

Author Responses to Comments

Notification to the authors:

1. With the next revision, please add the numeric code to indicate the affiliation of the authors next to the names of the authors on the title page of the *.pdf manuscript file.

Response: According to the advice, we added the numeric code: ¹, to indicate the affiliation of the authors in the revised MS.

2. Please ensure that the colour schemes used in your maps and charts allow readers with colour vision deficiencies to correctly interpret your findings. Please check your figures using the Coblis – Color Blindness Simulator (<https://www.color-blindness.com/coblis-color-blindness-simulator/>) and revise the colour schemes accordingly.

Response: According to the advice, we checked all the Figures using the Coblis – Color Blindness Simulator and modified the color schemes of the Figs. 4-6, 8 and 10-12 accordingly in the revised MS.

Referee#2 Comments

We thank the reviewer for his/her appreciation of the revisions, and comments/suggestions. The MS is revised according to all the comments from the referee, and the point-by-point responses are provided below.

General comments:

This version of the manuscript has been further improved. However, some sentences are still bad in expressions, better find someone more professional to make it easier for readers.

Response: We thoroughly checked the whole text and improved the language in the revised MS.

Specific Comments:

1. Sentences in the manuscript are often long and hard to read, for example, lines 82-86, lines 97-101, lines 101-105, lines 274-278, lines 288-291, etc.

Response: We modified/rephrased all the noted sentences in the revised MS. Please see Lines: 82-87, 97-105, 275-280 and 290-298.

2. Grammar and expression problem: lines 14-15, lines 64-66, lines 74-76, lines 127-128, lines 294-295, etc.

Response: We corrected all the language errors. See Lines: 14-15, 65-67, 75-77, 128-129 and 296-297, in the revised MS.

3. Line 17. It is not completely right to say “whereas SO₄²⁻ was higher in summer at both the sites”, cause the SO₄²⁻ is still peaked in winter in ND.

Response: We corrected this phrase as “--- whereas SO₄²⁻ was higher in summer than in all other seasons at HEP and comparable among seasons, although it peaked in winter at ND.” in the revised MS (see Lines: 16-18).

4. Lines 383-385. I can understand that the NO₃ radical oxidation is an important source of SOA, however, I don't think the higher concentration of ion NO₃⁻ will accelerate the oxidation

process. If the authors do not agree, better explain the mechanism of how ion NO_3^- accelerate the oxidation reaction of VOCs.

Response: We fully agree with the reviewer that the VOCs are oxidized by NO_3 radical, not by NO_3^- ion. In the previous version, we highlighted the loadings of NO_3^- ion to indirectly represent the high abundance of NO_2 and thus NO_3 radical availability. However, in order to make it clear to the reader, we modified it by noting the seasonal variations of NO_2 , instead of NO_3^- ion, in the revised MS (see Lines: 382-387).

5. Lines 923-924, the style of the references is weird.

Response: We corrected the references style in the revised MS.