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Atmospheric Measurement Techniques Discussions

Interactive comment on "Algorithm Theoretical Baseline for formaldehyde retrievals from S5P TROPOMI and from the QA4ECV project" *by* Isabelle De Smedt et al.

Anonymous Referee #2

Received and published: 25 January 2018

This work presents an extensive and detailed report of the retrieval algorithm of HCHO for TROPOMI on board of Sentinel-5. I believe that the manuscript is clearly written and well suits for the AMT so I recommend the publication with a few minor comments for clarification as follows:

L162: Please enlarge the size of tick and labels in Figures 3, 4. L208: "the assumption of a single effective light path" any supporting literature and previous studies would be highly appreciated for this sentence. L237-239: The BrO retrieved from the first fitting is used in the second fitting and it error may affect the retrieval of HCHO in the second fitting but the error analysis associated with this was not included in the manuscript.

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Discussion paper

L246: I guess that the retrieved HCHO from the second interval in Fig. 3 is adjusted considering the retrieved BrO from the first interval but is not clearly written in the manuscript. L280, L297-298: Is the sub-interval larger or shorter than a fitting window for each species, for example, HCHO? What if estimated shifts with the shorter sub-intervals differ within the fitting window, how would you apply this to the calibration? L299: It appears that the calibration of earth radiance follows the interpolation to the irradiance grid. But the sequence should be reversed I guess, otherwise, a possible shift can interfere interpolated radiance and needs to be corrected before the interpolation to the grids. L367: Can you take into account the variation of ozone columns with latitude for AMF using the US standard? Line 480-481: Using the measured radiance as reference spectrum instead of irradiance can reduce (or remove) row-dependent offsets. Do we need to remove stripe patterns dependent on the row when the measured radiances are used as reference? Line 482-485, It would be appreciated if you can add some explanations about the cause for the latitudinal dependent offset. For example, Khokhar et al. (2005) suggested that the interference of O3 absorption may cause the latitudinal offset. Does this affect HCHO and BrO? Any quantitative information for the latitudinal offset? Does it also change in the two step fitting procedures with the wide and narrow fitting windows, respectively? In addition, if you used the irradiance as reference it may need to account for the latitudinal variation of O3 and BrO absorption in the fitting.

Figure 8: It appears that not all M' is linear. So the question is how you include values for the nonlinear M' in the lookup table. Table 12: it is not clear what the use of x indicates.

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