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Development of an OClO Slant Column Product for the GOME-2 Sensors

Andreas Richter, Folkard Wittrock, and John P. Burrows
University of Bremen, Institute of Environmental Physics (IUP), Bremen, Germany (richter@iup.physik.uni-bremen.de)

Stratospheric ozone depletion by catalytic reactions involving halogens is one of the most prominent examples of anthropogenic impacts on the atmosphere. In spite of the rapid and successful international action to reduce emissions of CFCs and other ozone depleting substances leading to the Montreal Protocol and its amendments, ozone depletion in polar spring is still observed in both hemispheres on a regular basis. For the coming years, slow ozone recovery is expected but individual years will still see very low ozone columns depending on meteorology and possible interactions with climate change.

Monitoring of both ozone and ozone depleting substances in the stratosphere remains a priority to ensure that the predicted reduction in halogen levels and recovery of ozone columns is taking place as predicted. One way to observe stratospheric chlorine activation is by measurements of OClO which can be detected by UV/visible remote sensing from the ground and from satellite. While the link between OClO levels and chlorine activation is complicated by the fact that a) OClO is not directly involved in ozone depletion but is produced by reaction of BrO and ClO and b) is rapidly photolysed at daylight, the long existing data series from both ground-based and satellite observations makes it an interesting tracer of chlorine activation.

The GOME-2 instruments on the MetOp series of satellites are nadir viewing UV/vis spectrometers having the spectral coverage and resolution needed for Differential Optical Absorption Spectroscopy retrievals of OClO. With their combined lifetime of more than 15 years, they can provide a long-term data set. However, previous attempts to create an OClO product for GOME-2 suffered from large scatter in the OClO data and time-dependent offsets.

Here we present an improved OClO slant column retrieval for the two instruments GOME2-A and GOME2-B. The data is shown to be of similar quality as for earlier instruments such as SCIAMACHY, and is consistent between the instruments. The time series from the two instruments nicely reproduces the large interannual variability in chlorine activation in both hemispheres. Validation with ground-based DOAS zenith-sky observations in Ny-Ålesund shows very good agreement in NH spring. Some baseline drift remains in the GOME2-A data which could be further reduced by application of an offset correction.