

Interactive comment on “Information-based mid-upper tropospheric methane derived from Atmospheric Infrared Sounder (AIRS) and its validation” by X. Xiong et al.

Anonymous Referee #2

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This paper simply describes an update validation for AIRS CH₄ operational products, even though it is not explicitly indicated in the title. The authors first tie the AIRS CH₄ most sensitive layer to the tropopause heights by using the averaging kernels of CH₄ retrievals, they then derive the CH₄ sensitive layer using the tropopause heights for CH₄ validation. While the validation results are valid and informative, I don't think this paper provides significant enough original science value since the AIRS CH₄ validation has been published before (Xiong et al., 2008). In addition, this method of using tropopause information is debatable (see below) and the manuscript is not well written.

Why not carry out AIRS CH₄ validations to the geographically varying layer defined

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directly from the averaging kernels of the retrievals? Even though the CH₄ averaging kernels are not distributed at DACC, the authors should have the capability to obtain them using the off-line codes. The correlations between the tropopause heights and the peak locations of AIRS CH₄ averaging kernels (Fig. 2) are not convincing. This added complication is unnecessary for the validation work and makes the paper difficult to understand.

The authors need to discuss the significance and the implications of the biases and rms especially related to climate studies.

The authors chose 800km as the validation scale and later indicate the sampling size as part of the blame for the disagreements between AIRS CH₄ and aircraft in situ data. Why not select a smaller and optimized scale for the validation study?

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