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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Effects of fertilization and stand age on N_2O and NO emissions from tea plantations: A site-scale study in a subtropical region using a modified biogeochemical model" *by* Wei Zhang et al.

Anonymous Referee #1

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General comments: This study modified a process-based model to investigate effects of fertilization and stand age on N2O and NO emissions from tea plantations. The authors did intensive works, including model modification, model evaluation, scenario analysis, and uncertainty analysis. However, the authors provided limited discussions for some important contents/results (please refer specific comments) and some descriptions were not very clear. I suggest author further improving the language, clarity, and discussions of the manuscript.

Specific comments: Lines 21 to 22: This sentence is not clear. For example, did you

mean the observations showed a 62% increase and the simulations showed a 36% increase? Maybe not using "consistently" in this case. Line 31: The "word" should be "world". Line 60: The "which" is not clear; suggest rewriting. Line 113: "full" application is not as clear as "exclusive application". Section 2.2: My understanding is that soil buffering impact is an important mechanism regulating soil H and pH changes. But it looks that there was no parameterization of this mechanism from the equations and parameters described in this section. Line 169: The "tea residue" was actually "tea leaf residue"; right? Lines 217 to 220: This sentence is too long; I suggest breaking this long sentence. Lines 231 to 235: This sentence is long and not clear for me. Did you mean you have set 35 different scenarios for investigating the stand age effects? Line 256: Please add refs for the latin hypercube sampling. In addition, I cannot well capture the author's intention for breaking simulation error into structure error and input error after reading the manuscript. If the break is important, I suggest briefly introducing the intention and discussing the breaking results to better guide readers. Lines 286 to 289: This sentence is not clear. Not sure which values are for the original model and for the modified model. Lines 298 to 302: Given the observed effects (e.g., -25%) and the relatively large observational errors (e.g., 73%), I am curiosity about if the observed stimulation or mitigation effects were significant or not. Lines 305 to 307: It looks (table 6) that the original model performed better than the modified model in capturing the inhibitory effects on NO fluxes; right? This need to be mentioned and discussed. Lines 320 and 322: Seems the original model performed better in simulating the EFds of NO. Could you provide an explanation? Lines 327 to 329: This sentence is not clear; please rewrite. Lines 342 to 343: It is not straightforward to compare the field observations with the uncertainty of the regression lines. Why did not directly compare with the uncertainty of the simulations? Line 353: It looks the differences in simulating gas fluxes and yields between the original and modified models were primarily induced by pH differences. Did you find any observations or literatures that reported soil pH (or soil pH change) in old tea fields (such as 35-years)? This kind of reports could increase the reliability of simulating soil pH change by the modified model. Discussion section: One

important part of this manuscript is model modifications. However, limited discussions regarding the model modifications were provided. I suggest authors providing more discussions regarding the model modifications; such as implications, limitations, and advantages of the modified model etc. Lines 387 to 388: I suggest deleting this sentence because the former results (i.e. comparable models performance for the early stand ages and no-validated models performance for the old stand ages) cannot confirm this conclusion. Lines 397 to 398: Please change the word of "dominant" as it may be not proper to call "62 to 67%" and "57 to 62%" as dominant. Lines 498 to 499: As I previously mentioned, I don't think this conclusion is solid since the long term N2O and NO emissions were not evaluated. Figure 3: The blue cycles are for the modified model and the gray cycles are for the original model?

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