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Interactive comment

Interactive comment on "Contributions of the troposphere and stratosphere to CH$_4$ model biases" *by* Zhiting Wang et al.

Anonymous Referee #2

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The paper provides a valuable study on extending aircraft measurements to stratosphere for validating satellite total column retrievals. Overall it is well-written, and the results are useful. It should be accepted for publication after minor revisions.

General comments:

1. As the MIPAS data are used as 'the reference' to quantify bias and random errors of the (extended) stratospheric CH4 data, a more detailed about the quality of MIPAS data is helpful. Also, the errors of the MIPAS data should be taken into account when the authors discuss whether the precision and accuracy of the resulting stratospheric CH4 columns meet the requirement for satellite XCH4 validations etc.

2. I'd like some discussions on using the extended aircraft data for validating CH4 retrievals from other instruments such as IASI, particularly over extra-tropical regions

Minor comments:

1. Line 20, Page 5: '..were specified from monthly global mean observations.. Please specify which CH4 observations were used to construct the global monthly mean'

2. Line 25, Page 5:'..which has no additional constraint...' To be more accurate, please add 'in stratosphere'

3. Line 27, Page 7:'....stratospheric CH4 that is likely to be due to the impact of the polar vortex dynamics',

Change to '...stratospheric CH4, which is likely to be due to the impact of the polar vortex dynamics'

4. Line 27, Page 9: '...therefore, any variation in the bias along the latitude will be smoothed out', Why averaging along longitude will 'smoothing out any variations along the latitude' ?

5. Line 37, Page 9:'...We test this by applying a bias-correction to the ..', More details about bias correction is helpful.