UP 1: Atmosphäre - Spurengase, Aerosole und Labormessungen

Zeit: Dienstag 11:00–12:30 Raum: HS 5

Hauptvortrag UP 1.1 Di 11:00 HS 5

Aircraft borne combined measurements of the Fukushima radionuclide Xe-133 and fossil fuel combustion generated pollutants in the TIL - Implications for Cyclone induced rapid lift and TIL physico-chemical processes — Hans Schlager[1], •Frank Arnold[2,1], Hardy Simgen[2], Heinfried Aufmhoff[1], Robert Baumann[1], Siegfried Lindemann[2], Ludwig Rauch[2], Frank Käther[2], Liisa Pirjola[3], and Ulrich Schumann[1] — [1]DLR IPA, Oberpfaffenhofen, Germany — [2]MPI Kernphysik, Heidelberg, Germany — [3]University of Helsinki, Helsinki, Finland

The radionuclide Xe-133, released by the March 2011 nuclear disaster at Fukushima/Daiichi (hereafter FD), represents an ideal tracer for atmospheric transport. We report the, to our best knowledge, only aircraft borne measurements of FD Xe-133 in the Tropopause Inversion Layer (TIL), indicating rapid lift of polluted planetary boundary layer air to the TIL. On the same research aircraft (FALCON), we have also conducted on-line measurements of fossil fuel combustion generated pollutant gases (SO2 and other species), which had increased concentrations in the TIL. In addition, we have conducted supporting model simulations of transport, chemical processes, and aerosol processes. Our investigations reveal a potentially important impact of East-Asian cyclone induced pollutants transport to the TIL. This impact includes particularly aerosol formation.

UP 1.2 Di 11:30 HS 5

Cool and wet or coal and dry, how coal fired power generation modifies regional climate — •Wolfgang Junkermann[1,2] and Jorg M. Hacker[2] — [1]KIT, IMK-IFU, Garmisch-Partenkirchen, Germany — [2]ARA, Flinders University, Adelaide, Australia

Burning coal for power generation has environmental impact due to up to now unavoidable carbon dioxide emissions leading to global warming. A further unanticipated side effect of flue gas cleaning and reductions of sulphur and nitrogen oxide emissions is the enhancement of the production of ultrafine particles serving as cloud condensation nuclei (CCN) precursors. The number of additional CCN can modify cloud microphysics on a regional scale. Here we show first observational evidence for a large scale significant modification of rainfall spatial and temporal distribution due to power generation from state of the art 'clean' coal burning.

UP 1.3 Di 11:45 HS 5

OClO time-series in the volcanic plume of Mt. Etna, Sicily — •Jonas Gliss, Nicole Bobrowski, Marco Huwe, Constantin Mayer, Henning Finkenzeller, Leif Vogel, and Ulrich Platt — Institut für Umweltphysik, Universität Heidelberg

The study of the chemical composition of volcanic plumes is important both for the understanding of volcanic processes and the influence of volcanic activity on the atmosphere. Volcanic gas can have impacts on the atmosphere on regional and global scales. Besides very stable compounds (e.g. CO_2) also reactive halogen-species such as BrO, ClO, OClO are abundant in volcanic plumes.

The so-called method of Multiaxis Differential Absorption Spectroscopy (MAX-DOAS) is an established method to determine these reactive components in volcanic plumes by analyzing scattered sunlight which has passed the plume.

We present MAX-DOAS measurements that were performed at Mt. Etna, Sicily in September 2012. For the first time it has been possible to measure spatial distributions of the halogen compound chlorine dioxide (OClO) in a volcanic plume. Along with the evaluation of OClO the species bromine monoxide (BrO) as well as sulphur-dioxide (SO_2) were evaluated for each data set. OClO column densities up to several 10^{14} molecules/cm^2 have been measured in an area of about 4 km around the emission source. Assuming a plume width of less than 1 km this yields OClO concentrations of several hundred ppt in the volcanic plume. We will discuss these results and their importance to improve our knowledge about chlorine-chemistry in volcanic plumes.

UP 1.4 Di 12:00 HS 5

SCIAMACHY WFM-DOAS XCO_2: Improvements and Comparison with FTS Measurements — •Jens Heymann, Oliver Schneising, Maximilian Reuter, Michael Buchwitz, Heinrich Bovensmann, and John P. Burrows — University of Bremen, Institute of Environmental Physics (IUP), Bremen, Germany

Carbon dioxide (CO_2) is the most important anthropogenic greenhouse gas contributing to global climate change. Column-averaged dry air mole fractions of CO_2 (XCO_2) as retrieved from the satellite instrument SCIAMACHY on-board ENVISAT (launch 2002) have the potential to provide important missing global information on regional CO_2 surface fluxes. This however requires to satisfy challenging accuracy requirements. Here, we present results of an inter-comparison of seven years (2003 – 2009) of SCIAMACHY XCO_2 retrievals obtained with version 2.1 (WFMDv2.1) and an updated version (WFMDv2.2) of the WFM-DOAS retrieval algorithm with FTS measurements from TCCON sites. An improved cloud filtering method has been applied to the WFMDv2.2 retrievals because scattering by unaccounted clouds, especially thin cirrus clouds, is an important error source. The filter is based on a threshold technique using radiances from the saturated water vapour absorption band at 1.4 μm which is mostly sensitive to thin clouds. The inter-comparison of the SCIAMACHY WFM-DOAS XCO_2 versions with FTS measurements shows overall better agreements for WFMDv2.2. These results show that the cloud filtering method successfully improves the SCIAMACHY WFM-DOAS XCO_2 data set.

UP 1.5 Di 12:15 HS 5

Bestimmung von N2O-Druckverbreiterungskoeffizienten im 0400-Band bei 2250-2400 cm-1 und 0002-Band bei 4300-4450 cm-1 mittels hochauflösender FTIR-Spektroskopie — •Viktor Werwein[1], Anton Serdyukov[1], Jens Brunzendorf[1], Oliver Ott[1], Anne Rausch[1], Olav Werhahn[1] und Volker Ebert[1,2] — [1]Physikalisch-Technische Bundesanstalt, Bundesallee 100, 38116 Braunschweig — [2]Center of Smart Interfaces, Technische Universität Darmstadt, Petersenstraße 32, 64287 Darmstadt

Das von der PTB koordinierte europäische Forschungsprojekt "EUMETRISPEC" zielt auf die Entwicklung und Validierung eines Messstands zur rückgeführten Bestimmung molekularer Spektraldaten. Hierfür wird derzeit ein hochauflösendes FTIR-Spektrometer (Bruker IFS 125HR) charakterisiert, über Vergleichsmessungen mit hoch auflösender Laserspektroskopie validiert und um spezielle Messzellen zur präzisen Einstellung der thermo-chemischen Randbedingungen erweitert. Zielgrößen sind dabei zunächst die Linienparameter exemplarisch ausgesuchter Übergänge der wichtigsten Treibhausgase. Erste Testexperimente für das Spektrometer beschäftigten sich zunächst mit den Linienparametern der 4ν2- (2250-2400 cm-1) und der 2ν4-Bande (4300-4450 cm-1) von Distickstoffmonoxid, einem wesentlich zur Erderwärmung beitragenden Treibhausgas. Die erhaltenen Ergebnisse werden mit den Werten aus der HITRAN-Datenbank und der Literatur verglichen.