

Geosci. Model Dev. Discuss., community comment CC1
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Comment on gmd-2022-294

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Community comment on "Forcing the Global Fire Emissions Database burned-area dataset into the Community Land Model version 5.0: impacts on carbon and water fluxes at high latitudes" by Hocheol Seo and Yeonjoo Kim, Geosci. Model Dev. Discuss., <https://doi.org/10.5194/gmd-2022-294-CC1>, 2023

This study focuses on a decidedly useful topic. The design is a reasonable approach to learning about the limitations and potential to improve CLM's fire simulations. Phrasing and copyediting are substandard. The analysis of the results needs more meat in terms of using details of the two runs to better understand how and why they differ. The model runs would support a substantially tighter and more coherent assessment. What can the authors show or even speculate about why CLM fire matches not only rather poorly to the datasets, but also differently in the two continents? Saying CLM Fire is "limited", pointing out that it is imperfect, is less useful than helping the community think about reasons and specifics. Several of the speculations about real-world reasons the CLM fire algorithm is imperfect are insightful and useful.

Some notes about uncertainty in the benchmark datasets seem warranted. As an obvious example, GFED emissions too are a model. While it is reasonable to assume the comparison data is more accurate than an ESM simulation of fire, what considerations about the inevitably imperfect inventories should a reader keep in mind? How similar are the two inventories' derivation algorithms and data sources? Making the comments specifically relevant to the patterns the study finds would be most helpful. As only an example, what is the correlation of GFED and AKFED emissions for the study area and period?

Any information about the relevance of peat fire would make this paper a substantially stronger tool for improving fire in CLM. As examples, what is the relative abundance of peat in the study area compared to the rest of Siberia? What portion if any of the "open loop" Siberian burned area and emissions were generated from the peat fire algorithm within CLM fire?

Thank you for tackling this study.

general - Please either use a consistent number of significant digits, or justify why not.

line 41 - 'Human-caused' is conflated with human-ignited. Warmer climate, too, is human-caused.

102 - Equations 1 & 2 should be cited, including with equation numbers from Lawrence19

106 - By "leaf size" do you mean LAI? The terms are not interchangeable.

153 - What data source do you use for woodfuel burning estimates?

166 - Pls explain why you chose the specific area within Siberia, and what relevant ways it is similar to or different from the rest of Siberia.

201 - an egregious example of the need for copyediting. Ditto l. 230-234.

217 - While the general point is very well taken, "no human impacts" is an overstatement. See p.29 of [https://fire.ak.blm.gov/content/aicc/Alaska%20Statewide%20Master%20Agreement/3.%20Alaska%20Interagency%20Wildland%20Fire%20Managment%20Plan%20\(AIWFMP\)/2022%20AIWFMP%20Final%20Signed%202022-02-28.pdf](https://fire.ak.blm.gov/content/aicc/Alaska%20Statewide%20Master%20Agreement/3.%20Alaska%20Interagency%20Wildland%20Fire%20Managment%20Plan%20(AIWFMP)/2022%20AIWFMP%20Final%20Signed%202022-02-28.pdf). Responding agencies will "conduct site protection as warranted."

237 - OK, but there now exists information about differences between GFED3 and GFED4. To what extent is Veraverbeke's explanation that you reiterate perhaps now addressed - or not?

239 - Rather than speculate, pls look up the numbers and compare them at least to each other and ideally also to additional references.

256 - rates of change, or changes?

279 - 281 needs replacing. Line 279 is an overstatement; Line 280 was known before the study started simply because all models are imperfect; Line 281 is not a logical conclusion based on the prior two statements. Writing a stronger analysis as requested in the general notes above will provide better material to summarize in this paragraph.