Reviewer 1: Comments

Specific comments

C1 *This manuscript needs a substantial revision to clearly convey the similarities and differences among the presented algorithms. The four algorithms involved in this work is 4.1 CPC algorithm, 4.2 CLC algorithm, 4.3 CLCT algorithm as well as the standard CCD algorithm (3.2). The algorithm descriptions span from pages 5 to 11, including an extensive repetition of common processes shared across each algorithm. Moreover, it is inappropriate to treat them as independent algorithms for CPC, CLC, and CLCT, respectively, they should be specific option details in the process of the reference sector choice (pacific or local) and the adjustment schemes (climatological, regression).*

Revised: We have addressed repetitions and refined the text (**Section 4**).

C2 Revise the structures. My suggestion is

1. *data*

- *TROPOMI (bring here 2.1 and introduce the TROPOMI total ozone/cloud/CCD TCO products)*
- *ozonesonde*
- *Algorithms*

First describe the general common process. And then specify implementation details in each section.

- *standard CCD*
- *Authors' algorithm*

4 results

Revised: We changed the structure and modified the text. We would still like to keep the description of the CCD TCO product after the description of our algorithms so that we can shorten it by only highlighting the differences with CPC (**l 200-209**).

C3 5.1 ***Uncertainty Budget****. The error budget estimation method needs to be improved. According to Equation 1, the uncertainty estimate is almost dependent on the number of samplings for each grid box. But, In the local reference sector process, the longitudinal range of the reference sector is expanded until the minimum of sampling encounters, affecting the inhomogeneity of the samplings. The error term to the inhomogeneity of the samplings caused by stratospheric variability and upwelling of the boundary layer into the upper troposphere, should be included.*

Revised: Added two more terms to the equation: the standard deviation from averaging total ozone under clear sky conditions and the above-cloud column ozone (stratospheric ozone) (**Section 5.1**). Equation 1, Figure 7, and the corresponding text have been modified accordingly.

C4. Section 5.2 *should be significantly revised. It is not proper to deliver comparison results for each station. My suggestion is to discuss the validation results, separately w.r.t 1) geophysical variables (e.g. total column ozone, cloud pressure, aerosol index) using all pairs from all stations (not each station) 2) seasonal comparison for maybe several sectors (e.g., pacific region, subtropical), 3) Figure 12 and Table 1 and a few stations from Figure 8 to summary the validation results.*

Revised : Seasonal comparisons with ozonesondes have been conducted across several sectors (Pacific, Non-Pacific, and subtropical) (**Section 5.2.1)**. The summary and validation results, along with updated figures, have been included. We have retained the station-by-station analysis, as the other reviewer has expressed interest in this aspect.

C5. *It is more interesting to see the comparison/evaluation results for ACCO with each meteorology against ozone sonde, rather than TCO.*

Revised : We have added an additional figure (**Figure 14**) that presents mean differences and standard deviations between TROPOMI and sonde measurements versus the average ACCO corrections at the 270 hPa reference level for all three CHORA algorithms and each station and discussed the results (**Section 5.3.3**).