Atmos. Meas. Tech. Discuss.,
doi:10.5194/amt-2016-119-AC1, 2016
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Atmospheric Measurement Techniques Discussions
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EGU

Interactive comment on "Proposed standardized definitions for vertical resolution and uncertainty in the NDACC lidar ozone and temperature algorithms – Part 1: Vertical resolution" *by* Thierry Leblanc et al.

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Received and published: 22 July 2016

We would like to thank the reviewers for taking the time and making the effort to review our manuscript. We have addressed all points raised by the reviewers, which improved the quality of our manuscript. Our responses are detailed below.

Reviewer 1:

P2L14- Are these final impacts largely affecting absolute concentration? uncertainty? Quality of the data? The study by Godin et al. (1999) showed for example that the use of different vertical resolutions can lead to a 10-30% difference in the retrieved ozone

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concentration above 35 km, essentially owed a combination of low O3 concentration (low lidar sensitivity) and poor vertical resolution at these altitudes. The use of different vertical resolutions affects both retrieved ozone concentration and its uncertainty. We clarified this in the text.

P3L43 – This appears to be the first use of full-width half maximum. Define acronym FWHM here and use throughout. FWHM definition added.

P3L10 – Vertical filtering may also be chosen in order to capture the vertical scale of some geophysical process. (e.g. stratospheric intrusion/gravity waves). It may be useful to use a "real life" example of a geophysical feature that was smoothed different ways and the resultant differences (as opposed to a random signal) in Figure 1. It is correct that in some cases, vertical resolution is not degraded in order to capture small scale features. We therefore added the following text: "unless specific geophysical processes are investigated (e.g., gravity waves, stratospheric intrusions)". Regarding figure 1, we decided to maintain the current figure because the example given can apply to any measured signal, i.e., raw lidar signal, ozone, temperature, or any other species whatsoever.

P3L20 – Are there any citable references from the TOLNet/Gruan efforts? There is no citable reference at this time that is specifically dedicated to the implementation of standardized vertical resolution within GRUAN or TOLNet. The standardization work is currently ongoing. We added those networks' URL in the text for reference.

P4L35 – Python (sp) Corrected

P4L15 – remove or reword "the simplest kind of digital filters" Removed

P6L19 – Sentence starting with "It is more abstract.." needs to be reworded We replaced this sentence with: "It is a powerful tool allowing a high level control of the smoothing and differentiation processes"

P6L28 – is radian.bin the appropriate unit? Is the "'." Necessary? We believe it is the

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proper way to express this unit. If not, it will be corrected during proofreading.

P7L19 – remove tab/carriage return here Done

P7L25 – for completeness, generally define c_o Here, because of the general definition of the coefficients, we cannot say much on c_0. At this stage of the discussion, this coefficient can take any value, which is why we have not specifically defined it.

P8L2 - gain of the filter is already defined Corrected

P8L5 – Transition to discussing z(k), it may be helpful to define equation 19 in terms of z(k) We clarified the sentence, by adding a reference to Eq. 1. The modified sentence now reads: “Referring back to Eq. (1), the gain provides a quantitative measure of the actual smoothing impact of the filter on the signal at a particular location z(k) and for a given spectral component f”

P8L10 – perhaps there is a better way than saying “smoothing by ns” in the title here. “Smoothing via the transfer function” “smoothing by ns” is a (rarely-used) technical expression describing this type of filters. Because it is not commonly-used, we decided to refer to it only one time, and then replace the other occurrences by the more commonly used” n-point boxcar average” expression.

P8L26 – Reword this sentence starting with “We recognize. . .” – do you recognize the coefficients? We modified this sentence, which now reads: “We recognize the coefficients of a smoothing-by-5s filter or 5-point boxcar average, or 5-pts running average”.

P9L20/25 – remove wiggles and use ripples throughout the section Done.

P11L13 -remove carriage return Done

P11L23 remove for prior to e.g. Done

Section 3 – perhaps a bulleted list of the instruments would help organize this section. In the current state there are some sentences that may need reworded (P12L20). It’s important for the audience to understand why this standardization is so important (i.e.

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it looks like there are many variations on archived data and unifying them will help the community as a whole). Very good suggestion. We re-organized this section using bullets

Reviewer #2

pg2. l2: 'Network for the Detection of Atmospheric (not stratospheric) Composition Change'; NDACC now includes the entire atmosphere including the boundary layer. Thank you for noticing this typo. It is indeed not restricted to the stratosphere anymore, though the focus remains on the stratosphere and free troposphere, the boundary layer being mainly addressed through partner networks such as TOLNet.

Section 5: I suggest the authors incorporate the summary aspects of this section into the abstract or, perhaps into a 'discussion' section . . .then provide a short, succinct 'conclusion' section delineating the important take-home points We now have split section 5 into a discussion and a short conclusion as suggested, and we added one more sentence to the abstract. The new sentence is: "When data processing implies multiple smoothing operations, the filtering information is analytically propagated through the multiple calls to the routines in order for the standardized values of vertical resolution to remain theoretically and numerically exact at the very end of data processing"

Section 5: I also suggest the authors consider deleting the last sentence of this section 5 Sentence removed

Please also note the supplement to this comment:
http://www.atmos-meas-tech-discuss.net/amt-2016-119/amt-2016-119-AC1-supplement.pdf

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