Atmos. Chem. Phys. Discuss., 5, S1516–S1517, 2005
www.atmos-chem-phys.org/acpd/5/S1516/
European Geosciences Union

Atmospheric Chemistry and Physics Discussions

Interactive comment on "Indicators of Antarctic ozone depletion" *by* G. E. Bodeker et al.

Anonymous Referee #2

Received and published: 11 July 2005

The paper comprises two important parts: comparison of different satellite and ground-based data sources and description of various indicators of the Antarctic ozone hole. Both parts are important and could be published as separate papers. While the paper in its present form is acceptable for publication after minor revisions, more in-depth analysis in each of the two parts could make it even more interesting.

The authors have demonstrated the differences between different ozone data sources without analyzing the possible sources of these differences. For example, from Figure 6 it appears that the largest difference between EPT and TOGOMI occurs at high zenith angles. Or, perhaps the difference between EPT and GOME (Figure 4) is a function of column ozone itself. A better understanding of these differences could allow in better correction of the data, although it is unlikely that better corrections would substantially change the main results of the paper. It would be also interesting to see how the

suggested indicators of Antarctic ozone depletion perform if the data from different sources are used without any corrections.

The indicators discussed in the paper provide useful information about the ozone hole development. However, it is difficult to agree with the principal conclusion of the paper. The authors propose to use the ozone hole size in November, date of the hole disappearance, and the AVP mean ozone mass deficit for detecting the ozone recovery. These indicators largely depend on the date of the vortex disappearance. While the ozone hole itself can make the vortex last longer, other "external" factors may have a greater influence on the vortex disappearance. This was clearly demonstrated in 2002. Therefore, with these indicators, long-term changes in the dynamics that make the vortex less stable could be misinterpreted as ozone recovery. As for recovery detection, it is easier to determine long-term changes in a data set with small year-to-year variations. From this point of view, the minimum ozone plot (Figure 14) looks more attractive than the November ozone hole size (Figure 9) as an indicator of the ozone recovery. It would be interesting to see mean ozone hole size plots for September and October.

Linear interpolation of ozone values over the polar cap during the polar night in August -September may overestimate the ozone hole size during that period. It may also cause the differences shown in Figure 11. It is not necessarily true that if ozone is low at the edges of the vortex, it is also low within the dark area inside the vortex. It would be interesting to compare the interpolation results with actual Dobson moon measurements and integrated ozonesonde profiles from the polar night area.

Instrumental errors are always present in the data. Some indicators are more sensitive to those errors and some are less sensitive. The authors may want to study how a small error would affect different indicators. For example, what would happen with the curves in Figure 9 if one adds or subtracts a small ozone amount (e.g., 5DU) to the actual data?

Interactive comment on Atmos. Chem. Phys. Discuss., 5, 3811, 2005.