Atmos. Chem. Phys. Discuss., 2, S888–S889, 2002
www.atmos-chem-phys.org/acpd/2/S888/

Atmospheric Chemistry and Physics Discussions

Interactive comment on "Comparison of total ozone from the satellite instruments GOME and TOMS with measurements from the Dobson network 1996-2000" *by* K. Bramstedt et al.

K. Bramstedt et al.

Received and published: 20 January 2003

In his comment, M. Newchurch raises the problem of cloud dependencies in the comparisons of the four Satellite datasets with respect to the DOBSON network.

For the GOMEDOAS dataset (the name of the operational GOME ozone product in our paper), we checked this dependency, using the cloud cover information coming along with the GOME data product, which is derived from the O_2 absorption. We found indeed a dependency of the mean difference between the GOMEDOAS and the Dobson measurement. Whereas for cloud-free or almost cloud-free pixels the mean difference is -0.5 to -1.0 %, for cloudy pixels the mean difference increases to -4 %.

Most likely, this is caused by a problem of the airmass factor calculation for a cloudy scene. The ozone total column is calculated by dividing the slant columns densities

Full Screen / Esc
Print Version
Interactive Discussion
Discussion Paper

(SCD) with the airmass factor. In the operational system, two airmass factors are calculated, down to ground and down to cloud-top. The total AMF is then defined as the linear combination of AMF_{cloud} and AMF_{clear} weighted with the fractional cloud cover. Lower ozone values for high cloud coverage indicate too large AMF_{cloud} values, most likely caused by insufficient values for cloud-top height and/or cloud albedo, which are both taken from climatologies. In addition, the assumed ozone column below clouds (the so-called ghost vertical column) depends on the cloud-top height.

Checking these dependencies for the other datasets would be a huge task beyond this work, because they are no direct cloud products available with these datasets. According to the paper mentioned in the referee comment (Newchurch et. al, 2001), similar dependencies as for TOMS should apply also to the GOMETOMS dataset.

Beyond the cloudiness of the pixels, other factors also most likely have an impact on the accuracy of the retrieved ozone values, for example the solar zenith angle (especially for large angles). Instead of looking at smaller subsets, neglecting such parameters results in a large dataset with appropriate statistical properties of the entire data base.

For the final version of the paper, we will include the findings above along with an appropriate plot showing the cloud-cover dependency of the GOMEDOAS dataset.

Interactive comment on Atmos. Chem. Phys. Discuss., 2, 1131, 2002.