinnhuber[1] — [1]Institut für Umweltphysik, Universität Bremen — [2]The Catholic University of America, Washington DC

We present first results of trace gas retrievals from mesospheric emission signals observed in the SCIAMACHY limb measurements. Mesospheric emission signals are observed throughout the UV and visible spectral range. We focus on measurements in the UV-C region (214 - 330 nm).

In the UV region, band emissions of molecular species (e.g. NO, OH) are observed as well as line emissions of metallic species like Mg, Fe, Na, Si and their ionized counterparts. These emissions are partly due to resonance fluorescence. In this case number densities of the ground-state can be retrieved from the observed emission signals.

A retrieval of NO and Mg/Mg$^+$ assuming resonance fluorescence has been developed. First results of altitude profiles as well as monthly averaged global distributions of Mg/Mg$^+$ will be presented. These are the first simultaneous observations of Mg and Mg$^+$ in the mesosphere yet, neither of these species has been measured on a global scale yet before. Variations in the ratio of the two species are analysed. Concurrent retrievals of the two species provide insight into sources and sinks of mesospheric Mg/Mg$^+$. Additionally, the correlation between total abundances of Mg/Mg$^+$ and the solar activity is investigated.

## Fachvortrag

UP 26.5 Mi 15:30 E

**Tomographic retrieval of MIPAS measurements in the UTLS region** — •Tilman Steck and Michael Höpfner — Institut für Meteorologie und Klimaforschung, Forschungszentrum Karlsruhe, Postfach 3640, 76021 Karlsruhe, Germany

The Fourier transform spectrometer MIPAS (Michelson Interferometer for Passive Atmospheric Sounding) on Envisat measures infrared emission of the Earth's atmosphere in a limb viewing mode. Due to the long ray path, limb sounders are sensitive to even little abundant species. However, horizontal gradients cause systematic errors within the retrieval if a horizontally homogeneous atmosphere is assumed.

A dedicated method of taking full 2-dimensional (2d) fields of state parameters into account is presented. The diagnostics comprise estimated random error and vertical and horizontal resolution. The method is applied to measurements of MIPAS in the special mode S6. The derived 2d ozone distribution show stratospheric intrusions into the troposphere.