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Atmospheric Measurement Techniques Discussions

Interactive comment on "Limb–nadir matching using non-coincident NO_2 observations: Proof of concept and the OMI-minus-OSIRIS prototype product" *by* Cristen Adams et al.

Anonymous Referee #2

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This manuscript describes a new method of using non-coincident limb-nadir sounding to retrieve tropospheric NO2 column from satellite measurements. This is an intriguing and potentially very useful technique for future geostationary satellites. The paper is generally well-written and understandable and the methods described in adequate detail. With minor revisions it would be a useful contribution to the literature.

Comments:

1) The motivation for using non-coincident measurements should be made more clear in the introduction. It appears that the main motivation is application for future geostationary missions where coincident limb measurements will not be available for most nadir observations. The current paragraph on this feels buried toward the end of the

introduction section – it took me time to figure out the motivation for this difficult technique. The motivation could be made even more relevant by a brief discussion of the power of geostationary observations for NO2 measurements and the associated science they (and by extension this method) will help enable.

2) Due to the pivotal role played by the model in translating the non-coincident measurements it would be beneficial to have a brief discussion of the model's validation, particularly when using the monthly and climatological inputs used.

3) As the model scaling factors are applied to each vertical layer from the Osiris retrieval, how does the vertical resolution of Osiris effect the corrected stratospheric column? How much would the result differ with different vertical grids?

4) The Osiris data were temporally averaged over 3-day windows to gain better spatial coverage. How would this be changed or effect application of this method to geostationary nadir measurements?

Tables and Figures:

Table 1: Since the correction factors are from a previous publication it's not clear that this is a necessary inclusion.

Figure 9: As the colorbar ranges are close (as opposed to being different by an order of magnitude) I would recommend the same range for all the panels for more accurate visual comparisons.

Figure 12: This figure is very hard to parse since the symbols overlap each other much of the time. I'm not sure the best way to fix, perhaps smaller symbols?

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