

Interactive comment on “The ACOS X_{CO_2} retrieval algorithm, Part 2: Global X_{CO_2} data characterization” by D. Crisp et al.

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We thank the referee for their useful comments. We have attempted to address each below. p.12, l.9: steps steps -> steps - Done

section 5: Fig. 2b is not discussed in the manuscript. - We have added the following reference: "The spatial distribution of this bias for July is shown in Fig. 2b."

p.15, l.21: in the in -> in the - Done

p.26, l.11: O2 A-band band -> O2 A-band - Done

p.27, l.13: It is not entirely clear what “B2.8corrected” and “B2.8offset” refer to. - We now define these terms more explicitly in the text, which now states: ..the “B2.8offset“

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product was created by dividing the raw B2.8 product has been divided by 0.982 to remove the ~ 7 ppm XCO₂ bias. This B2.8offset product was, and then subtracted from the B2.9 product. In Fig. 17 c, the B2.8corrected product was results were first corrected produced by correcting the raw B2.8 product with the empirical approach developed by Wunch et al., (2011; “B2.8corrected”). This product was then subtracted from the B2.9 product.

Table 4: What is “outcome”? - This term has been defined, as in the text: Outcome (convergence reached)

Figures: I am afraid that the resolution of most figures is still not sufficient for quality printing. Some figures (eg. Fig. 1, 3, : : :) have spurious frames and lines. - This is an artifact of the .pdf conversion. The original figures in the Word template have much higher resolution. I don't know how to fix this problem.

Fig. 8, caption: Is Delta-XCO₂ really calculated with respect to TCCON? Isn't it with respect to the assumption that the southern hemisphere shows uniform XCO₂? - Yes. This is described correctly in the text, and has been added to the figure caption. “((i) the difference between the ACOS GOSAT XCO₂ estimates and a spatially-invariant XCO₂ background derived from TCCON data collected at latitudes between 20° S and 70° S, ”

Fig. 10: Some quantities such as “Perr” in the legend lack units. “Blended albedo” is only explained later in the manuscript. - The caption was expanded to define these terms explicitly: “Chi₂ O₂, Chi₂ Weak, and Chi₂ Strong are the values of $\bar{\chi}_2$ for the ABO₂, SCO₂ and SCO₂ bands, respectively. AOD Total is the column integrated cloud and aerosol optical depth at 755 nm, Perr is the difference between the retrieved surface pressure and the ECMWF prior, XCO₂ Sig is the a posteriori CO₂ error, Div Steps is the number of diverging steps, and Albedo Test refers to the “blended albedo” filter introduced by Wunch et al. (2011), which rejects soundings over ice-covered surfaces where the albedo (and SNR) in the SCO₂ channel is much lower than that for

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the ABO2 channel."

Fig. 12: Panels a) and b) swapped. - Yes. The captions have been swapped for consistency.

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