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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Comparison of three vertically resolved ozone data bases: climatology, trends and radiative forcings" *by* B. Hassler et al.

Anonymous Referee #1

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The paper presents three global ozone data sets available for global climate models as input data or for validation purposes. In general the paper is well written and the results are presented in a clear fashion. A thorough comparison of the three data sets will provide a very useful tool for the modeling community. Such a comparison should if possible compare to independent measurement data sets, compare exactly the same quantities and attribute analyzed differences to the different ways of compiling the data sets. I feel that the manuscript needs to be improved in all three points before publication in ACP.

General comments

The evaluation of integrated ozone shows clear differences between the data sets. However, since not the same quantities are compared it is not possible to deduce the

origin of these differences. Among other things they could result from the differences between ozone integrated from 250 to 1 hPa and stratospheric ozone or from the different time periods on which the climatologies are based. The authors should aim at comparing the same quantities between the three data sets (e.g., ozone integrated between the tropopause and 1 hPa). Additionally the comparison would be more meaningful if it could be based on an independent observational data sets (TOMS/SBUV) with the tropospheric ozone column removed. If this is not possible it should be shortly discussed in the text. Finally the impact of using different time periods for the climatological background value should be explored more in detail and possibly presented in a Figure by analyzing BDBP based on a time period comparable to the FK98 climatology (which has already been done as stated in section 3.2). If the time period length has a substantial impact on the absolute values this would be important information about the RW07 and SPARC climatologies.

The first sentence in section 3.2 (vertically resolved ozone) is very confusing. In which sense are the patterns similar? Is this comment referring to the global distribution or to the differences to FK98 discussed in the next sentence? The whole section reads like a comparison to FK98 would be included but only three data sets are presented in Figure 2. To me it seems that differences change sign at 7 hPa (instead of 10 hPa) and that the peak of RW07 is at 5 hPa (instead of 7 hPa). BDBP has high values mostly between 30 and 7 hPa. It seems surprising that RW07 has its maximum at 5 instead of 10 hPa. Can this be explained somehow?

The discussion of the anomalies could be strengthened by referring to what the BDBP anomaly time series looks like if one (or more) basis function (e.g., volcanoes, ENSO) is omitted from the regression model. This way one could distinguish between the impact of the different measurements used as input for the three data sets and the impact of the various basis functions. It is hard to follow the discussion in 4.2 without a figure.

The comparison of the time series seems to be mostly based on observational data

used for the compilation of the BDBP data base. Since BDBP includes a large part of the vertically resolved ozone measurements this is only a natural consequence, however, at least for later parts of the time period additional independent data sets are available. Why is the raw BDBP data shown? It is not discussed in the text and somehow is a bit misleading when looking at the plots.

Specific comments:

Page 26564, Line 24: Give full name for SAGE here (instead of doing so on the following page).

Page 26565, Line 21: SAGE data where, in the polar regions or globally?

Page 26565, Line 22: What about data between 55° and 65°?

Page 26565, Line 22: So this means that the regression model is only applied to anomalies? Are those deseasonalized anomalies?

Page 26568, Line 3-4: TOMS and SBUV have been defined before.

Page 26574, Line 6: The measurement systems are not independent from the three data sets.

Page 26574, Line 23: Why BDBP Tier 4? What does it stand for and is it different from the version used earlier in the paper?

Page 26575, Line 1: The term ''higher pressure levels" used here could be interpreted as a pressure level which is higher up in the atmosphere or as a level of higher pressure. Note that the term ''higher pressure" was used before in the text to indicate regions lower in the atmosphere.

Page 26580, Line 5: The differences are not small in my opinion.

Page 26585, Line 12-14: shouldn't this be the other way around (i.e., RW07 larger at higher altitudes . . .)?

Page 26585, Line 25-27: this statement would benefit from improved comparisons in section 3 (see general comments).

Interactive comment on Atmos. Chem. Phys. Discuss., 12, 26561, 2012.