



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

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Satellite instruments like GOME, GOME-2 and SCIAMACHY measure the spectral intensity of the sunlight, scattered back from Earth's 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 Density (SCD), can be derived. Chlorine dioxide (OCIO) 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 OCIO 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 Earth's 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 OCIO columns and vertical profiles are compared to ECMWF analysis data, studying the dependence of the OCIO enhancements on meteorological parameters like stratospheric temperatures, potential vorticity, PSC area and volume.

In addition the OCIO observations are compared to correlated ECHAM5/MESy2 (EMAC) simulations, which were calculated for the time of the satellite observations. We investigate the inter-hemispheric differences in the observed and simulated OCIO 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.