

Dear Mr/Mrs,

We thank the referee for the constructive comments and helpful suggestions to improve this manuscript. We respond to each of the review comments. The original comments made by the reviewer are numbered and typeset in italic font, whereas our response is printed in normal format.

- 1. The credibility in the part of the used data is weak. In the validation or comparison study, the reliability of one of the data sets should be secured. At the final paragraph of Section 5, the authors mentioned the comparison study with aircraft measurement. The results from Xiong et al. [AMTD, 2015] should be added to the manuscript, which already discussed the validation of AIRS V6 methane data with aircraft data. If there is the paper describing the quality on GOSAT TANSO-FTS TIR, add it to the manuscript.*

Some descriptions on the validation of AIRS V6 data from Xiong et al.(2015) were added as suggested by reviewer#3.

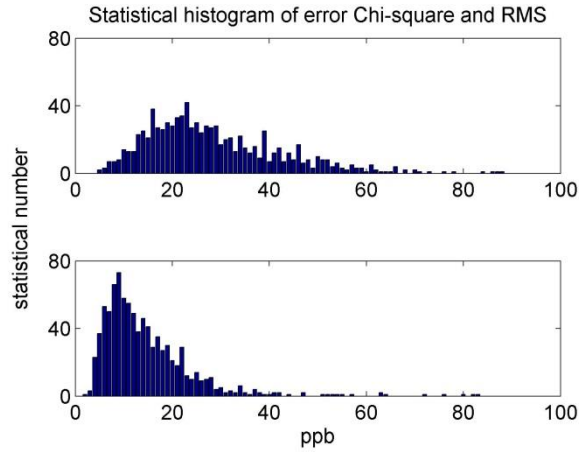
We added a sentence stating more information on TANSO-FTS TIR and its calibration could be found in Kuze et al.(2012). More descriptions on TANSO-FTS TIR CH4 retrieval algorithm were also added referring to Saitoh et al. (2015).

- 2. p.10554, l.23: In Figure 1, the GOSAT TANSO-FTS footprint is so thin color, it is difficult to see the distribution. Is Figure1 necessary? Please revisit the other description of data number difference.*

We have replot the GOSAT TANSO-FTS footprint using another colorbar. Use of Figure.1 is mainly for showing the difference of footprint of AIRS and GOSAT TANSO-TIR.

- 3. Ip.10557, l.20-24: Please modify Figure 6 as follows. It is more helpful to understand that Fig6a is put to X- and Y- axis of Fig6b as PDF distribution.*

We modified Figure.6(a) and replot it to a histogram graph as below.

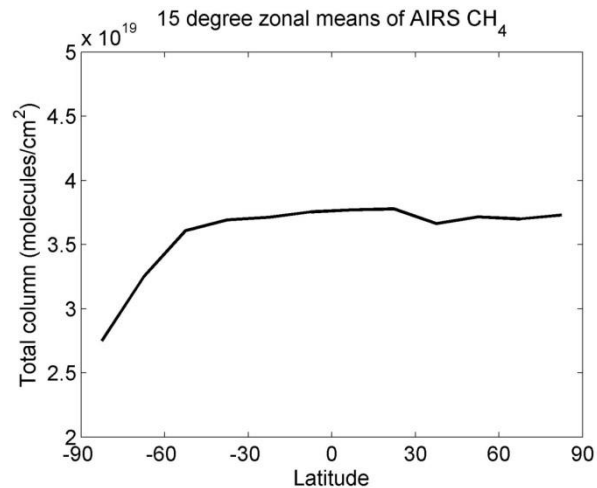


4. *Ip.10558, l.12: Does 'direct' means 'without AK smoothing'? Please refine the description.*

Yes, we rewrite this sentence as 'In next sections, we will focus on the comparison of the total abundance between AIRS and GOSAT-TIR retrievals without applying averaging kernel for smoothing'

5. *p.10559, l.6-9: On Figure11, how much significant the difference between the 5% and 2% STDs is?*

Since the difference values vary in all zonal regions, there are not fixed values between 5% and 2% STDs. The relative errors are calculated according to Eq.1. So we added another plot of 15-degree zonal means of AIRS CH₄ total columns to Fig.11. The plot is shown as:



Technical Corrections:

Texts and figures have been revised following referee's comments.

A copy of the manuscript with tracked change as well as a clear version is submitted.

Best Regards,

Mingmin Zou and all co-authors.