UP 10: Atmosphäre - Spurengase, Aerosole und Labormessungen

Zeit: Mittwoch 14:00–15:30 Raum: HS 5

UP 10.1 Mi 14:00 HS 5

First results from NIR lunar total column xCO_2 FTIR spectroscopy — •Matthias Buschmann, Nicholas Deutscher, Mathias Palm, Thorsten Warneke, Tine Weinzierl, and Justus Notholt — Institut für Umweltphysik, Universität Bremen, Bremen, Deutschland

The measurement of long-lived greenhouse gases, like CO_2 and CH_4, and identification of their sources and sinks is very important in the context of climate change research. Networks like the TCCON (Total Carbon Column Observing Network) continuously monitor a variety of trace gases in the atmosphere by employing ground based Fourier Transform InfraRed (FTIR) spectroscopy on solar radiation in the near infrared (NIR). A precision is yielded that is suitable for satellite and model validation and has given deeper insight in atmospheric chemical processes. However, at high latitude sites (like Ny Ålesund, Spitzbergen at 79° N), there is no direct sunlight in winter due to the polar night and the moon is the next best source of NIR radiation. In this talk we will present the first results of trace gas retrieval using a customised, cooled InGaAs detector at our site in Ny Ålesund.

UP 10.2 Mi 14:15 HS 5

A potential secondary ice process in tropospheric clouds — •Patricia Handmann, Thomas Pander, Alexei Kiselev, and Thomas Leisner — Karlsruher Institut für Technologie

Aerosols and water vapor are the two main constituents of clouds. At the same time, aerosols can nucleate ice in supercooled droplets and influence the precipitation processes in clouds via the WEGENER-BERGERON-FINDEISEN process of glaciation, when frozen droplets grow at the expense of liquid ones and fall to the ground. In experiments conducted at an electrodynamic trap with an attached high-speed camera, a potential secondary ice process influenced by aersols has been observed during the freezing of water droplets. Weak spots in the ice shell around a liquid core may crack up and bubbles may form which, once they break up, may eject small ice particles at several meters per second. This process may help in understanding the occasionally observed rapid glaciation in clouds.

UP 10.3 Mi 14:30 HS 5

Deliquescence and Efflorescence Behavior of Ternary Inorganic/Organic/Water Aerosol Particles — •Andreas Peckhaus[1], Stefan Grass[2], Lennart Treuel[2], and Reinhard Zellner[2] — [1]Karlsruher Institut für Technologie (KIT), Karlsruhe, Baden-Württemberg. — [2]Universität Duisburg-Essen, Essen, Nordrhein-Westfalen.

The deliquescence behavior of ternary inorganic /organic/water aerosol particles has been investigated at room temperature using a surface aerosol microscopy (SAM) technique. The results obtained for the deliquescence relative humidities (DRH) for deposited particles of variable inorganic/organic contents show a eutectic behavior with the mixed particles showing deliquescence at lower DRH compared to the pure inorganic and organic components, respectively. This behavior has been quantitatively modeled using the extended aerosol inorganics (E-AIM) thermodynamic model of Clegg et al. in combination with the UNIFAC group activity approach to account for organic molecular solutes. In addition, we have investigated the efflorescence behavior of supersatured and formerly deliquesced ternary solution droplets using space resolved Raman spectroscopy. In the efflorescing aerosol particles a partial crystallization of individual components is found. Further drying of such droplets produces solid particles in which the inorganic and organic phases show some spatial separation with the organic component being predominantly found at the outer part of the particle.

UP 10.4 Mi 14:45 HS 5

Heterogeneous Ice Nucleation of Micrometer Sized Water Droplets on Well Defined Surfaces — •Moritz Haarig, Isabelle Steinke, and Thomas Leisner — Karlsruher Institut für Technologie (KIT), Institut für Meteorologie und Klimaforschung - Atmosphärische Aerosolforschung (IMK-AAF))

Ice nucleation in clouds has an impact on global climate, because it influences the structure of clouds and thus precipitation and the global radiative budget. Often, aerosol particles are found to be immersed in water droplets where they initiate the formation of ice. However, it is still not clear which characteristics of the aerosol particles are important for being good ice nuclei.

In our experiment, we have created a testbed for immersion freezing where we can investigate the freezing of several hundreds of water droplets on well-characterized surfaces. We present freezing curves for silicon, copper and graphite and also the corresponding heterogeneous ice nucleation rates. We have also investigated the surface roughness of these materials with an atomic force microscope. Furthermore, in future studies we will change the surface properties of certain materials by chemical etching. This gives us the opportunity to learn more about the influence of different morphologies on the process of ice nucleation.

Kaffeepause, 30 min