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Atmospheric Measurement Techniques Discussions

Interactive comment on "High Resolution Tropospheric Carbon Monoxide Profiles Retrieved from CrIS and TROPOMI" *by* Dejian Fu et al.

Anonymous Referee #2

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Review of High Resolution Tropospheric Carbon 1 Monoxide Profiles Retrieved from CrIS and TROPOMI by Fu et al.

This manuscript describes how multispectral retrievals of CO can be obtained outside of MOPITT's single instrument capabilities in a TROPOMI – CrIS joint retrieval. It's laudable that the authors undertook this important task, since as they point out MOPITT (and all other EOS instruments) are well past their expected lifetime, and it's important to look for alternatives. They make a good case for combining TROPOMI and CrIS, but it's unfortunate that they have to (?) use the one test day from 2013 to demonstrate the utility of their instrument. It would have been preferable, though perhaps not possible, to focus on more recent CrIS CO data since full resolution data has been available for over a year now. Nonetheless, the work is important and needs to be demonstrated first, as it is in this manuscript.

Combining the data from two instruments yields a small mismatch of about 3km and 5 min, smaller than the instrument foot print and adequate for all but challenging topography such as urban areas.

The presentation of the retrieval technique, including associated equations, is straightforward and largely based on authors' previous experience with TES. An application of the retrieval algorithm to an African biomass burning event is quite appropriate and informative. The results are quite encouraging, especially since they are an apparent improvement on what can be obtained from MOPITT combined retrieval. It will be good to test MUSES product in practice with real data from both instruments, and that can't be done soon enough. Given the operational nature of the two instruments used, MUSES seems to be not only providing a good product, but it is a good long term investment of research effort.

It would be good to talk about the loss of data due to clouds that can be expected from the MUSES retrieval.

P12, line 6: should be "complements" not "compliments"

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