Response to the Reviewers' comments on the manuscript: Simultaneous detection of atmospheric HONO and NO_2 utilizing an IBBCEAS system based on an iterative algorithm

Dear Editor and Reviewers,

Thank you very much for your letter and the comments from the referees on our paper submitted to AMT. We have checked the manuscript and revised it according to the comments.

Comments and suggestions:

1. For detection limit, the authors used "2δ", this description is very strange. The common description is "2σ", which standards for signal to noise ratio of 2.

Response

Thank you very much. We have revised it according to the reviewer's comment.

Comments and suggestions:

2. Page 2, Line 69, "IBBCEAS technology has been demonstrated to applied HONO" includes grammar error, "applied" should be "apply to"

Response

We have revised it according to the reviewer's comment.

Comments and suggestions:

3. Page 3, lines 84 and 85, "The key point of this technology is to determine the effective absorption path length, so as to correct the absorption cross section", this description is not right, absorption cross section (of HONO or NO_2) can't be corrected in this measurement and they are cited from references or database.

Response

Thanks for your suggestion. We rewrote this sentence "The key point of this technology is to determine the effective absorption path length, so as to determine the gas concentration by using DOAS retrieval."

Comments and suggestions:

4. Page 3, lines 101, "The Our instrument's capability of", "The" should be deleted

Response

We have revised it according to the reviewer's comment.

Comments and suggestions:

5. Page 4, line 127, "The IBBCEAS system in this study was developed based on Duan et al. work (2018) [25]." developed is a redundant word and should be deleted.

Response

We have revised it according to the reviewer's comment.

Comments and suggestions:

6. Page 5, lines 164-165, “it is necessary to ensure that the ambient temperature of the instrument is stable.” This sentence is not right, ambient temperature is variant, but you need to stabilize the gas temperature inside the optical cavity or correct the result contributed from temperature changing to decrease the uncertainty.

Response

We have revised it according to the reviewer's comment.

Comments and suggestions:

7. It is better to use abbreviation for “figure” (Fig.) in the manuscript, for example: Fig.1 not Figure 1 in page 4, line 128; page 6, line 169 (Fig.2 not Figure 2); page 8, line 234 (Fig.4 not Figure 4); . . .

Response

We have revised it according to the reviewer's comment.

Comments and suggestions:

8. “The Allan deviation continuous its decrease for averaging times up to several hours.” This sentence is not right, please pay attention to the grammar and description.

Response

We have revised it according to the reviewer's comment.

Comments and suggestions:

9. Kalman filtering section from Pages 10 to 11. Kalman filtering can improve measurement precision but can’t enhance detection limit. The authors should discriminate “detection limit” and “precision”. The used detection (or measurement) sensitivity is not accurate.

Response

We have revised it according to the reviewer's comment.

Comments and suggestions:

10. References, all journals should use abbreviation, for example, “Atmospheric Measurement Techniques” should be “Atmos. Meas. Tech.”.

Response

We have revised it according to the reviewer's comment.

Comments and suggestions:

11. Pages 17, lines 555-561, there is a problem in gas handling system in Fig. 1. With your current setup, the purging flow of left side will continuously dilute the sample, which will lead to extra uncertainty, please estimate this uncertainty. If you used the sampling rate of 1 SLM, the purging flow is 0.1 SLM, flow rate ratio is 10:1, can’t neglect, may increase extra 9.1% uncertainty.

Response

We have considered the effect of adding purging flow in section 3.4.

Comments and suggestions:

12. Figure 5 on Page 19, it is so hard to discriminate L1 to L5, please prepare this figure clearer for readers.

Response

We have revised it according to the reviewer's comment.

Comments and suggestions:

13. Figure 6 on Page 20, the authors confused the colors for the observed data and fit, the description for the red lines and blue lines in figure caption don’t match the figure.

Response

We have revised it according to the reviewer's comment.

Comments and suggestions:

14. Figure 11 on page 22, it is better to use different colors for data and linear fit.

Response

We have revised it according to the reviewer's comment.

Comments and suggestions:

15. Figure 12 on page 23, it is so crowd for the figure, the text has hidden the curves in the figure.

Response

We have revised it according to the reviewer's comment.