

Interactive comment on “WETMETH 1.0: A new wetland methane model for implementation in Earth system models” by Claude-Michel Nzotungicimpaye et al.

Anonymous Referee #2

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The paper describes an intermediate complexity approach to represent methane production and oxidation in an Earth system model. Modeling the two component fluxes of methane from wetlands is challenging and this paper is a good contribution to the existing land surface models engaged in wetland methane emission research. The paper is very well written and is excellently referenced.

I have just minor comments and clarifications:

In the introduction, please mention ‘acetotrophic methanogenesis’ and ‘hydrogenotrophic methanogenesis’ when discussing the three pathways for methane production from microbes.

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Fig 1 – suggest adding a CH₄ production figure

Eq 1 – is C_i representative of total soil C, or more mobile source of C, like the intermediate pool (if using a CENTURY type model) ?

Eq 1 – specify that S(theta) is for vertical profile, not for the entire grid fraction

Is there any coupling of permafrost sub routines w your CH₄ production scheme? Do they both use same soil temperature – and so if soil temperature is cold, then no CH₄ emissions?

What is the model timestep of CH₄ production and oxidation?

Does soil carbon get reduced to account for carbon lost through CH₄ production?

Is Zoatz the same as Zoxic, I was a confused here what the difference is.

Ultimately, the oxidation rate is fixed through space and time, my calculation is that 96% of gross methane production is oxidized, e.g., $1 - \exp(-0.05/0.0146)$ – is this correct?

Why not vary Zoxic to represent a dynamic water table height? I didn't understand why this is fixed at 0.05 globally and over time.

Interactive comment on Geosci. Model Dev. Discuss., <https://doi.org/10.5194/gmd-2020-176>, 2020.

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