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Interactive comment on "A Predictive Algorithm For Wetlands In Deep Time Paleoclimate Models" *by* David J. Wilton et al.

Anonymous Referee #1

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The manuscript by Wilton et al. covers an interesting topic appropriate for GMD. The authors attempt to develop a nearest neighbor-based algorithm to simulate the inundation dynamics for estimating wetland CH4 emissions in deep time paleoclimate. The writing is clear. The results are interesting and this approach provides a way to simulate wetland areal dynamics in ancient climate. However, there are several issues in this manuscript needed to be addressed before publication.

The main confusion I have is on the validation of this approach. It is not convincing that using one reference dataset to train their algorithm, and then evaluate the simulated results with the same reference dataset. It would be necessary to compare with independent inundation products to justify their approach, or the authors need to provide the uncertainty in the estimated inundation using their approach given that there are

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Discussion paper

large uncertainties in wetland extent among existing inundation products (Melton et al., 2013).

-The logic of this approach is a bit confusing to me. If I understand it correctly, this nearest neighbor-based algorithm implicitly assumes the locations of wetlands should close to each other and inundation is correlated with eight variables the authors proposed. But according to the modern dataset, is there any analysis/evidence prove that this relationship exist? Fan (2011) suggest that water table depth is a key to simulate wetland distribution - at least it is an important variable to capture the distribution of peatlands in high latitudes as some of the peatlands don't show inundated condition but still emit CH4.

- I'm not sure that comparing the simulated wetland distribution with coal deposit can be helpful as the authors have already mentioned some of the limitations using coal deposit. Also, it's hard to tell how good the fit is from reading Figure 7.

- It would be great to address a bit more about the background why it's important to develop a dynamic inundation algorithm for deep time paleoclimate simulation and what's the current status of research on this topic.

References:

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