

Major comments:

- Did your spinup include land use areas? (How much land use even is there in the study regions?)
- CC1 response a bit lacking, as they raised a good point about peat fires. Even if you determine it's not an issue, you should mention this in the MS.
- Throughout: The paper is framed as forcing CLM with GFED4 burned areas to learn about real-world hydrological and biogeochemical cycling. However, the analyses make it more of a "model evaluation" paper—you're mostly seeing how much CLM's results are affected by its biased burned area, rather than learning much about real-world fire. You should either reconsider the framing (preferable to me—it's easier, and still an important evaluation!) or add analyses supporting your original framing.
- Results, throughout: Contextualize numbers. I don't have an intuitive sense of what, e.g., a difference of 5.41 mm in canopy evaporation means. What do these results mean in terms of percent difference, either between simulations/observations or between simulations? Are they biogeochemically/ecologically meaningful differences? (You don't need to give % change for every number, although in some cases that might help. What I'm saying is, you need to give the reader a better sense of what the numbers *mean* in relative terms.)
- It's good that you discuss possible reasons for the burned area and C flux results. However, these discussions are important enough (and will be long enough, once you expand them as I suggest below) that they should be moved out of the Results and into a new Discussion section.

Detailed comments:

- Throughout: Why is the default run called "open-loop"? Wouldn't it be more straightforward to just call it "default"?
- Title:
 - "Global Fire Emissions Database burned-area dataset into Community Land Model version 5.0" doesn't work. Maybe something like, "Forcing the Community Land Model version 5.0 with burned area from the Global Fire Emissions Database"?
 - You can delete " – Biogeochemistry" to make the title simpler.
- Sections 2 and 3 should be combined into a single "Methods" section. It especially doesn't make sense to have Sect. 2.2 in a different section from the rest of the experimental design. Also, Sect. 3 has the same name as Sect. 3.2. Here's my suggested reordering under a single "Sect. 2, Methods", new ← original:
 - 2.1 ← 2.1: Model description
 - 2.2 ← 3.1: Site description
 - 2.3 ← 3.2: Experimental design
 - 2.4 ← 2.2: Fire and C fluxes datasets
- L10: Capitalize "Global Fire Emissions Database" and "Community Land Model"
- L14: "trends" should be "signs" or "directions"
- L26: Delete "remarkably"—too opinionated
- L31: Replace ", at" with "in"

- L38: "regions" is weird here, since it usually refers to geographical areas. Try replacing "carbon in belowground regions" with "belowground carbon".
- L71: Capitalize "Community Earth System Model"
- L75: Hyphen needed in "sub grid"
- L84: Capitalize "Lightning Imaging Sensor" and "Optical Transient Detector"
- L94, 104: What do "24.26" and "24.27" refer to? Equation numbers? I don't see those anywhere in Lawrence et al. (2019).
- L96 (Eq. 1), L106 (Eq. 2): All vectors (CE , C , CC , f_i , M) should be in boldface italics: <https://www.geoscientific-model-development.net/submission.html#math>
- L114:
 - Delete "Especially, the "
 - "represent" should be "represents"
- L127: "leaf size" should be "leaf area"
- L141–145
 - Is Veraverbeke et al. (2015) the citation for AKFED? If so, cite that in the first sentence here. If not, add the correct citation—and then why is Veraverbeke et al. (2015) discussed at all?
 - L144: "presumed" is almost certainly not the right word. "Calculated"? "Determined"?
- L146: Not just EXP-GFED4, right? Also OL?
- L169: Replace "but" with "and"
- L195: Replace "big fires" with ""large burned areas or "anomalous years"; "big fires" implies individual contiguous burn patches, which may not be the case.
- L199: What is this sentence trying to say? Why "especially"? What's special about it?
- Paragraph at L201–5 needs a total rework.
 - "inadequately" is a value judgment; whether the model performs adequately depends on what question it's being used to answer. Replace this with something that describes the CLM bias objectively.
 - L201: Re-state grid cell resolution here.
 - L202: Observed by GFED? Or AKFED?
 - L202–3: "a few"? How many?
 - L204: "simulating largely burned areas"? What does this mean?
 - L204: "more grid cells"? Relative to what?
- Paragraphs at L207–26 need rework.
 - Please combine these paragraphs. You do some discussion in the second paragraph, which is confusing because the paragraph break makes it seem like you're moving on to something else.
 - You should also discuss the issues with wind speed in global fire models: Lasslop et al. (2015), <https://www.publish.csiro.au/wf/WF15052>
 - "position"?

- "misunderstanding" is not the right word. Do you mean "misrepresentation"?
- What do you mean by "the limitation of using point data in the grid-based model"?
- L219: "Persistence" ("duration" would be clearer) has what units?
- L220: "fires can last longer" in CLM or real life?
- Expand discussion of fire duration into its own paragraph and add citations. Much literature exists about both (a) real-world fire durations (especially in Alaska, where large fires contribute a huge proportion of burned area), (b) the effect of the constant-duration (or max 1 day) assumption in fire models, and (c) the effect of including dynamic, > 1 day fire duration in models.
- Paragraph about Alaskan fire policy needs expansion. What do those different levels mean? How much area is in each level, especially in your study area?
- L224: "anthropophonic" is not a word. "anthropogenic"?
- It's unclear what the difference is between Sections 4.2 and 4.3. You should strongly consider combining them to tell a more cohesive story about your results.
- L241–9
 - Did C emissions change much between what Veraverbeke et al. looked at (GFED3s) and GFED4?
 - Be clearer throughout about when you're discussing CLM vs. GFED (vs. real life?) combustion completeness factors.
 - You cite the combustion completeness factors for GFED3 (van der Werf et al., 2010) instead of the dataset you actually used (GFED4; Giglio et al., 2013). There were actually important changes to how combustion completeness works in GFED4!
 - L248: Tilde should be an en dash
- L251: "form" should be "from"
- L253:
 - "more reliable" in what? GFED/CASA or CLM?
 - "dominant" in what? Observations and/or GFED/CASA and/or CLM?
- L256–61: This paragraph feels weird in a section about carbon fluxes without you first having discussed GPP/NEP/NPP. LAI is an explanatory factor of those things and thus should go after the GPP/NEE/NEP discussion.
- L264: "rate" is not correct here, as it implies something with time in the denominator. Replace "rates of changes" with "differences".
- L290–6: This paragraph fits more in the Conclusions section.
- L321–31:
 - At some point this paragraph transitions from talking about both regions to just Alaska. Make Alaska its own paragraph, as you did for Siberia.
 - L322: Replace "grids" with "grid cells".
 - L323: "affected" in what direction?
 - L324: "may"?
 - L329: Replace "the CLM-dynamic global vegetation model" with just "CLM"

- L370: Please cite the specific version (git tag or commit SHA) of CLM on which you made your changes.
- L465–6: Please replace citation with Rabin et al. (2018): <https://gmd.copernicus.org/articles/11/815/2018/>
- Figs. 2, 3, 5, 6, 9, 10: Please use more colorblind-friendly colors in Fig. 5, especially avoiding red and green. For all these figures, using different line styles (solid vs. dashed vs. dotted) and/or a variety of markers (instead of just squares) would also help. Some useful resources can be found here: <https://www.geoscientific-model-development.net/submission.html#figurestable>