

AMT-2014-14, “A method for colocating satellite XCO₂ data to ground-based data and its application to ACOS-GOSAT and TCCON”

Responses to Reviewer 1

With unprecedented precision requirements on CO₂ total column measurements, validation of satellite remote sensing data through a reliable ground-based network is an ever important task. Part of this task is developing and improving on validation methods. In this paper, a robust validation method has been presented and applied to ACOS-GOSAT total column CO₂ retrievals. This method will likely be a precursor to future validation efforts. The presentation and quality of this work is excellent. I recommend its publication in AMT but I would like to first make a few comments below.

Thank you for your kind assessment. We now give a point-by-point response to your detailed comments.

1. The method presented here is similar to a contemporary work that has been recently published in IEEE by Zeng et al., (2014). Although this current AMTD version may have been published before Zeng et al., (2014), I recommend that the authors cite Zeng et al., (2014) in the final version.

Thanks for bringing this to our attention. We added the reference to the paper in the literature review section (7th paragraph of Section 1).

2. Regarding interpolation error: I would have liked to see the magnitude of the interpolation errors according to equation (7) and compare them to the TCCON errors. For example, a plot of the interpolated GOSAT XCO₂ with the error bars against the TCCON XCO₂ would be interesting to see. This does not have to be done for all stations.

We attach two images of the interpolated (bias-adjusted) GOSAT XCO₂ with 95% confidence-interval lines against TCCON XCO₂ for January of 2010 for Park Falls and Lamont in Figure 1. As you can see, the average magnitude of the interpolation error is about ± 0.7 ppm. We made a note about the magnitude of the interpolation error in the last paragraph above Section 4 of the revised manuscript.

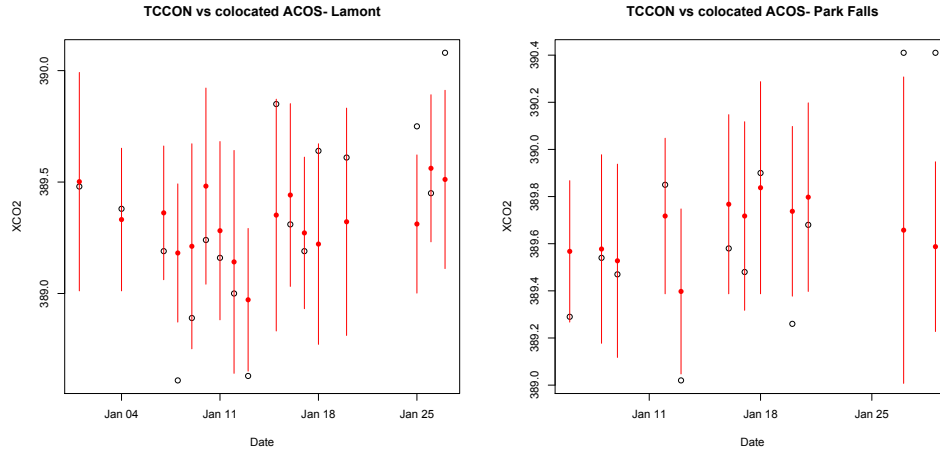


Figure 1: TCCON daily-median values (black circles) in January, 2010 vs 95% confidence intervals from collocated ACOS values (red dot and line). Only days with more than 20 TCCON data values are displayed.

3. *Figure 3 needs a legend. Why is there discontinuity in the black curves?*

We added legends to the upper left corner of each panel in Figure 3. The discontinuity in the graphics was due to a small coding error which wasn't dealing properly with the dates, leading to a discontinuity between December 31st, 2009 and January 1st, 2010. It is now fixed (see Figure 2). Thank you.

4. *Figure 5 shows very important results but it is too small. It could be stretched more and the fonts increased in size. Also, the legend on the lowest panel seems to be covering the results for Ny Alesund.*

We stretched Figure 5 and increased the font size. The legend on the lowest panel has also been adjusted to avoid blocking results for Ny Alesund. The new figure is attached below in Figure 3.

5. *page 1500, Chapter 2, 2nd paragraph, first sentence: change "projected" to "project"*

Done. Thanks.

6. *page 1504, line 4: change "tends" to "tend"*

Fixed. Thank you.

