Atmos. Meas. Tech. Discuss.,
doi:10.5194/amt-2016-137-RC2, 2016

Atmospheric Measurement Techniques Discussions

Interactive comment on "Validation and Analysis of MOPITT CO Observations of the Amazon Basin" *by* M. N. Deeter et al.

Anonymous Referee #2

Received and published: 27 June 2016

This paper has 2 main foci: (i) an evaluation of MOPITT TIR and TIR-NIR CO retrievals over the Amazon Basin; and (ii) an analysis of seasonal and interannual variations of CO over the Amazon Basin since 2002. Both of these issues are of scientific relevance. However, the manuscript is lacking in some important aspects in terms of both these issues. My major concerns are:

1) It is unclear as to the extent to which the generally good agreement and correlations shown in Figures 4 and 5 arise because of the influence of the prior when aircraft data are smoothed with the MOPITT averaging kernel. Typically, in comparing insitu data (or model output) to satellite retrievals, comparison points are carefully selected to excluded instances when the prior has a significant influence on the posterior. In fact, the MOPITTT users' guides themselves recommend the use of an Observation Quality Index (OQI), with thresholds depending on the application, to filter out retrievals

with large "observation-dependent" noise values. It is not clear that any such quality control was done in the analysis presented here, and it is therefore unclear whether the statistics presented with regards to bias and standard deviation are scientifically robust.

2) The analysis on the seasonal and interannual variation is quite superficial. The seasonal analysis is presented in terms how the seasonal cycle of the retrievals differs from that of the prior. While this is true, a more important issue is whether the V6 retrievals provide a qualitatively or quantitatively different picture of the seasonal cycle compared to previous studies based on MOPITT data or other independent data. Similarly, while the interannual variation is presented in terms of interannual variations in monthly mean anomalies, there is no information presented as to how these variations compare to independent estimates of interannual variations of biomass-burning emissions of CO in the region. For example, does the year-to-year percentage variation in the MOPITT TIR-NIR surface retrieval during the dry season correspond to percentage variations in bottom-up biomass burning CO emission estimates in this region? What is the cause of the strong anomaly in Nov-Dec in 2015? A more robust analysis is needed to get a sense of the added value provided by MOPITT V6 retrievals in this region.

Other comments:

I assume that the points shown in Figures 4 and 5 represent individual aircraft flights. No rationale is provided for the specific choice of the 200 km and 24 hour windows used to select MOPITT retrievals for comparison with these aircraft flights. How sensitive are the comparisons to alternate choices of these windows?

Based on analysis of the retrieval error as a function of AOD, the authors rule out the possibility that retrieval bias is related to high aerosol loading. Can the authors speculate on other possible causes of the retrieval bias?

Interactive comment on Atmos. Meas. Tech. Discuss., doi:10.5194/amt-2016-137, 2016.