

Earth Syst. Sci. Data Discuss., referee comment RC1
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Comment on **essd-2021-85**

Anonymous Referee #1

Referee comment on "Reactive nitrogen fluxes over peatland and forest ecosystems using micrometeorological measurement techniques" by Christian Brümmer et al., Earth Syst. Sci. Data Discuss., <https://doi.org/10.5194/essd-2021-85-RC1>, 2021

The authors present the almost annual high-resolution (half-hourly) total Nr and NH₃ flux datasets at two representative ecosystems. The dataset may be useful for model validation for atmospheric chemistry and land surface processes. However, considering publication I have to ask the authors to answer the following questions and comments;

- Could you demonstrate the novelty of the datasets more strongly, via comparing with the prior studies in terms of temporal resolution, data length, data quality, site characteristics (vegetation type)? For example, what about the quality or uncertainty of other past eddy covariance study for Nr over the vegetation compared with your datasets? How long is the longest record of past datasets, and where and what vegetation type? Another example is green-house gas flux; other ESSD papers demonstrated typically for greenhouse gas flux for longer time period (> several ten years), which enables us to discuss the annual carbon budget. Actually you mentioned about the impact of nitrogen deposition on carbon storage in 1443-448 in p15, but your WET site dataset for instance is collected for less than 1 yr and could not used for annual deposition/emission. Although this is partially described in Introduction section, more explanation is still required.

- Please add the following data to your repository or if available from other projects (e.g., LTER, fluxnet, ...) please add these link address to your repository website: net radiation, sensible and latent heat, CO₂ fluxes over the canopy, soil temp and moisture (for model validation), atmospheric pressure, precipitation, downward long-wave radiation (for model input), plant functional type (PFT), LAI, canopy height, leaf trait, soil type and texture (for input parameters). Management (fertilizer practice) data, too. They are generally required for land surface modeling in addition to your concentration and flux data.

- I think your low-resolution data can be used for validation of your high-resolution data over time series and/or scatter plots. Currently this seems to be used just for dry deposition estimation though.

- please show the accuracy of gap-filling method using dry deposition models (4.3.2 and 4.4) via comparing the model outputs with original flux data over time series and/or scatter plots. Then you can tune the parameters such as Massad et al. (2010) model to reproduce the original flux data (unnecessary use of default parameter sets, if the results are improved)

- Table 3 lacks the info about NH₃ concentration and flux measurements and low-resolution datasets (while all data are available in the website).

- Fig. 3: pls specify if the flux data is gap-filled or not. Also could you add the lower detection limit for the NH₃ flux of "n.a." over the forest site?