

Reviewer # 3

Comments and suggestions:

1. I think that the main shortcoming of the paper is that the authors do not make sufficiently clear what it is that is new about their instrument. Is it the choice of wavelength that enables O₂-O₂ to be used as a gas to measure the effective cavity length? Or is it a series of incremental changes that allow it to be used outdoors in dirty, vibrating or temperature varying environments? Other instruments of the same kind are described, but little that is specific is said about their shortcomings, and how this instrument overcomes these issues.

Response

This paper describes details of a newly developed HONO and NO₂ simultaneous measurement system with significant improvements in efficient sampling, vibration resistance and temperature resistance by applied of the purge flows, bypass flow and different thermostats. And as our knowledge, this is the first application of determining the effective cavity length by pure oxygen, and we discussed the wall loss of for HONO and NO₂, HONO adsorbed on the surface, photolysis of HONO by the 365 nm UV-LED light source and secondary HONO formation based on IBBCEAS technique in detail. We think they are the innovation points about our instrument.

Comments and suggestions:

2. I agree with the other referee that this is not an instrument just for China - surely it is for the world?

Response

Yes, we deleted "in China" in the title.

Comments and suggestions:

3. The authors should delete the words "home made" - this is not very positive, and the fact that

they have made the instrument is enough.

Response

Thank you for your suggestion, we deleted the words "home made".

Comments and suggestions:

4. In the abstract, sentence 3, some rewording is in order. Instruments don't make significant improvements, their makers do.

Response

Thank you for your suggestion, it was corrected to: "To achieve robust performance and system stability under different environment conditions, the current IBBCEAS instrument has been developed with significant improvements in terms of efficient sampling as well as resistance against vibration and temperature change." Please see P1. Line 21-23.

Comments and suggestions:

5. One of the references is incomplete (J et al.) and the reference to Krauss is quite insufficient for a reader to follow up.

Response

Corrected.

Comments and suggestions:

6. In section 2.1 the Beer-Lambert law ought to be quoted so as to properly introduce extinction. There is also something odd about the sentence order, where sentence 3 seems out of place in between two others on extinction.

Similarly in section 2.3 the order in which the concepts are presented seems odd. It would be improved if the two paragraphs were swapped, but it could probably do with more work.

Response

Thank you for your suggestion, the order of the sentences in section 2.1 and section 2.3 have been modified and the two paragraphs were swapped. Please see P3 Line 28 – 31 and P4 Line 23 – P5 Line 9.

Comments and suggestions:

7. The beginning of section 2.4 is a bit ambiguous - it could be construed that the current IBBCEAS is not the improved one, but that the improved one is a different one. Also, what is "temperature resistance"? Is it the reciprocal of thermal conductivity? Sentence 2 of this section is vague; what changes? How much?

Response

Thank you for your suggestion, it was corrected to: "This IBBCEAS instrument has been developed with significant improvements in terms of efficient sampling as well as resistance against vibration and temperature change to achieve robust performance in different field environments. For example, we found that the parameters of the CCD spectrometer changed with temperature especially when it dropped below 5 °C. To ensure the IBBCEAS can work across a wide ambient temperature range (5 ~ 35 °C)." Please see P5 Line 12 – 18.

Comments and suggestions:

8. The lines after equation 2 are hard to follow as there is an incomplete sentence - I think possibly a comma has been replaced with a full stop?

Response

Corrected. Please see P6 Line 10 – 11.

Comments and suggestions:

9. In section 3.2.2 I think there should be a reference for these absorption peaks. When you refer to particle free gasses here it suggests that there are gasses other than O₂ used. Also you have not in fact shown that the purge flow is significant because you haven't given the actual physical length of the cavity.

Response

Thank you for your suggestion, we added" In the spectral range of the 365 nm LED, NO₂(Voigt et al., 2002), HONO(Stutz et al., 2000) and O₂-O₂ collision pair(Greenblatt et al., 1990) have clear absorption peaks. " Please see P7 Line 12 - 13, and we added" Using this method, the geometric cavity length of the IBBCEAS instrument was 55.0 cm and the effective cavity length was determined to be 48.0 ± 0.5 cm."Please see P7 20 - 23.

Comments and suggestions:

10. In section 3.2.3, "detailly" is not a word in English.

Response

Corrected.