

Atmos. Chem. Phys. Discuss., referee comment RC2  
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## Comment on acp-2022-30

Anonymous Referee #2

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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-RC2>, 2022

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The authors report results from an aerosol sampling campaign in a rural cloud forest during December 2018. Different size fractions were sampled on filters taken during daytime and night-time and during some days fog events impacted the aerosol composition. The most important measured aerosol components were ammonium, nitrate, sulphate, and black carbon. Ammonium and nitrate were also analysed for stable isotopes no nitrogen and oxygen.

The study nicely show local dynamics of aerosols and their partitioning into different size fractions. Differences in stable oxygen isotopes of nitrate during foggy conditions revealed a possible oxidation pathway involving peroxy radicals.

My major concern is the performed source apportionment using the stable nitrogen isotopes and a mixing model (MixSIAR). Many aspects of the procedure are insufficiently described (e.g. what is posterior in this context, and how should probabilities interpreted). Table 4 seems to list the results of the source apportionment. I see mostly values around 20 with standard deviations around 15. A threshold of 20 is applied, but the choice of this value is not motivated. Overall, most values do not seem to be significantly different. I fail to see how any conclusions can be drawn from this model. Therefore, I suggest to remove this part.

Minor comments:

Language needs to be improved. Several issues... already in the first sentence of the abstract (aerosol components NOT compositions).

Figure 1: extend the figure to also indicate how daytime and night-time chemistry results in different stable isotope composition. A good description is given in the supplement. Maybe some of this can be incorporated in Fig 1.

L132/133: I am not sure if organic nitrogen can be neglected. There are several papers out reporting organic nitrates and other organic nitrogen compounds in aerosols. The authors should at least discuss how their results would change if there are significant fractions of other nitrogen compounds.

L214-216: This sentence has language issues. The argumentation does not seem to be logical.

L228-230: Was there any evidence for agricultural activity during that period? What was different compared to other periods?

L281-282: "The posterior probability of PM1 and PM1-10 nitrate sources has difference slightly:" This seems to be a mixture of poor English with lab/model-slang.