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Atmospheric Measurement Techniques Discussions

Interactive comment on "Smoothing error pitfalls" *by* T. von Clarmann

Anonymous Referee #1

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Overview

This is a nice thought provoking paper that revisits and challenges established thinking on the quantification and description of error estimates for atmospheric remote sounding measurements. I enjoyed reading the paper; it is well thought out and generally well written. While the discussion is, in places, arguably a more philosophical than is typical in atmospheric science literature, the bottom line message is one the atmospheric remote sounding community would generally benefit from internalizing and acting on in the representation of their results to the wider community.

As with the other reviewers, I feel that the manuscript would benefit from some more specific examples. Such examples could serve as more concrete "case studies" to which subsequent authors describing their remote sounding datasets can "anchor" a citation. However, I understand that such additions would change the character (and

increase the length) of the paper, and go beyond this authors original intent. As such, as, in my opinion, this discussion deserves publication (and where better than in AMT), I would be OK if the author decided not to go down that path.

I have little to add to the discussion, other than some minor (mostly wording) suggestions, given below. I also appreciated reading the interactive discussion between the other reviewers and the author, and am generally satisfied by the responses given by the author to the thoughtful comments from reviewer #5.

The writing is very clear and logical indeed. In a few places the choice of phraseology reflects the author's linguistic roots, but it is in all cases perfectly understandable. I've identified a few of these places and suggested potential amendments, but a brief look over by a copy editor would probably not hurt.

Last minute note. I wrote this review before I've had a chance to read over Clive Rodgers comments. Given the deadline is rapidly approaching, I've decided to go ahead and submit this review rather than delay things by trying to consider his points in more detail.

Minor comments

—- Page 3302

Line 18: Suggest deleting comma before "because"

Line 24: "... as fine as *that* chosen ..."

—- Page 3306

Line 1: "... suggest the application of generalized ..."

Line 15: Consider adding the point that this is more complex in the non-linear case, but that that is beyond the scope of this paper.

—- Page 3307

Lines 15-18: I wonder if, somewhere in this discussion, it might make sense to point out to the less familiar reader that "Gaussian error propagation" applies equally to random variables regardless of whether they have a "Gaussian" probability distribution function or not. It is perhaps unfortunate that the same mathematician's name is attributed to these two cornerstones of statistics, as many people's natural assumption may be that one requires the other.

—- Page 3308

Equation 12:. Is there any value in discussing the significance of cases where (W^T W)^{-1} is singular here?

Line 15: As pointed out by others, would be good to define "parameter error" here.

—- Page 3309

Line 10: Consider citing equation 8 after "propagation"?

Line 22: "... have been chosen *to be* 1km and ..."

—- Page 3310

Line 2: "... were chosen *to be* altitude ..."

Line 21: "both" -> "the two"

Line 27: "how" -> "by which"

Line 29: "which will be tried" -> "as will be attempted"?

—- Page 3311

Line 4: "Having understood the source of the problem, the natural approach would appear to be to evaluate ..."?

Line 19: "... problems with the definition of these quantities ..."

Line 21: would: "it is not our intent to discuss the state ..." be better?

—- Page 3312

Line 6: "not acceptable" -> "unacceptable"?

Line 14: "an alternative understanding of the meaurements of the atmospheric state as characterizing an extended ..."?

Lines 20-24: I have to confess to not having understood how this "back door" differs from the front one that was discussed in sections 3 and 4. Apologies if I've missed something.

—- Page 3313

Line 24: "notion with respect to the soothing error concept, inapplicable to ..." -> "discussion of the smoothing error in this paper, inapplicable to ..."?

—- Page 3314

Line 1: "also turns" -> "also makes"

Line 8: "suggest in their paper that profiles be validated against each other by ..."

Line 11: "... these authors suggest that S_\delta be calculated as"

—- Page 3315

Line 18: Any citations of papers giving examples of those "retrievals without a formal constraint"?

—- Page 3316

Line 6: Perhaps consider having a new sentence and "However, " before "wouldn't". Also this sentence needs to end with a question mark. However, the phrasing of this thought as rhetorical question is out of character with the rest of the paper. Consider rewording?

—- Figure 1

Consider adding a legend to the plots. Having to read through the caption to get the meaning of colors etc. is a little tedious. Minor point, consider postscript fonts rather than Hershey fonts for clarity (!p.font=0 in IDL).

Caption: Suggest "gridwidth" -> "grid spacing"

"More important" -> "More importantly"

Interactive comment on Atmos. Meas. Tech. Discuss., 7, 3301, 2014.