

Interactive comment on “SCIAMACHY WFM-DOAS XCO₂: reduction of scattering related errors” by J. Heymann et al.

Anonymous Referee #2

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This paper describes the additional cloud filtering method and post-processing correction method for SCIAMACHY WFM-DOAS XCO₂ product. The reduction of scattering related error in the satellite remote sensing of CO₂ from SWIR spectrum is one of the important issues in this field and is relevant for AMT. I recommend it to be published after the following comments are addressed.

1. Line 25, page 4287 and references; change "Saito" to "Saitoh" and "Yoshida et al. 2011a, b" to "Yoshida J. et al. 2011; Yoshida Y. et al. 2011"
2. Line 13, page 4292; how many channels exist within the spectral window of 1.395–1.41 μm ? Also, please specify the typical values of measurement error for averaged signal.

3. section 4.1.1; add description about the "default aerosol scenario", "viewing zenith angle", and "optical properties of cirrus cloud" used in the sensitivity study (Fig. 3 and Table 1).

4. section 4.1.2; for my understanding, this section is the most important part in this paper. So, more precise explanation would be helpful.

(a) Can you give more explanation about the root cause of XCO₂ error ? A 2-D-histogram of non-corrected WFMDv2.1 XCO₂ as a function of the scan-angle-corrected O₂-ratio might be helpful.

(b) To show the effectiveness of the new cloud filtering, 2-D-histograms of Fig. 4(b) should be given in a full O₂-ratio range. Some plot to show the effectiveness of the 1.4 μm cirrus filtering would be also helpful.

(c) Is O₂-ratio in the middle panel of Fig. 4(a) raw value or scan-angle-bias corrected value ? If corrected value, please add superscript "cor" to O₂-ratio in the label (like eq. (1)).

(d) To avoid confusion, please add superscript "cor" to O₂-ratio in the label of the right panels of Fig. 4 and eq. (2).

(e) Change superscript "fit" to "ret" in eq. (2).

5. Line 14, page 4299; according to Table 3, 7.5 ppm should be 7.2 ppm.

6. Table 4 and Fig. 6; there exists small differences between Table 4 and Fig. 6. For example, $r = 0.74$ for Lamont of WFMDv2.1 in Table 4, but $r = 0.73$ in Fig. 6.

7. Fig. 8; if possible, please add some comments about the difference in the seasonal cycle amplitude between WFMD and CarbonTracker.

8. Fig. 8; it might be better to use a different color for WFMD data. It is difficult to distinguish blue and black symbols.

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