

Interactive comment on “Technical Note: A new global database of trace gases and aerosols from multiple sources of high vertical resolution measurements” by B. Hassler et al.

Anonymous Referee #1

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1 Summary

This technical note by Hassler et al. introduces a new ozone profile database (BDBP), which promises several advantages over other existing profile compilations. The note describes the new concepts of the BDBP, outlines the advantages, and gives an overview over the database. Quality control procedures of the ingestion process are also described. Some of the current short-comings are indicated. I think it is very good that the BDBP is described in this way as an ACPD technical note. The BDBP is certainly interesting for many ACPD readers. In my opinion, this technical note de-

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serves publication in ACPD/ ACP. I have, however, several comments, that should be addressed before a publication in ACP.

2 Major comments

Although titled “technical note” the manuscript contains very little technical information about the database. How many Gigabytes storage space are required for the BDBP? What are the system requirements (Windows, Unix)? What kind of access speed is provided, e.g., for single profiles? For monthly mean time series at a certain level/ latitude/ longitude? What kind of user/ programming interface is/ will be provided? What programming language is used? Will the database be available to users? Over the web? To install locally? I realize that not all these questions might be relevant / easy to answer at this point, but certainly many of them should be answered in an additional section. After all, this is a “technical note”, so technical details are important. Please add a section on these technicalities.

Like reviewer 2, I also feel that the question of consistency/ systematic differences between different datasets is a very important one. This is mentioned a little bit (e.g. page 7680, lines 12 to 16), but it is really a very fundamental problem. It should be discussed in more detail throughout the manuscript. I think the BDBP (version 2.0?) would become much more useful if it did include steps to remove systematic differences between datasets. I don't know how much work this is with the current BDBP, but 1 or 2 Figures showing systematic differences between SAGE and sondes, or between SAGE and HALOE (or the lack of such significant differences) would be a very important addition to the manuscript. These results should be compared with published differences (see, e.g., the references given by reviewer 2). Such a mini-intercomparison would outline how this fundamental problem could be tackled in a version 2.0 of the BDBP (and how the BDBP 1.0 already makes it easy to do such intercomparisons?). This

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would also improve the manuscript substantially.

3 Minor Comments

page 7661, around line 1: What happened to longitude? Is it not a dimension anymore? Should this not be 4 dimensional?

page 7662, around line 10: How are high resolution profiles (e.g. 5 second data from radiosondes) brought onto the 1 km grid? Interpolation might not be the best in this case (noise, fine structure), averaging might be better.

page 7662, line 26: replace "measurements" by "data", since e.g. NMC/NCEP pressure and temperature are not measured but analysed. (See also below).

page 7663, line 23: What season has sparse coverage? Probably summer. Be specific.

page 7666, line 22: What is meant by "large absorption (... > 5%). Do you mean aerosol optical depth > 0.05? Or aerosol transmission < 95%. Is this line-of-sight or vertical? One way or two way? Please clarify.

page 7667, section 3.2: HALOE ozone profiles sometimes have spikes in the ozone error estimates that appear unphysical. How did the authors treat such spikes? Were they screened/ removed.

page 7669, section 3.4.1, and other parts of the paper: Is the 1 km grid of the BDBP for geometric altitude (SAGE, POAM?) or for geopotential altitude (sondes, NCEP analyses, HALOE?). How is geometric altitude converted to geopotential altitude (or the other way around)?

page 7669, 1st paragraph: I think Smit et al., (2007) would be a very good additional, and more recent, reference for ozone sondes (<http://www.agu.org/pubs/>

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[crossref/2007/2006JD007308.shtml](http://code916.gsfc.nasa.gov/Data_services/merged/index.html)).

page 7670, near line 25: For a first cut this is probably ok. However, for trend analyses it is probably not ok: Upper stratospheric ozone has declined by 15% or more from 1980 to about 1996 (e.g. Newchurch et al., 2003). So residual ozone has changed over time as well. Using a fixed climatology will, therefore, introduce spurious trends into the NFs. Can you use residual ozone from the BDBP? Or from the SBUV zonal mean profile record (http://code916.gsfc.nasa.gov/Data_services/merged/index.html)?

page 7672, near line 20: Is pressure/height uncertainty translated into ozone uncertainty? Make this clear. Please also state the assumed temperature uncertainty. How do the stated uncertainties in temperature, pressure and relative humidity compare with manufacturers specifications (e.g. from www.vaisala.com)? Please state if your numbers are consistent with manufacturer specifications, or with what is commonly known.

page 7673, line 6. Before about 1985 most stations were flying non-Vaisala radiosondes. Please make some statement about the errors of those older sondes (and maybe try to account for them in a future version?).

page 7674, line 24: What is required to compute a monthly mean? Is one profile enough, or do you require several profiles? How many? Please describe.

page 7675, line 1: If I understand it correctly, to go from a B factor of 50% (half of all grid-cells have a monthly mean for half of the time) to a B factor of 100% (all grid-cells have a monthly mean all the time) I need to increase the number of monthly means by a factor of 4. So the B-factor goes up with the square root of the number of available monthly means. Do I understand this correctly? Maybe this should be explained.

page 7676, line 13: I guess you mean latitude bins and altitude bins? Please state/repeat how wide these bins were.

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page 7678, line 21: As indicated in my major comment, this statement needs to be backed up by an additional section giving technical details about the BDBP.

Table 1, row "Temperature": SAGE I and II do not measure temperature at all, HALOE only measures temperature at levels above 4 hPa. I don't know about POAM, but would suspect about the same. All these temperatures and pressures are not measured but come from operational NMC/ NCEP analyses (with possible jumps etc.). Please make that very clear! This should also be made clear in sections 2 and 3 of the text. You also need p and T to convert between pressure and altitude vertical coordinates. This should also be clarified in the text.

Also: should pressure or air density not also be a variable? Otherwise how do you convert to/ from mixing ratio?

Table 3: Same as with table 1: SAGE and HALOE (and probably POAM as well) do not measure temperature over all of this altitude range. Instead most of it is taken from NMC/ NCEP operational analyses, (with the indicated potential problems). Please make that clear.

Table A1: A very useful additional column would be to give the (average) number of soundings per year for each station.

Fig. 4: In panel a.) I think it would be good to also plot the B factor for the 1965 to 2006 time period / and or the 1965 to 1979 time period and/or the B factor from sondes alone. This would show the coverage from the sondes, and the increase of coverage gained by the satellites. Panel B. does not give much information about the coverage from the sondes. It only shows that they are the main instruments providing tropospheric information.

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4 Conclusion

A worthwhile and informative technical note on a database with large potential. Please give more technical details, and let us know when, where, and how it will be available.

Interactive comment on Atmos. Chem. Phys. Discuss., 8, 7657, 2008.

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