UP 7 Poster: Atmosphärische Spurengase und Aerosole: Instrumentelles

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

UP 7.1 Di 10:15 Poster TU HTF

Berührungsfreie Abbildung nicht-sphärischer luftgetragener Partikel — •Roland Schön, Martin Schnaiter und Ulrich Schurath — Forschungszentrum Karlsruhe, Institut für Meteorologie und Klimaforschung, Bereich Atmosphärische Aerosolforschung

Zirren tragen zum Strahlungshaushalt der Erde bei, da sie einerseits sichtbares Licht streuen, andererseits terrestrische Strahlung absorbieren. Um diese Prozesse zu quantifizieren, werden Informationen über die Form der Eiskristalle und die orientierungsabhängige Streufunktion benötigt. Es wurde ein System zur ereignisgetriggerten, berührungsfreien Abbildung kleiner Partikel in einem schnellen Luftstrom entwickelt, das zunächst zur Untersuchung von Eiskristallen an einer Zirren-Simulationskammer und später für Messungen in natürlichen Zirren verwendet werden soll. Es besteht im Wesentlichen aus einem Trigger-LASER und einem Streulichtdetektor, der eine ultraschnelle Blitzlampe und eine CCD-Kamera mit Makro-Zoom-Objektiv immer dann auslöst, wenn sich ein Partikel durch das Gesichtsfeld der Abbildungsoptik bewegt. Das Detektionsvolumen wird vom Strahlquerschnitt des LASER's und vom Gesichtsfeld des Detektors aufgespannt. Zur Charakterisierung der Tiefenschärfe und des Auflösungsvermögens der Abbildungsoptik wurden zunächst Versuche mit mikromanipulierten Testobjekten und anschließend mit asphärischen Partikeln in einem schnellen Luftstrom (Saharastaub-Aerosol) durchgeführt.

UP 7.2 Di 10:15 Poster TU HTF

Long path DOAS tomography by the use of Multibeam DOAS instruments: Results of an indoor validation campaign — •Kai Uwe Mettendorf, Andreas Hartl, Denis Poehler, Ulrich Platt, and Irene Pundt — Institut für Umweltphysik; Universität Heidelberg

Long path DOAS (Differential Optical Absorption Spectroscopy) tomography uses 10 to 40 intersecting light beams to probe 2-3 dimensional concentration distributions of various trace gases (e.g. NO2, SO2, ozone, HCHO) in the measurement area. From the average concentrations measured along the different light paths the concentration distributions can be reconstructed with suitable inversion algorithms. First indoor tomographic DOAS measurements with the recently developed Multibeam Long path DOAS instruments were performed in an empty facility hall in Heidelberg/Germany in order to validate the method. The measurement setup used three Multibeam instruments and a total of 39 different light paths. The size of the test field was 10 m x 15 m. The concentration distribution consisted of one or two NO2 filled cylindrical polycarbonate vessels placed inside the test field. The results of the reconstructions using the Simultaneous Iterative Reconstruction Technique (SIRT) are shown.

UP 7.3 Di 10:15 Poster TU HTF

Measurements of NO2 and HCHO in Northern Italy with the AMAXDOAS Instrument — •Klaus-Peter Heue[1], Marco Bruns[2], John P. Burrows[2], Ulrich Platt[1], Andreas Richter[2], Bing Chao Song[1], Thomas Wagner[1], Ping Wang[2], and Irene Pundt[1] — [1]Institut für Umweltphysik, Universität Heidelberg, INF 229, D-69120 Heidelberg — [2]Institut für Umweltphysik, Universität Bremen, Otto-Hahn-Allee 1, D-28359 Bremen

The AMAXDOAS-instrument is a specially designed Multi Axis DOAS instrument for airborne measurements. In August 2002 and September 2003 the instrument was installed on a Partenavia 68 in the framework of the European FORMAT project. During each campaign 10 flights were performed in greater Milano and the Po-Valley. The typical flight altitude was within or just above the boundary layer. Here we present data from both campaigns.

In 2002 we focused on the HCHO distribution around Milano. The different viewing directions allow us to retrieve profiles of both aerosol and HCHO from the observed SCDs of O4 and HCHO.

During the second campaign it was possible to derive NO2 emission rates of the large power plant Sermide (south east of Mantova). Downwind of the power plant the emission plume had been crossed three times. As we measured forward and backward with several elevations, a 2 dimensional reconstruction of the plume is possible allowing a detailed analysis of the emissions.

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.