

Interactive comment on “Intercomparison of stratospheric ozone and temperature profiles during the October 2005 Hohenpeissenberg Ozone Profiling Experiment (HOPE)” by W. Steinbrecht et al.

Anonymous Referee #2

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This paper is a careful comparison between 2 coincidentally located lidar systems capable of measuring stratospheric ozone and temperature. The paper assumes the NASA lidar is a standard and the DWD lidar is compared to it.

The authors discover several interesting/important issues with their lidar systems of interest to lidar scientists, as well as users of NDACC measurements. The three most important results are: 1. the NASA lidar underestimated its ozone error by a factor of 1.7 2. the DWD lidar has a problem with its ozone algorithm 3. the DWD lidar had some problems in its Rayleigh temperature analysis.

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The last item is carefully studied in the paper and the authors show the necessary correction and how they greatly improve the measurements. Unfortunately, while they tell us the problem they believe is causing item 2, they do not fix their algorithm and show in the convincing manner of item 3 that the results improve. They should do at least a pilot analysis showing an improvement in the ozone algorithm in this paper.

I find item 1 particularly troubling, as the NASA lidar is the "transfer standard" the other NDACC instruments are comparing against. One would think such a serious underestimation of the instrument's error would have implications on previous results, and the authors need to either comment in detail on these implications or show that using the underestimated error was not a problem.

With these changes this will be an excellent instrument validation paper and I would encourage my students now and in the future to read it to see how to perform a through comparison.

SPECIFICS

! means major change, otherwise minor revision or wording changes.

format: page-line number

!38-12: if you know how to remove it state that now. Otherwise it sounds like you don't know how to correct it, e.g. a problem with the differential filter used in the ozone algorithm has been identified as the source of the error and the DWD data base will be reprocessed with this correction".

38-14: Results...consistent: consistently good? bad? What does it mean consistent? They all see ozone in the stratosphere?

38-18: not statistically.... put in ()

!Abstract is not consistent with paper's title. The abstract focusses on the DWD lidar and says almost nothing about the NDACC system. Hence title amended to something

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like:

Validation of the DWD lidar stratospheric ozone and temperature measurements during the"

39-10: IN 1990

39-25: What does Keckhut give an overview of?

40-12: This paper discusses (or shows or highlights) results from the HOPE inter....

40-13: as you say focus is on DWD lidar, hence you should amend the title (see above).

Table: "signal induced noise @λon /λoﬀ (near 100 km)" entry for NASA lidar is missing or should be marked N/A.

Fig 1 caption: you may want to put on the figure or in the text what the physical separation between the transmitter and receiver mirrors is.

41-25 "state or configuration" are better words here than "status"

42-5 the range bin is 300 m. The bin width for each sample is 1 microsec, corresponding to 150 m (don't say range bin here).

42-8 is not strongly or appreciably or significantly absorbed by ozone.

42-10 similarly

!44 How do you use your ozone profiles to correct your density profiles to get temperature? If you use the straight Rayleigh profiles with correction you will have an error on the order of a degree around 30 km. There are corrections in the literature for this effect, but in your case you know the ozone to make the correction. It is important you discuss what you do (or don't do) concerning this point. I can provide references if needed.

46-2 terminated and the time centering adjusted. (delete short sentence).

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!49-2 "since both systems fire at different times": didn't you see previously you synched the choppers so they fire at the same time! Please explain this apparent contradiction.

!50-17: if NASA is off by 1.7x and they are the calibrated transfer standard don't all the other inter-comparisons they have done need to be re-evaluated?

50-24: emperature should be temperature

!58-14: you should say explicitly in this sentence (or one more sentence): what the algorithm problem is is it fixable? will it (and when) be fixed

! I am puzzled by one thing after reading this study: why didn't your try your analysis with a better differential filter and show the improvement to proof this important result in your paper?

! The paper would benefit from (early on) rather than just quoting previous studies tell us how well you believe the NASA lidar is calibrated so we have a lower limit on what to expect (in the past against whatever the gold standard is, how well does it compare, 0.1%, 1%, 10%?).

Interactive comment on Atmos. Meas. Tech. Discuss., 2, 37, 2009.

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