

**Title: Measurement Report: Chemical components and  $^{13}\text{C}$  and  $^{15}\text{N}$  isotope ratios of fine aerosols over Tianjin, North China: Year-round observations**

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**General comments:**

After revision, this manuscript has been improved a lot. However, honestly, there are some sections still needs to be further clarified. Detailed comments could be found as follows:

**Specific Comments:**

Generally, I'm confused by two points that proposed by the authors.

The first one is still, about the application of isotopes to trace the source contributions. In introduction section, the authors stated that the isotopic fractionation is more significant in the case of the isotopic composition of molecular species, but insignificant in the case of  $\delta^{13}\text{C}_{\text{TC}}$  and  $\delta^{15}\text{N}_{\text{TN}}$ . However, the authors then added a sentence "unless gas-to-particle and/or particle-to-gas transitions are significant". So, to my understanding, the authors actually indicated that the fractionation effects could be significant on the values of  $\delta^{13}\text{C}_{\text{TC}}$  and  $\delta^{15}\text{N}_{\text{TN}}$  in aerosols. If so, then the authors can not directly use the values of  $\delta^{13}\text{C}_{\text{TC}}$  and  $\delta^{15}\text{N}_{\text{TN}}$  in aerosols to explore the source contributions in Sections 3.5 and 3.8, unless the fractionation effect on  $\delta^{13}\text{C}_{\text{TC}}$  and  $\delta^{15}\text{N}_{\text{TN}}$  in Tianjin aerosols was clearly discussed.

The second one is the use of WSOC/OC in Section 3.4. I'm quite confused with the explanation of the authors. The authors explained that "...WSOC is mainly generated by oxidation reactions of VOCs in the atmosphere, rather than primary emissions", and stated that "...the mass fraction of WSOC in OC can be regarded as an indicator of aging of aerosols in the atmosphere". Then, the authors also added a sentence that "...when the contribution of the WSOC is insignificant from biomass burning". However, according to the former paragraph and whole manuscript, the biomass burning is a key contributor to the aerosol components in Tianjin aerosols. So the WSOC/OC can still be used to explore the aging of aerosols? Why? The authors need to clarify this.

**Technical corrections:**

Line 22: I don't think you have direct evidence to support the idea "...they were mainly driven by  $\text{NO}_3$  radicals in the former period"

Line 26: Add  $\text{SO}_4^{2-}$ ,  $\text{NO}_3^-$  and  $\text{NH}_4^+$  following sulfate, nitrate and ammonium, respectively. And double check the whole manuscript to define such abbreviations when they are first referred.

Line 35: Probably better to add a sentence to make it more meaningful, such as "Therefore, it is important to explore the source and formation process of the  $\text{PM}_{2.5}$ ".

Line 36: change ":" to ",". And, double check whether the "-" (through the whole manuscript) is in English style.

Line 40: Replace “(secondary OC, SOC)” with “to form secondary OC (SOC)”?

Line 41: Add “,” following “37%”.

Lines 71-74: I think better move these sentences to lines 127.

Lines 123-125: I think the authors should focus on why trace the source and formation process in Tianjin aerosol is important, but not what they are stating in current version.

Line 160: The authors better color the area of Tianjin instead of using a red star.

Line 218: Explain how the 0.83 was obtained.

Line 223: IRMS

Line 234: why 5 days??

Line 236: The authors should add some sentences about the descriptions of statistical analysis and remember to adjust the title of the 2.3 Section correspondingly.

Lines 263-264: Add citations.

Line 289: Replace “fruitful” with “effective”.

Line 312: Delete “and”.

Line 339: “40,0”??

Lines 375-378: Why the high concentrations of  $\text{NO}_3^-$  in aerosols could accelerate the oxidation reaction of VOCs by  $\text{NO}_3$  radicals? Which process? Clarify it.

Figure 5. Add p-value after each regression function.

Line 402: Wrong number of -6.5.

Line 404: Double check whether the “±” is in English style.

Lines 455-458: Why the increased emission in winter is not regarded as the reason for the peaked  $\text{NO}_3^-$  concentration in winter?

Lines 461-462: Why the oceanic source of  $\text{SO}_4^{2-}$  is not regarded as the reason for higher concentrations of  $\text{SO}_4^{2-}$  in summer than spring?

Lines 493-494: Keep consistent of “p”, and double check the style of “≥”.

Lines 572-574: I don't think the authors can draw such conclusion based on the discuss above, cause there is no discussions on the seasonal change of  $\delta^{15}\text{N}_{\text{TN}}$  at all.