UP 10: Poster session

Zeit: Donnerstag 16:30–18:30 Raum: HS 22

UP 10.1 Do 16:30 HS 22

Estimating global warming from anthropogenic heat emissions — •Peter Steiglechner, Maria Martin, and Georg Feulner — Potsdam-Institut für Klimafolgenforschung (PIK)

The consumption of primary energy from sources such as fossil or nuclear fuels and the consequent dissipation to heat induces a direct climate warming, the so called anthropogenic heat flux (AHF) forcing.

The current global AHF is negligibly small compared to the indirect forcing from greenhouse gas emissions. However, by continuing the historically observed exponential growth of primary energy consumption, e.g. fueled by fusion power, the impacts of the AHF can become a relevant factor for anthropogenic post-greenhouse gas climate change even on the global scale.

We estimated the global warming from different scenarios of growing AHF forcing in climate models ranging from conceptual Energy Balance Models to a climate model of intermediate complexity. The associated feedbacks, in particular the ice-albedo feedback and the ocean heat uptake, as well as the influence of the heterogeneity of the forcing were examined. The global mean temperature response from the AHF today is of the order of $0.010 - 0.016\,\mathrm{K}$. A transient tenfold increase of this forcing heats up the Earth System additionally by roughly $0.1 - 0.2\,\mathrm{K}$ in the models used in this work.

The transition to a renewable energy mix, explicitly without nuclear power, however, largely eliminates the increasing AHF forcing and its climate impacts, independent of the growth of energy production.

UP 10.2 Do 16:30 HS 22

Cloud microphysical properties from airborne camera observations of the backscatter glory — •Veronika Pörtge, Lucas Höppler, Tobias Kölling, Tobias Zinner, and Bernhard Mayer — Ludwig-Maximilians-Universität, Meteorologisches Institut, München, Germany

Cloud microphysical properties such as the effective radius of the droplets or the shape of their size distribution determine the effect of clouds on the global radiation budget and hence on Earth's climate. In this study we present a remote sensing method for detecting those optical properties by using the backscatter glory which is a well-known optical phenomenon for water clouds.

The glory is caused by backscattering of sunlight by spherical droplets in clouds. This backscattering results in colorful concentric rings surrounding the observer's shadow which can be quantitatively described by Mie theory. The angular radius of the rings is a very accurate and direct measure of the droplet size, while the "sharpness" of the image contains information about the width of the size distribution.

We analyse systematic camera observations which were taken during the NARVAL-II campaign in 2016 from the HALO aircraft by comparing them with radiative transfer simulations. Results of this method will be presented and compared to "traditional" remote sensing methods.

UP 10.3 Do 16:30 HS 22

Untersuchung der raum-zeitlichen Variabilität verschiedener Luftschadstoffe in der Innenstadt Düsseldorfs mit mobilen Messungen — •Konradin Weber[1], Georg Heweling[2], Tobias Pohl[1], Christian Fischer[1] und Christoph Böhlke[1] — [1]Hochschule Düsseldorf HSD, Labor für Umweltmesstechnik UMT, Münsterstr. 156, 40476 Düsseldorf — [2]Qiagen GmbH, Qiagen Straße 1, 40724 Hilden

Die Corneliusstraße in der Düsseldorfer Innenstadt ist als eine besonders stark mit Luftschadstoff-Immissionen belastete Straße in NRW bekannt. Verschiedene Luftschadstoffe werden dort vom Landesumweltamt LANUV NRW überwacht. Um jedoch die Belastung eines ausgedehnten Innenstadtbereiches beurteilen zu können, sind zusätzlich auch Informationen über die räumliche und zeitliche Variabilität der Luftschadstoffe in diesem Stadtgebiet notwendig.

Aus diesem Grund wurden in 2017 zahlreiche Messfahrten mit einem umfangreich instrumentierten Mess-Pedelec der HSD in Düsseldorfs Innenstadt durchgeführt. Als Messsysteme wurden dabei eingesetzt: Cavity-DOAS (für NO2), Optical Particel Counter OPC (für Feinstaub), UV-Absorption (für Ozon), elektrische Aufladung (für Ultrafeinpartikel UFP), Aethalometer-Verfahren (für Ruß).

Die Messfahrten wurden mittags, in der Rush-Hour sowie um Mitternacht durchgeführt. Eine Besonderheit bei diesen Untersuchungen stellten die Messungen von UFP sowie Ruß dar. Bei den Untersuchungen konnten weitere Belastungsschwerpunkte in der Innenstadt identifiziert und einzelnen Schadstoffkomponenten zugeordnet werden.

