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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Tropospheric carbon monoxide variability from AIRS and IASI under clear and cloudy conditions" *by* J. Warner et al.

Anonymous Referee #2

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General Comments: This manuscript presents a combined analysis of AIRS and CO observations with several goals. An informative discussion of AIRS cloud clearing is presented in order to demonstrate the quality of the results. A new technique is introduced to separate background and recently emitted CO observations, potentially aiding in the development of new techniques for constraining emissions (though this is not done here). And third, a comparison between AIRS and IASI is presented to discuss the use of these datasets together for longer term trend analysis. Each of these topics could be the basis of a very rich and useful paper and at times, they seem a bit disjointed presented together here. They could also use a bit more discussion. In particular, the separation of recent emissions from background CO observations is very interesting and potentially very useful to other researchers seeking to estimate emis-

sions, but not enough information is provided to allow others to apply these techniques. Also, discrepencies between AIRS and IASI require further discussion. I recommend publication becasue I think the analysis presented here is sound, innovative, and potentially very valuable, but more details need to be given so that researchers could duplicate this type of analysis.

Specific Comments: P16337, Line 7 – I find the term 'new emissions' a bit confusing. Readers could interpret that to mean, recently emitted CO; a new source of emissions that didn't exist before (like a fire or new power plant), or a more up-to-date emissions inventory. I think 'recently emitted CO' is more clear for this work.

P16338, Line 23 – Why not use the MODIS fire products? Is it because they are limited and cant observe all fires? Might point this out.

P16338, Lines 24-27 – Is there any long term instrumental degradation expected in these records as is the case with MOPITT?

P16340, Line 26 – What is the AIRS L2 clear indication based on? Why not use this instead of MODIS?

Figure 5 – I have trouble distinguishing the clear and cloudy lines – can these be made thicker?

P16343, Paragraph – I'm confused over how the background and recent emissions are separated. More details are needed here as this is fundamental to the analysis.

Figure 6 – It strikes me that the 'new emissions' tend to follow the background which makes me wonder what the differentiation is. When does a 'new emission' mix/age enough to become the background? How do you separate them entirely?

P16344, Line 25 – I think the 'new emission' term is particularly confusing here. It implies that emissions are being calculated from AIRS which is not the case. This is showing that a subset of AIRS CO observations captures the seasonal cycle of inventories well. Could the same be said of the total CO observations (not segregated

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into new emission and background)?

P16346, lines16-18 – See first comment. These are not emissions.

Figure 11 – Why use AIRS only through 2011? Aren't AIRS CO data available for more recent periods to include in these comparisons? This would seem to be a priority given the discussion of trend analysis.

P16348, Lines 16-17 – There seems to be a clear discrepancy between AIRS and IASI in NH trends during the period for which both datasets are shown in Figure 11. Why might this be? I understand that this may be beyond the scope of this paper, but I think some more discussion would be helpful as this is potentially very important.

P16348, Line 25 – I think the correlation coefficients need to be placed in context. What is the correlation between the total CO (segregated into new emission/background values)? What improvement in correlation coefficient does this technique give?

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