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Atmospheric Chemistry and Physics Discussions



# *Interactive comment on* "The isotopic fingerprint of the pre-industrial and the anthropogenic $N_2O$ source" *by* T. Röckmann et al.

**Anonymous Referee #2**

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This paper presents very valuable new information on the isotopic signatures and trends in atmospheric N2O. The paper is clear and well-written. To my opinion, it can be published with only slight modifications.

The advantage of this interactive system is that I can see the remarks of my colleague-referee.

Therefore I need to give only one additional remark/question: not withstanding the high-class experimental achievements of this work, the scatter of the isotopic data in fig 1 is still in the same order as the fitted trends. Especially close to the surface, deviations occur significantly outside the fittable range. Is this due to not yet damped seasonality, or is there any other plausible cause? The text states that the most weight is given to the deepest points, as they provide the most critical fit test. Looking at the data and

the fit curves I do not fully agree with this argument. After all, this concerns only two out of 15 data points per fit, and on the very edge of the depth at which the curves get a steeper slope. Even more, the model choices might be extra critical that around pore close-off depth. Futhermore, it should be pointed out in the text and caption of fig 1 which fit curve/color is finally regarded as being the "best fit", and + or - how many curves/colors is the standard deviation of this fit.

Finally I would like to make a similar remark as posed by my colleague-referee: Of his/her comments, I would like to stress the remark about the error/range estimates: which effects/factors contribute the most to the error/range estimates given in table 1?

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Interactive comment on Atmos. Chem. Phys. Discuss., 2, 2021, 2002.