UP 16 Atmosphärische Spurengase und Aerosole: Laboruntersuchungen

Zeit: Mittwoch 15:15–16:00 Raum: TU TA201

Fachvortrag UP 16.1 Mi 15:15 TU TA201

Intercomparison of Formaldehyde Measurements in an Atmosphere Simulation Chamber — •Jens Bossmeyer[1,2], Theo Brauers[1], Franz Rohrer[1], Eric Schlosser[1], Ralf Tillmann[1], and Robert Wegener[1] — [1]Forschungszentrum Jülich, ICG-II: Troposphäre, D-52425 Jülich, Germany — [2]Institut für Umweltphysik, Universität Heidelberg, INF 229, D-69120 Heidelberg, Germany

Atmospheric measurements of formaldehyde (HCHO) with independent instruments often provided inconsistent results. HCHO intercomparison experiments covering typical tropospheric mixing ratios of 1-30 ppbv were conducted under controlled conditions in the atmosphere simulation chamber SAPHIR. We employed two differential optical absorption spectroscopy instruments, one with a xenon arc lamp (XDOAS), the other with a laser as light source (LDOAS), and a wet chemical method based on the Hantzsch reaction. The XDOAS is based on literature absorption cross sections, whereas the Hantzsch instrument was calibrated on liquid standards prior to and after the measurements and the high resolution LDOAS had been calibrated once on the Hantzsch in a previous intercomparison. The scatter plots of the simultaneously recorded time series of all three instruments show excellent linear correlations with r bigger than 0.97. However, the regression line between Hantzsch and XDOAS exhibits a significant slope of 1.3 indicating calibration problems whose origin still has to be identified. The implications for atmospheric HCHO measurements will be discussed.

Fachvortrag UP 16.2 Mi 15:30 TU TA201

Ozone isotopomer distribution from its formation reaction — •Christof Janssen, Bela Tuzson, and Konrad Mauersberger — MPI für Kernphysik, Saupfercheckweg 1, 69117 Heidelberg

The formation of ozone $O + O_2 + M \rightarrow O_3 + M$ (R1) shows a large and exceptional oxygen isotope anomaly, that may serve as tracer for atmospheric oxidation [1]. Transfer of the anomaly into stratospheric CO_2 has already been demonstrated and the isotopic signature of N_2O may also in part originate from ozone related chemistry [2]. Presently, several questions remain open. Most importantly, the details of the above transfer pathways as well as the origin of the isotope anomaly in ozone are not fully understood.

We present diode laser based measurements of the isotope specific rate coefficients of the ozone forming reaction (R1) for all five isotopomers relevant to the atmosphere. The results confirm that the isotope effect in ozone formation is driven by large differences in zero-point energies and also has a contribution from molecular symmetry [3]. Implications for the isotope transfer mechanism into CO_2 are discussed.

[1] Brenninkmeijer, C.A.M. et al., *Chem. Revs.* **103,** 5125 (2003).
[2] Röckmann, T. et al., *Geophys. Res. Lett.* **28,** 503, (2001).
[3] Janssen, C. et al., *Phys. Chem. Chem. Phys.* **3,** 4718 (2001).
[4] Lämmerzahl, P. et al., *Geophys. Res. Lett.* **29,** (2002).

Fachvortrag UP 16.3 Mi 15:45 TU TA201

Radius, density and refractive index measurements of a single levitated aerosol droplet using white light resonance spectroscopy — •Ulrich Krieger and Alessandro Zardini — Institut für Atmosphäre und Klima (IACETH), ETH Zürich, 8093 Zürich, Schweiz

Up to now most of the atmospheric studies using an electrodynamic balance (EDB) to study single levitated aerosol particles have relied on the mass to charge ratio as the principle measure to determine hygroscopic growth.

Sizing liquid, spherical particles in an EDB by analyzing the angular dependent light scattering (scattering phase function) is often used. Alternatively one can obtain an elastic scattering-intensity spectrum from a particle either by varying the wavelength of the incident light or by varying the size of the scattering particle that is illuminated by a fixed wavelength light. Although these techniques are well established they have not been used extensively for atmospheric studies because of their lack of versatility, needing either a particle evaporating under quasi-steady conditions or a particle not changing in size studied with a laser system tunable over a wide wavelength range. We propose an alternative method measuring the Mie resonance spectra using a white light source. In addition, we propose to use a modified version of the periodic drag force technique to determine the density of the levitated particle. We will explain the basic concept and show first results on hygroscopic growth of sulfuric acid particles.