

## ***Interactive comment on “Impacts of updated spectroscopy on thermal infrared retrievals of methane evaluated with HIPPO data” by M. J. Alvarado et al.***

**Anonymous Referee #1**

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This work investigates the impact of using updated spectroscopic data on the analysis of TES spectra (as a part of the changes introduced in TES retrieval products version 6 over version 5). Aircraft observations from all five HIPPO (HIAPER Pole-to-Pole Observations) campaigns of the Carbon Cycle and Greenhouse Gases Study have been used for the evaluation of the induced changes. It should be noted that the new version 6 also incorporates an update of a-priori trace gas profiles, which to some degree reduces the conciseness of the present study (however, it is demonstrated that the induced changes are of secondary importance).

Altogether, this is a solid piece of work and I recommend publication in AMT. I would

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like to suggest consideration of the following minor corrections:

It is not clear to me whether surface temperature ( $T_{surf}$ ) is a retrieved quantity or not. The state vector for the joint estimate contains  $T_{surf}$ , whereas on the bottom of page 6, it is claimed that "The raw retrieved CH<sub>4</sub> profile can have a significant positive bias due to errors in unretrieved model parameters such as ... surface temperature ... ."

Section 4.2 describes the application of the TES observation operator for HIPPO profiles. The method for extrapolation beyond the ceiling altitude is outlined. As section 4.1 states the lower bound of HIPPO profiles might be located at a level of up to 650 mbar, so the method applied for extrapolation downwards should also be provided for sake of completeness.

The caption of table 3 should contain the information that the tabellated values are in ppb.

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Interactive comment on Atmos. Meas. Tech. Discuss., 7, 10059, 2014.