UP 10.4 Do 16:30 HS 22

Potential Arctic Cirrus Cloud Feedbacks on the Composition of the UTLS — •Florian Haenel[1], Wolfgang Woiwode[1], Michael Höpfner[1], Roland Ruhnke[1], Farahnaz Khosrawi[1], Oliver Kirner[2], Felix Friedl-Vallon[1], Sören Johansson[1], Anne Kleinert[1], Jennifer Schröter[1], and Björn-Martin Sinnhuber[1] — [1]Karlsruhe Institute of Technology, Institute of Meteorology and Climate Research, Karlsruhe, Germany — [2]Karlsruhe Institute of Technology, Steinbuch Centre for Computing, Karlsruhe, Germany

The composition of the UTLS (upper troposphere/lower stratosphere) plays a key role in climate change, as radiative forcing of the atmosphere is sensitive to abundances of greenhouse gases in this region. Therefore, a correct representation of processes and feedbacks in the UTLS in atmospheric models is crucial. Cirrus clouds in the UTLS are directly capable of redistributing water vapour (H2O) and nitric acid (HNO3). This may furthermore lead to changes in the vertical distributions of the greenhouse gases methane and ozone. The role of high latitude and particularly Arctic cirrus clouds is not well understood. We retrieve vertical profiles of these trace gases measured by the airborne infrared limb sounder GLORIA during the POLSTRACC campaign in the vicinity of cirrus clouds. Comparison to the measurements and sensitivity studies with simulations by the high-resolution forecast model ICON-ART and the climate-chemistry model EMAC will gain insight into the performance of the models and the significance of these processes on the composition of the UTLS.

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Bestimmung der zeitlichen Entwicklung stratosphärischer Aerosolparameter über Nordnorwegen aus LIDAR-Messungen — •Jacob Zalach und Christian von Savigny — Universität Greifswald

Stratosphärische Aerosole sind von großer Bedeutung für die Ozonchemie und die atmosphärische Strahlungsbilanz. Die Aerosolbefrachtung zeigte innerhalb der letzten 15 Jahre eine deutliche Variabilität, wobei sich bisherige LIDAR-Langzeitbeobachtungen auf mittlere geografische Breiten konzentrieren.

Im Rahmen des LESAP Projektes wurden Daten des RMR-LIDAR Systems der Alomar Station bei 69°N im Zeitraum von 1995 bis 2018 ausgewertet. Die Messungen der Rückstreuverhältnisse bei verschiedenen Wellenlängen erlauben es Partikelradien, Extinktionskoeffizienten und Dichten zu bestimmen.

Der Beitrag skizziert das Auswertekonzept und zeigt die im Messzeitraum beobachtete Aerosolentwicklung. Ein Vergleich der errechneten Extinktionskoeffizienten mit Werten, die mittels Satellitenmessungen gewonnen wurden, zeigt zwar eine relativ gute Übereinstimmung aber auch charakteristische Abweichungen. Die Gründe dafür werden diskutiert.

UP 10.6 Do 16:30 HS 22

Aerosols from remote Central West Antarctica - Characterization and Chemical Imaging — •Johannes Weis[1,2,6], Ricardo H. M. Godoi[1,3], Ana F. L. Godoi[1,3], Simon Mueller[1,2], Sérgio J. Goncalves Jr.[3], Heitor Evangelista[4], Swarup China[5], Bingbing Wang[5], Alexander Laskin[5], Tristan H. Harder[6], and Mary K. Gilles[1] — [1]Chemical Science Division, Lawrence Berkeley National Laboratory, Berkeley, CA 94720, USA — [2]Department of Chemistry, University of California, Berkeley, CA 94720, USA — [3]Department of Environmental Engineering, Federal University of Paran UFPR, Curitiba, PR, Brazil — [4]LARAMG, State University of Rio de Janeiro Uerj, Rio de Janeiro, RJ, Brazil — [5]William R. Wiley Environmental and Molecular Science Laboratory, Pacific Northwest National Laboratory, Richland, Washington 99352, USA — [6]Department of Physics, University of Wuerzburg, Germany

Changes in Antactica's ice sheets and shelves are of primary concern to the regional and global climate. We hypothesize that the West Anarctic warming can be related to the aerosols transported and formed in this

region. Internal composition and characteristics of single aerosol particles were studied by means of chemical mapping via synchrotron-based scanning transmission X-ray microscopy with near edge X-ray absorption fine structure spectroscopy (STXM/NEXAFS) and consequent rule-based cluster classification. Complementary data from computer-controlled scanning electron microscopy with energy-dispersive X-ray spectroscopy (CC-SEM/EDX) offers a deeper understanding of aerosol particles formed in Antarctica's pristine environment.