Geophysical Research Abstracts
Vol. 12, EGU2010-4802-2, 2010
EGU General Assembly 2010

Satellite observations of OClO from 1995 to 2010 in comparison to ECMWF data and EMAC simulations

Sven Kühl (1), Janis Pukite (1), Steffen Dörner (1), Patrick Jöckel (2), Rüdiger Sörensen (1), and Thomas Wagner (1)

(1) Max Planck Institut für Chemie, Mainz, Germany (skuehl@mpch-mainz.mpg.de), (2) DLR, Institut für Phsik der Atmosphäre, Oberpfaffenhofen

Satellite instruments like GOME, GOME-2 and SCIAMACHY measure the spectral intensity of the sunlight, scattered back from Earths atmosphere, on an almost global and daily scale. By applying the DOAS method to the spectral measurements, the integrated concentration of several trace gases along the light path, the so called Slant Column Densitiy (SCD), can be derived. Chlorine dioxide (OClO) is an important indicator for stratospheric chlorine activation, the basis for massive ozone depletion in polar spring.
Due to the daily coverage of the polar regions, the OClO measurements give a good overview of the intensity and the extension of the chlorine activation. While the observations in nadir geometry (i.e. perpendicular to Earths surface) provide a (indirect) measurement of the total column, the limb observations (i.e. tangential view) can be inverted to vertical profiles.
We investigated GOME, GOME-2 and SCIAMACHY data from 1995 to 2010, covering Arctic and Antarctic winters with very different meteorological situations (very cold and very warm winters; early and major warmings). The derived OClO columns are compared to ECMWF analysis data, studying the dependence of the OClO enhancements on meteorological parameters like stratospheric temperatures and potential vorticity.
Also, the interaction of stratospheric OClO with NO2 and BrO is investigated for selected meteorological situations as well as for long term correlations for different seasons and latitudes, considering in particular the impact on the ozone chemistry. In addition the OClO SCDs are compared to model results calculated (in a nudged setup) with the ECHAM5/MESSy Atmospheric Chemistry (EMAC) general circulation model for the time of the satellite observations. We investigate the inter-hemispheric differences in the observed and simulated OClO profile (e.g. regarding the magnitude, the altitude of the profile peak and their evolution throughout the winter). For the Arctic, we study the inter-annual differences and investigate the dependence of the observed and modeled chlorine activation on the respective meteorology.