Biogeosciences Discuss.,
https://doi.org/10.5194/bg-2020-344-RC1, 2020

Biogeosciences
Discussions

Interactive comment on "Nitrogen isotopic fractionations during nitric oxide production in an agricultural soil" *by* Zhongjie Yu and Emily M. Elliott

Anonymous Referee #1

Received and published: 18 November 2020

Dear authors, this was a pleasure to review your manuscript. It raises a very interesting topic of application of stable isotope studies for better understanding of soil N cycle. The manuscript presents a few of very original analytical approaches, like NO and NO2- isotopic analyses (as one of the very first for soil studies) and application of D17O to trace NO3 and NO2 soil transformations. The combination of all the approaches and the construction of the NO isotope model is very complex and challenging to present in an understandable form, but authors managed this very well. The manuscript is well organised, the results are well documented and supplement contains a lot of additional information precious for the readers who will further apply or develop the presented approach. I could have one suggestion of expanding the analytics, maybe useful for

your future studies. Since you used Chilian NO3 with the D17O anomaly you could also monitor this anomaly in NO2- (this may be difficult due to low concentrations) or in NO or N2O. This would allow you to determine the extend O-exchange and no further consideration of two scenarios: with and without O-exchange will be needed. This will bring more clarity to the whole study. An example of using D17O of N2O to determine O-exchange can be found in Lewicka-Szczebak et al. (2016, BG). I have just a few very minor comments: - Fig. 6 - do you assume that the abiotic NO cannot be further reduced to N2O? - L 609 - what do you mean here with "modified isotopologue-specific model" - this term was not used before in the manuscript and it is not clear if you just refer to the presented NO isotope model or sth else - L 624 - what is "more normal" isotope effect? - Section 4.3 - I wonder why you do not consider NO2- oxidation to NO3- for oxic and suboxic conditions. If this process was so intensive under anoxic conditions, why it should not be active under oxic and suboxic conditions?

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