with height. Time series of seasonal (3-monthly) mean gravity wave activity show maximum amplitudes around 1989-1991 and 2000-2002, which is concomitant with the solar activity maxima within the 11-year solar cycle, and the time intervals of increased mean wind shear on a decadal scale.

EP 2.11 Fr 17:30 TU BH349

The global signal of the 11-year sunspot cycle in the atmosphere: When do we need the QBO? — •Karin Labitzke — Institut für Meteorologie, Freie Universität Berlin

The global structure and the size of the signal of the 11-year sunspot cycle in the stratosphere and troposphere was examined in earlier studies. The correlations between the solar cycle and heights and temperatures of and at different pressure levels were mainly carried out with the whole data set and only during northern winters the years were separated according to the phase of the Quasi-Biennial Oscillation. Here, this work is expanded and it is shown that the QBO must be introduced throughout the year, because the solar signal is very different in the respective phases of the QBO, particularly over the tropics and subtropics. The structure of the solar signal in northern summer appears to indicate that the mean meridional circulations (Hadley and Brewer-Dobson Circulations) are influenced by the 11-year solar cycle, especially during the east phase of the QBO. This result may help to find the mechanism through which the solar cycle (and the connected variation of the ultraviolet radiation) can influence the atmosphere

EP 2.12 Fr 17:45 TU BH349

Model Simulations of Thermospheric NO Intrusions and Comparison with MIPAS-ENVISAT observations — •Thomas Reddmann[1], Bernd Funke[2], Thomas von Clarmann[1], Sven Gabriel[1], Wolfgang Kouker[1], Manuel Lopez-Puertas[2], Roland Ruhnke[1], Gabriele Stiller[1], and Roland Uhl[1] — [1]Inst. of Meteorology and Climate Research, Research Center and University of Karlsruhe — [2]Instituto de Astrofisica de Andalucia, Granada

The contribution of NO intrusions from the lower thermosphere into the middle atmosphere to the total NOy budget during periods of higher solar activity and their effect on ozone chemistry is still an open question. During its first two years of operations the MIPAS instrument on the ENVISAT satellite observed NO enhancements in polar winter. In addition, first results of the solar storm period in October/November 2003 also showed enhanced NO concentrations in the upper stratosphere and ozone loss subsequent to this event. The MIPAS observations therefore provide a data set through which models of the middle atmosphere can be validated in respect of downward transport inside the polar vortex and the effect on ozone chemistry can be estimated.

Here we focus on first results of a comparison of the MIPAS observations of NO, ozone and stratospheric tracers with results obtained with the middle atmosphere model KASIMA. We discuss aspects of model initialization as data assimilation and the parameterization of photolysis rates especially for NO at high solar zenith angles.

EP 2.13 Fr 18:00 TU BH349

Enhanced NOx-induced ozone loss in the Arctic middle stratosphere during the 2002/03 winter and spring. — •Paul Konopka, Jens-Uwe Grooss, Martin Kaufmann, and Rolf Müller — Forschungszentrum Jülich, ICG-I, 52425-Jülich

High resolution, 3D simulations of tracer distribution in the Arctic tratosphere during the winter and spring 2002/2003 (SOLVE2/VINTERSOL) have been conducted with the Chemical Lagrangian Model of the Stratosphere (CLaMS). CLaMS is based on a Lagrangian formulation of the tracer transportand, unlike Eulerian CTMs, considers an ensemble of air parcels on a time-dependent irregular grid that is transported by use of the 3d-trajectories. The NOx-induced ozone loss driven by the so-called summertime NOx chemistry is a well-known photolytical mechanism mainly occurring in the middle and upper tratosphere over polar regions in spring and summer. By transporting ozone in CLaMS as a passive tracer, the chemical ozone loss can be deduced as the difference between the observed (HALOE, POAM, MIPAS) and simulated ozone profiles. Our results show that at least for 2002/03 winter the column ozone loss driven by the NOx chemistry is of the same magnitude as the chlorine-induced ozone loss in the lower stratosphere. The NOx-induced ozone decline mainly occurs in high latitudes near the vortex edge, as the stratosphere undergoes a transition from a strong mixing situation in the late winter/spring, when the vortex breaks down (top-down process), to a weakly stirred situation in summer.We discuss NOx sources which are responsible for this ozone loss, in particular the amount of stratospheric NOx that can be traced back to their sources above the stratopause.

EP 2.14 Fr 18:15 TU BH349

Towards a Better Understanding of the Energy Balance in the Upper Mesosphere and Lower Thermosphere: Contributions from the ESA ENVISAT Mission — •Martin Kaufmann[1], Martin Riese[1], Sergio Gil-Lopez[2], Manuel Lopez-Puertas[2], Bernd Funke[2], Gabriele Stiller[3], Thomas von Clarmann[3], Heinrich Bovensmann[4], Pekka Verronen[5], and Anne Smith[6] — [1]Forschungszentrum Juelich, ICG-I — [2]Instituto de Astrofisica de Andalucia — [3]Forschungszentrum Karlsruhe, IMK — [4]Universitaet Bremen, IUP — [5]Finnish Meteorological Institute — [6]National Center for atmospheric research, ACD, Boulder, USA

The mesosphere and lower thermosphere is highly sensitive to external influences from the sun as well as from the atmosphere below. Its chemical and thermal balance can change significantly due to natural influences as well as due to human-induced changes.

The combination of three instruments on board of ESA's ENVISAT satellite give a unique possibility to improve our understanding of this region. MIPAS is able to measure temperature, CO_2, and ozone during day- and nighttime. GOMOS measures nighttime ozone, and the SCIAMACHY instrument yields temperature, daytime-ozone, atomic oxygen, and in combination with the other instruments atomic hydrogen.

In this talk we focus on ENVISAT datasets which are already existing in this altitude region. The retrieval of ozone from MIPAS/ENVISAT will be described. The quality of the dataset with respect to uncertainties in the retrieval scheme and the forward modeling are analyzed.

EP 2.15 Fr 18:30 TU BH349

The sensitivity of the middle and upper atmosphere to solar and anthropogenic climate forcing: Simulations with HAMMONIA — •Hauke Schmidt, Guy P. Brasseur, and Marco A. Giorgetta — Max Planck Institute for Meteorology, Bundesstr. 53, 20146 Hamburg

The HAMMONIA general circulation and chemistry model resolves the atmosphere from the Earth's surface up to about 250 km. This newly developed model combines the 3d dynamics from the ECHAM5 model with the MOZART3 chemistry scheme. Additional parameterizations have been implemented to account for important processes in the upper atmosphere, like solar radiation in the extreme UV, the ion drag, and molecular processes.

This study concentrates on the response of dynamics and trace gases, in particular ozone and water vapor, in the mesosphere and lower thermosphere (MLT) region to solar and anthropogenic climate forcing. Results of different simulations with HAMMONIA for low and high solar activity on the one hand, and for present day and doubled CO2 concentration on the other hand are compared. The solar cycle experiments indicate e.g. an ozone increase for high solar activity of up to 25%, a temperature increase of 3 to 10 K, and a decrease in water vapor. Additionally, we address the effect of the different types of forcing on the energy budget of the MLT.