

**“Space-borne Observation of Methane from Atmospheric Infrared Sounder
Version 6: Validation and Implications for Data Analysis”**

by X. Xiong et al.

We appreciate the comments and suggestion from the anonymous referee #1, particularly the suggestion to correct many grammar mistakes and typos.

Major Remarks:

To indicate the meaning of the values attributed to AIRS quality flag before using this flag in the discussion of the results and in other sections of the paper.

Answer: *in Section 2.1, paragraph 1, we added “There are three types of quality flags for CH₄ retrieval products: 0 represents high quality, 1 represents good quality, and 2 represents bad quality and is not recommended to use. These flags are determined based on the retrievals of upstream products, especially the water vapor, as well as the convergence of CH₄ retrieval.”*

- To clarify the meaning of the term “a-priori” reported in parenthesis after the term “first-guess profile” (see page 9, line 7, in section 2). Do the authors mean, they have used the same source of data for both the first guess and a priori profile? Or what else?

Answer: Yes. *AIRS retrieval algorithm is different from optimization method. In the end of page 8, it states “.... the ΔX_L is obtained by solving the Equation (1) using singular value decomposition (SVD), and damping the least significant eigenfunctions of the SVD to constrain the solution. Below is added in the context “This retrieval methodology minimizes the dependence of the solution to the first-guess field and the first-guess error characteristics, and relies exclusively on the signal to noise of the observation to indicate the degree to which the information contained in the radiances should be believed.”*

- The use of the terms “obvious” and “obviously” appears to be inappropriate or misleading throughout the paper. Could you please elucidate the exact meaning in the different contexts or directly replace them with a more suitable terms (e.g., “evident” rather than “obvious” or “clearly” rather than “obviously”)?

Answer: *As suggested, we changed “obviously” to clearly, and “obvious oscillation” to “apparent oscillation”.*

Minor corrections:

- Page 2, line 8: the expression “some characterizations” is too general and uninformative. I recommend replacing it with a different formulation conveying at least some specific information

Answer: To be more precisely, we changed “some characterizations” to “the retrieval sensitivity”.

All other minor corrections have been changed as suggested.