Atmos. Meas. Tech. Discuss., 8, C4888–C4890, 2016
www.atmos-meas-tech-discuss.net/8/C4888/2016/

Atmospheric Measurement Techniques Discussions

Interactive comment on "New temperature and pressure retrieval algorithm for high-resolution infrared solar occultation spectroscopy: analysis and validation against ACE-FTS and COSMIC" *by* K. S. Olsen et al.

Anonymous Referee #1

Received and published: 14 January 2016

This is an interesting and technically competent paper that acts as a nice follow-on to Stiller et al. [1995] for pressure/temperature retrievals by occultation instruments, and the authors make a good case for revisiting it for measurements in the Mars atmosphere where a priori information is lacking. Validation of their method is against (Earth-based) ACE-FTS and COSMIC P/T retrievals. The paper _could_ go as written with minor changes, but I think it is too long and contains too much extra detail about ACE-FTS and COSMIC. This can be reduced without hurting the scientific value of this work, and would make a better paper.

Pg 10825, lines 12-16. All we need to know is that methane has been detected in Mars' atmosphere. The history of the measurements is not needed for this paper, and I recommend cutting these lines.

Pg 10826: The description and history of MATMOS can be made much sorter. We only need know the spectral range and resolution of MATMOS and ACE – we don't need to know CSA did this and Bomem did that, etc.

Pg 10827, line 26: Change "but recently . . ." to "and recently . . ."

Pg 10828, lines 17 – 25: This is a very long sentence. Suggest breaking it up, or making a bulleted list.

Pg 10829, line 6: Suggest noting that Norton [1991] used an onion-peeling approach rather an a global fit.

Ibid, line 14: Change to the singular . . . "The practical advantage of developing a new method is . . ."

Pg 10832: The methodology presented is difficult to follow when only presented in words. Strongly suggest a block diagram accompanying the text.

Pg 10834, line 22: "VSF" is only defined later on the next page. It should be defined here when first used.

Pg 10835, lines 9-13: Use a bulleted list rather than a long sentence for defining the symbols in Eq. 1.

Pg 10837, lines 4 – 20: Again, a block diagram would make this easier.

Pg 10839, line 1: The statement that g and M are left constant to keep the retrieval algorithm general and adaptable to other planets needs justification, although they make the case for Mars later.

Pg 10842, Sec 3.2: This is a long section about the validation of ACE-FTS P/T retrievals

that I don't think really belongs here. The thrust of the paper should be the methodology and utility of the new algorithm. It's necessary only to give an outline of the ACE P/T accuracies and precisions with references to other papers.

Pg 10848, lines 11 – pg 10849, line 6: Same complaint. An outline of the COSMIC accuracies and precisions are only needed, with references to other papers.

Pg 10850: line 11: I'd change "new technique" to "improved technique." After all, this follows on from Stiller's paper.

Figure 1 caption: Suggest spelling out what "VSF" is so that someone reading and skipping to the figures will understand what they're showing.

Figures 4, 5, 7, and 8: Suggest writing "Arctic 2010," "Middle East," "Arctic Fall", etc., near the appropriate curves in the figures themselves instead of (a), (b), (c), etc., to make it easier for the reader.

Interactive comment on Atmos. Meas. Tech. Discuss., 8, 10823, 2015.