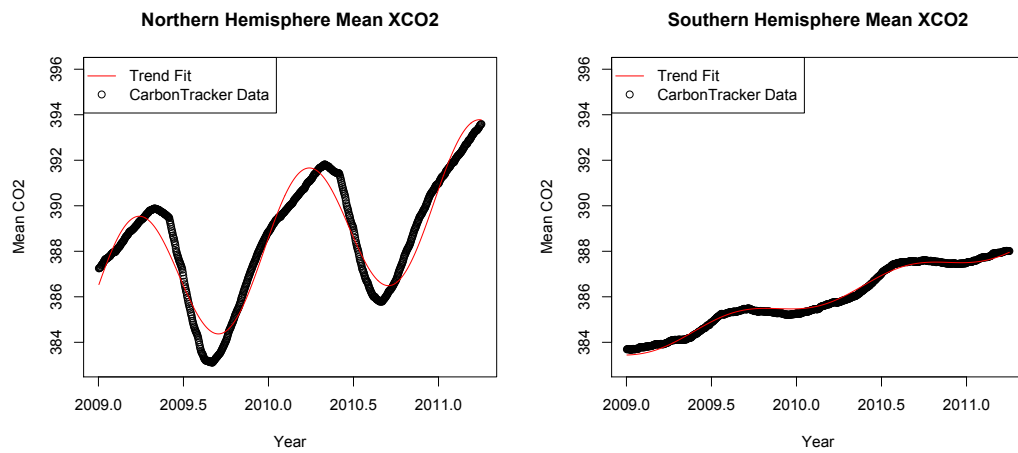


Figure 2: CarbonTracker data vs sinusoidal fit.

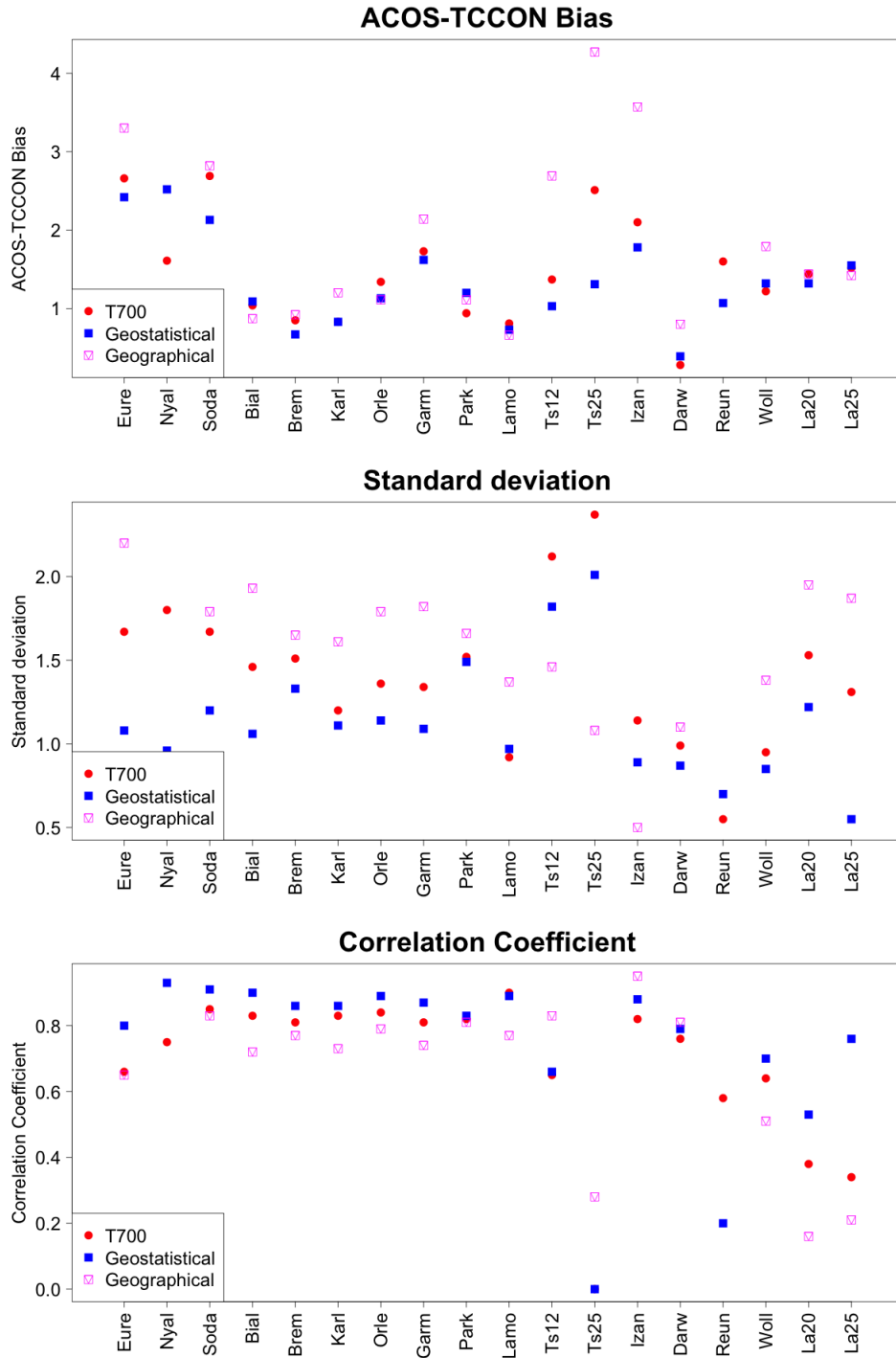


Figure 3: Summary statistics for the comparison between ACOS and TCCON using 3 colocation methodologies