UP 8 Poster: Atmosphärische Spurengase und Aerosole: Laboruntersuchungen

Zeit: Dienstag 10:15–12:15 Raum: Poster TU HTF

UP 8.1 Di 10:15 Poster TU HTF

PTR-MS as a Technique for Investigating Stress Induced Emission of Biogenic VOCs — •Jonathan Beauchamp[1], Armin Hansel[1], Einhard Kleist[2], Marco Miebach[2], Uwe Weller[2], Armin Wisthaler[1], and Jürgen Wildt[2] — [1]Institut für Ionenphysik, Leopold-Franzens-Universität, A-6020 Innsbruck, Austria — [2]Forschungszentrum Jülich, Institut Phytosphere (ICG-III), D-52425 Jülich, Germany

PTR-MS was used in conjunction with two GC-MS systems to investigate stress induced emissions of VOCs from plants. Experiments were performed in the laboratory under well defined conditions and VOC emissions were induced by ozone exposure at variable concentrations and for different durations. Tobacco (Nicotiana tabaccum cv. Bel W3) plants were used as the investigated species.

This investigation demonstrated the ability of PTR-MS to provide excellent high time-resolution on-line measurements of the relevant species. The combination of PTR-MS with GC-MS systems (enabling accurate compound identification) allowed for detailed investigation of the dynamics of the plants' responses to ozone stress. VOCs measured included methanol, C6- alcohols and aldehydes, methyl salicylate and sesquiterpenes. Results indicate that the temporal stress response of plants depend on the amount of stress encountered by the plant.

Measurement technique and experimental results will be presented.

UP 8.2 Di 10:15 Poster TU HTF

Atmospheric chemistry of C3-C6 cycloalkanecarbaldehydes — •Armin Wisthaler[1], Barbara D'Anna[2], Oivind Andreasen[2], Jyrki Viidanoja[3], Niels R. Jensen[3], Jens Hjorth[3], Claus J. Nielsen[2], and Armin Hansel[1] — [1]Institute of Ion Physics, University of Innsbruck, Austria — [2]Department of Chemistry, University of Oslo, Norway — [3]European Commission, DG - Joint Research Centre, Institute for Environment and Sustainability, Climate Change Unit, Ispra, Italy

Monoterpenes are emitted to the atmosphere from vegetative sources, they are highly reactive and play an important role in the chemistry of the lower troposphere. The gas-phase oxidation mechanism of monoterpenes is not completely explained, but substituted cycloalkanecarbaldehydes have been identified as important oxidation intermediates. In the present study, the hydroxyl radical and nitrate radical reaction rate coefficients of cyclopropanecarbaldehyde, cyclobutanecarbaldehyde, cyclopentanecarbaldehyde and cyclohexanecarbaldehyde have been measured at room temperature and atmospheric pressure of air. In addition, the gas phase reaction products of the cycloalkanecarbaldehydes with OH in the presence of NOx have been investigated using long-path FT-IR spectroscopy and proton-transfer-reaction mass spectrometry (PTR-MS). The identified products cover a wide spectrum of compounds including nitroperoxycarbonyl cycloalkanes, cycloketones, cycloalkyl nitrates, multifunctional compounds containing carbonyl, hydroxy and nitrooxy functional groups, HCOOH, HCHO, CO and CO2.

UP 8.3 Di 10:15 Poster TU HTF

Absorptionseigenschaften von intern gemischtem Ruß - Vergleich verschiedener Messmethoden — •Martin Schnaiter[1], Otmar Schmid[2], Andreas Petzold[3] und Ernest Weingartner[4] — [1]Forschungszentrum Karlsruhe — [2]Deutsches Zentrum für Luft- und Raumfahrt, Oberpfaffenhofen — [3]Max-Planck-Institut für Chemie, Mainz — [4]Paul Scherrer Institut, Villigen, Schweiz

Ein Großteil des frisch in die Atmosphäre emittierten Verbrennungsrußes mischt sich innerhalb von wenigen Stunden durch Koagulation und Kondensation mit anderen, primären oder sekundären Aerosolkomponenten. Um verlässliche Aussagen über die atmosphärische Aerosolabsorption treffen zu können, werden deshalb Messinstrumente benötigt, deren Absorptionsmessung nicht durch die Mischung mit anderen hauptsächlich streuenden Aerosolen beeinflusst wird.

In einer experimentellen Studie wurden die Resultate verschiedener im Feld eingesetzter Absorptionsmessmethoden im Falle von Ruß in definierten internen Mischungen mit organischen und anorganischen Aerosolkomponenten verglichen. Das Verhältnis von Rußabsorption zu Aerosolstreuung wurde dabei über einen weiten Bereich variiert. Im Einzelnen wurden verschiedene filterbasierte Methoden (Äthalometer, PSAP, MAAP) und eine photoakustische Methode (PAS) untersucht. Als Referenz diente eine Kombination aus Streu- und Extinktionsmessung bei mehreren Wellenlängen. Gefundene Übereinstimmungen bzw. systematische Abweichungen werden vorgestellt und diskutiert.

UP 8.4 Di 10:15 Poster TU HTF

Atmospheric Remote-Sensing Reference Data from GOME-2: Temperature-Dependent Absorption Cross-Sections of Ozone in the 240 - 795 nm Range — •B. Gür[1], P. Spietz[1], J. Orphal[2], and J.P. Burrows[1] — [1]Institute of Environmental Physics, University of Bremen, P.O. Box 330 440, 28334 Bremen, Germany — [2]Laboratoire de Photophysique Moleculaire, CNRS, Bat. 350, Centre d'Orsay, Orsay 91405 Cedex, France

The GOME-2 satellite spectrometer series consists of 3 flight models and is designed to record spectra of trace gases in the atmosphere and to derive a detailed picture of their atmospheric content and profile.

During the development of the GOME-1 satellite spectrometer, a recommendation was made by the GOME Science Advisory Group (GSAG)/Characterisation and Calibration Sub-group, that the temperature dependent trace gas absorption spectra should be measured under representative in-flight conditions with the GOME Flight Model.

For these measurements the spectroscopy team of the Institute of Environmental Physics developed a mobile absorption spectroscopy set-up called CATGAS (Calibration Apparatus for Trace Gas Absorption Spectroscopy) dedicatedly designed for this purpose.

ESA and EUMETSAT decided to use CATGAS for absorption measurements of O_3 with the GOME-2 FM's. In the past 2 years the CATGAS team performed 3 campaigns with two FM's (FM2, FM3, FM2-1), resulting in 3 data sets of temperature-dependent absorption spectra in the above mentioned wavelength range.

The absorption spectra are important as reference data for atmospheric remote-sensing of O_3 and other trace gases.

After a brief description of the set-up the current status of the results will be presented, together with a comparison to literature data.