Response to anonymous referee #2

We would like to acknowledge the referee for their helpful and thorough review. We believe that their comments improved the quality of this work.

Some of the statistics presented in the study have changed as a result of the error weighted linear fitting applied to the collocation data sets.

Our responses (in blue) follow the reviewer's comments (in black italics).

General comments:

1. Introduction. The authors took too many efforts in describing the importance of NO_2, instead of the historical validation using MAX-DOAS. The last paragraph needs to be extended by including more detail introduction of the previous validation works in both China and other regions.

The introduction has been revised accordingly.

2. Page 7, line 10. The explanation for the better agreement between GOME-2b and ground measurements is not very convincing. "Possibly, the NO_2 spatial distribution over the Guangzhou area during the GOME-2B overpass days is quite smooth and without significant horizontal gradients." I suggest providing further evidence (e.g., meteorological parameters) to support this argument, as it is quite an important statement to point out the better agreement of GOME-2b in this paper.

No evidence could be found to support this statement. The better agreement can be partly attributed to the lower NO_2 observed by MAX-DOAS in combination with the larger collocation data set compared to GOME-2A, which improves the metrics of the comparison. The manuscript has been revised.

3. Page 7, line 20. As pointed out by the authors themselves, "the number of coincident data pairs is rather small", the reliability of the conclusion is questionable. In addition, the validation result that GOME-2b shows lower bias with ground measurements than the other two sensors is not the same as previous findings, e.g., Wang et al. (2017). Further discussion on uncertainties of this conclusion is necessary.

More statistical analysis results and discussion on them have been included in the manuscript.

4. Section 3.2. A summary of the recommended MAX-DOAS settings based on the investigation is helpful for readers.

A summary of the recommended coincidence criteria has been included in section 3.2.

Specific comments:

1. Page 2, line 27, the bracket is missing in Shao et al., 2009

Brackets have been included.

2. Page 11, line 18. The sentence is too long to read. Please consider rephrasing it.

The sentence has been revised accordingly.

3. all the x in NOx should be subscript.

The manuscript has been revised accordingly.