

## ***Interactive comment on “Constraining a complex biogeochemical model for multi-site greenhouse gas emission simulations by model-data fusion” by Tobias Houska et al.***

**Anonymous Referee #2**

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The authors used a model-data fusion method to constrain the LandscapeDNDC model with multiple-year greenhouse gas fluxes from arable, forest and grassland sites. I appreciate the authors' effort to parameterize biogeochemistry models using long-term field data. I would like the authors to further clarify some of my concerns: (1) Is LandscapeDNDC a multi-layer (i.e., vertically-resolved) model? If yes, how many soil layers are included and how do you model the fluxes between layers? (2) In Tier I and Tier II, do you include the same parameters, e.g., all parameters in Table A1? To my understanding, hydrological parameters (e.g., in wcDNDC module) controlling soil water (represented by WFPS) in Tier I will also influence N<sub>2</sub>O and CO<sub>2</sub> in Tier II; however, some key parameters governing the biogeochemistry processes (e.g., in METRX mod-

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ule) do not necessarily affect soil water. (3) page 6: please further explain “within best 5% of all simulated RMSEs”. Do you mean the best 5% of total number of simulations or the best 5% of unduplicated RMSEs? If it's the former, the number of accepted model runs depends on the total number of model runs. Since multiple objectives (e.g., WFPS in different depths) are considered, do you integrate them (RMSEs) into one single objective? If not, how do you determine the acceptance of a model run? (4) Table 6: what are the criteria used to classify model performance? Other minor comments: (5) Table 1: Since the model DNDC include inorganic N, what's the inorganic N amount used in the model? How do you initialize the model? Using measured values (e.g., Table 1) or implementing model spin-up? (6) please use month names (e.g., January, February, ...) to indicate the month in a date (e.g., 01.11.2013)

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