

Atmos. Chem. Phys. Discuss., referee comment RC1
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Comment on acp-2022-30

Andrius Garbaras (Referee)

Referee comment on "Source apportionment and evolution of N-containing aerosols at a rural cloud forest in Taiwan by isotope analysis" by Ting-Yu Chen et al., Atmos. Chem. Phys. Discuss., <https://doi.org/10.5194/acp-2022-30-RC1>, 2022

The manuscript deals with the use of stable isotope ratio measurements for assessing sources and the formation of nitrogen-containing aerosols.

I found this manuscript interesting in a few aspects. First, the Authors used FTIR-ATR technique prior to isotopic measurements, which allowed to measure low amounts of nitrogen and oxygen in size segregated aerosol particles. Second, the Authors used low volume cascade impactor for day and night separate sampling and still were able to use individual plates for isotope ratio measurement. Third, the Authors demonstrate the use of a statistical isotope mixing model for aerosol source identification.

In my opinion, measurements were performed on the "edge" of isotope spectrometer capabilities, anyway is a nice attempt to look at the peculiarities of chemo-physical processes occurring in the cloud forest.

I would like to see more details on the measurement of the isotope ratio in the samples itself. This is actually a research that requires a lot of mastery because of the small amounts of analyte encountered. I would like the authors to provide more details in the supplementary material: what was the linearity of the spectrometer, what smallest samples did the authors measure with sufficient accuracy, or was the linearity tested with international standards of various sizes? All of these details will be useful to readers who apply similar analysis in the future.

Some specific comments:

Line 75 It's not clear where samples were collected. It's written that in Xitou experimental forest, but is not clear the location is up in the hill or in valley.

Line 105. There is no description how BC was measured with FTIR-ATR analysis. Does it is comparable with the measurements with other BC techniques, for example aethalometer?

Line 135. What stands for letter p in " $p\text{-NO}_3^- = \dots$ "

Line 170. Fig. 29 (c) and 2(d). NH_4^+ is not in the Fig. 2(d).

Line 170. It's not clear boundary level effect. Does it mean that the boundary level is always above the sampling station?

Line 190. I look at Fig. 3a and I see on average lower $\delta^{15}\text{N}$ values in submicron range comparing to bigger particles. Authors say that the "trend o a higher NH_4^+ $\delta^{15}\text{N}$ in submicron aerosol was also observed in Beijing". I not understand how Authors compare different size bins.

Line 195. What is mean "daytime fractionation"?

Line 200. PM_{1-10} was higher ... similar to $0.32\text{-}1\ \mu\text{m}$ aerosol. So no difference in all size bins, as almost the whole range fall in the $0.32 - 10\ \mu\text{m}$. This kind of differentiation seems artificial.

Fig. 2. The legend must be revised. I suggest adding a legend to the (b) and (d) for clarification.