

Interactive comment on “Indicators of Antarctic ozone depletion” by G. E. Bodeker et al.

Anonymous Referee #1

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General comments

This manuscript is comprised of two separate major parts. The first part describes the intercomparison and correction of a series of total column ozone data sets to produce gridded daily total ozone analyses for 1979–2003. A thorough assessment of a number of different satellite-based column ozone data sets is described, using ground-based observations as a reference. The corrections of the different satellite datasets are described in detail. The analysis dataset is essentially an update and extension of earlier gridded ozone analyses by the same author, so the preparation of the analyses is not the main purpose of the paper.

The second part of the paper utilizes the analyses developed in the first part to calculate and intercompare a number of different metrics for quantifying the size, magnitude,

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intensity or duration of the Antarctic ozone hole. The objective is to assess these different metrics and their ability to describe any possible recovery of Antarctic ozone in response to recent reductions in concentrations of ozone-depleting chemicals in the stratosphere.

This comparison of different metrics of the Antarctic ozone hole is very important. Different metrics, such as the area of the Antarctic ozone hole, the minimum column ozone value, and the duration of the ozone hole, have been used in previous studies and in operational monitoring of the ozone hole. However, I am not aware of such a thorough assessment of the different metrics being undertaken before. In fact, I am aware of a request from Dr Mike Proffitt, who prepares the WMO Ozone Monitoring Bulletins, to the Scientific Steering Group of the WCRP SPARC (Stratospheric Processes and their Role in Climate) project to initiate such a study but nothing was completed through SPARC directly. This manuscript provides a valuable resource by comparing the different metrics.

In addition, the analysis of the time variations of the metrics helps to determine their value for identifying possible early signs of any recovery of Antarctic ozone or weakening of the ozone hole. The discussion of the saturation of some of the metrics or their lack of sensitivity may help to identify preferred indicators for recovery of the Antarctic ozone hole. This discussion seems to be well balanced and I agree with the main recommendations for preferred indicators.

It is important to recognize that no single metric of the Antarctic ozone hole can represent all of its characteristics and that several metrics are likely to be more useful than a single one. Different aspects of the ozone hole, such as date of breakup, area, and mass deficit, are all important and are described by the different metrics included in this study.

This analysis is also likely to be helpful in identifying metrics of the Antarctic ozone hole that can and should be calculated from model simulations of the evolution of the ozone

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hole in the 20th century and model projections of its future simulation. The key metrics identified in this study will help to provide the opportunity for better evaluation of the performance of chemistry-climate models in simulating the Antarctic ozone hole. This would be a useful extension of the current study.

Another extension of the current study would be an assessment of the significance of the apparent changes in some of the metrics over the last four years. While such a statistical assessment of the changes is beyond the scope of the present study, it is an obvious area for further work. This study provides the foundations for a clearer identification of a statistically significant tendency towards recovery of the Antarctic ozone hole, something that has been anticipated for many years.

I do not believe that any significant revisions to the manuscript are required. I found it to be well structured, clear, well presented and easy to read.

Technical corrections

Page 3813, line 10: replace “proneness”, which is not an English word, with “susceptibility”

Page 3813, line 17: Antarctic ozone hole, not Antarctic hole

Page 3938, caption for Figure 8: the greyed area represents the maximum value during the interval 1979-99, not the mean. This is stated incorrectly in the caption.

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

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