

1. It is good publishing practice to keep the text as short as possible and strictly related to the novel scientific content. This is valid both for the main text and for the supplemental material. The supplemental material of this manuscript must be heavily shortened. You can't use the supplemental material to publish a comprehensive model documentation. For this I recommend the EGU Journal GMD. Please follow closely the respective recommendations of Reviewer 1.

*The Supplement has been shortened by removing those Appendices that are not referred to in the text. However the remaining material in the Supplement provides important information concerning model formulation that is necessary to those ambitious modellers that may wish to reproduce my findings. In contrast to many other modelling publications, I do not wish my model to be perceived as a 'black box'. I also note that the entire Supplement has been published with many papers in other journals without this issue of its length being raised.*

2. A weakness of the manuscript is lack of quantitative model performance. I completely agree with Reviewer 1 that showing some time series and discussing them is neither representative nor comprehensive. If I understand it correctly, you have now expanded the respective figures and include all data, which is good but will probably make the figures even less readable. Time series are not useful to get a clear impression of the model performance. If one would like to display the model performance in a figure, simple scatter plots (e.g. measured = y axis versus modelled = x axis - not as time series) were much more useful. However these graphs omit the temporal development and therefore cannot simply replace the time series. Please revisit the literature, there are many quantitative indicators for model performance (e.g. linear regression parameters, slope and offset and their significance and uncertainty, correlation analysis, and a number of more specific model performance parameters) that should be used in and can easily be presented in a table.

*The episodic nature of N<sub>2</sub>O emissions means that time series such as those presented in the paper are vital to determining that the model captures the timing and intensity of emission events. Much of this determination is lost in scatter plots which are hence less useful in establishing model performance. However I have added a summary of key parameters from regressions of modelled on measured emissions taken from scatter plots during each year of the study (intercept, slope, R<sup>2</sup>, F) in Table 3 as a statistical test of model performance. I discuss these parameters in a new section added to the Results on lines 418 – 431.*

3. You did not comment on the lack of uncertainty analysis. Reviewer 1 mentioned "The absence of any uncertainty analysis, and the focus on just a few of the many emission events observed, and the use of data from just one site, also make it hard to evaluate the work." Please provide an uncertainty estimation in the manuscript. You claim that the quantitative relationships that you use in the model have not been fitted from the site but arise from other studies or theory. You could, e.g., use the uncertainty that is connected with these relationships and estimate the consequence for the uncertainty of the predicted N<sub>2</sub>O fluxes with a state of the art Monte Carlo approach.

*Although this study includes just one site, it does include 6 years of data with more than 8000 data points, much more than most other N<sub>2</sub>O studies. I have added an example of the effects of parameter uncertainty by altering the values of two key parameters determining N<sub>2</sub>O emissions in the model in Table 5. These changes are described in the Methods on lines 393 – 400 and discussed in new sections added to the Results on lines 652 – 663 and the Discussion on lines 847 – 859.*