Geophysical Research Abstracts,
Vol. 11, EGU2009-7666, 2009
EGU General Assembly 2009

Vertical Ozone Profiles from GOME-2 on Metop-A

O.N.E. Tuinder (1), A. Delcloo (2), and L Kins (3)
(1) KNMI, de Bilt, Netherlands (tuinder@knmi.nl), (2) KMI, Uccle, Belgium, (3) DWD, Hohenpeissenberg, Germany

The Global Ozone Monitoring Instrument 2 (GOME-2) on board EPS/Metop-A, launched in Oct 2006, is the first instrument on a European operational meteorological platform aimed at sensing ozone and other trace gases in the Earthś atmosphere. GOME-2 is a nadir scanning instrument that measures UV-VIS back scattered solar light with a relatively high spectral resolution (0.2-0.4 nm). With a nominal pixel size of 80x40 km$\hat{2}$ it has an almost global coverage in one day.
Within the framework of the Ozone and Atmospheric Chemistry Monitoring Satellite Application Facility (O3MSAF) of EUMETSAT, KNMI runs the Ozone Profile Retrieval Algorithm (OPERA) to calculate a vertical profile of partial ozone columns in 40 layers from the surface up to 0.1 hPa. The algorithm uses GOME-2 radiance measurements in the range from 260 to 330 nm and tries to find the ozone profile best matching the original radiance measurements. This is done by iteratively adjusting the knowledge of the state of the model atmosphere via a forward model and the optimal estimation inversion technique.

We present results of the vertical ozone profiles calculated from GOME-2 data on Metop-A. With over two years of data, GOME-2 has proven to work well. Validation is performed using balloon ozone sondes, lidar and microwave instruments.

From the validation it appears that GOME-2 ozone profiles give better results at European mid-latitudes than at Nordic latitudes, especially around the tropopause. The mean relative difference between GOME-2 and ozone sondes is within +-10 % in the troposphere and the stratosphere. The high latitude stations (Ny-Alesund and Sodankyla) give poorer results: the mean relative difference between GOME2 and ozone sondes is within +-15 % in the troposphere and the stratosphere. The bias is larger in the UTLS region, especially at high latitudes. The standard deviation on the mean difference is of the order of 30% in the troposphere and 10 to 15% in the stratosphere at mid-latitudes. In the UTLS region, the standard deviation on the mean is considerably larger.

Comparisons with lidar and microwave instruments yield a mean accuracy in the lower to mid stratosphere of $\pm$5%, which is comparable to other satellite instruments like SAGE II, GOME-1, GOMOS or MIPAS. Thus GOME-2 proves to be a suitable instrument to continue the observations of stratospheric ozone change in the lower to mid stratosphere.

In conclusion, GOME-2 ozone profiles have sufficient accuracy to be used to study stratospheric ozone, related to climate and UV, and tropospheric ozone related to air quality and climate. The vertical ozone profiles are produced on a (pre-)operational basis and are publicly available to users in NRT via EUMETCast and offline via the EUMETSAT archive.