

Dear Authors,

Firstly, I would like to extend my warm congratulations on your comprehensive assessment of the state of extreme wildfires for 2023-24. This manuscript represents a significant and valuable contribution to the understanding of wildfires, and I believe it holds great potential for impactful publication after addressing a few minor revisions and additions.

Comments:

- I understand that this is the inaugural assessment, necessitating the inclusion of many details. However, the paper is quite lengthy, spanning over 100 pages (and more than 50 pages of supplementary material), which makes it challenging to read. Some sections could benefit from greater conciseness as some repetitions and details could be referenced rather than fully detailed within the paper. To improve readability and impact, I suggest the following:
 - Streamline sections to remove repetitive content.
 - Condense detailed explanations where possible by referencing relevant literature.
 - Focus on making the key findings and methodologies more concise and directly accessible.
 - The conclusion section is currently too long and reads more like an incomplete review rather than a focused conclusion of this study. I suggest strongly reducing it and concentrating on summarizing the key results and findings of this report. This will provide a clear and concise conclusion that highlights the main contributions and implications of your study.
- For future updates, it could be interesting to include regional data where available that can cover longer periods compared to satellite data. This would provide a more comprehensive historical context and enhance the analysis.
- Existing approaches are not considered in this inaugural report. For instance, hybrid models for seasonal fire risk, fire propagation models, or new fire susceptibility/risk mapping tools are not included. Adding a discussion on these approaches could provide valuable insights and indicate potential directions for future reports.
- In future versions, it might be beneficial to include a summary of the main scientific initiatives currently in action (e.g., projects, consortia, collaborating groups). Additionally, consider adding comments on ongoing work in the main scientific agenda, including how these efforts align with the Sustainable Development Goals (SDGs).
- In future versions, more attention should be given to the Wildland-Urban Interface (WUI), human exposure, and the broader impacts of fires, such as on air quality. These aspects are crucial for a comprehensive understanding of wildfire risks and their societal impacts.

Minor Comments:

L100-101: The authors state in the abstract that global wildfires are increasing in frequency and intensity due to climate change. This statement may oversimplify the complexity of wildfire trends and drivers. It would be beneficial to provide a more nuanced discussion or to soften the statement to reflect the multifaceted influences on wildfire activity. This will ensure the abstract accurately represents the detailed analysis provided in the paper. In addition, a very recently published paper assesses trends in extreme fires (Cunningham et al., 2024). I think this is an important reference to add to this paper, and their methodology may be applied to future versions of this report.

L124: The values like "2.22" should be rounded to an integer or at least to one decimal place. The associated uncertainty is likely significant, and using two decimal places may artificially increase the perceived confidence in these future estimates.

L150: You can reference IPCC AR6.

L175: Reference Zheng et al., 2021 Science Adv.?

L180: Any reference for this statement?

L196-213, L215-233: While the information is accurate, it would be beneficial to break these paragraphs into smaller, more focused sections that group related information together. This will enhance readability and ensure a more logical flow of ideas.

L255-256: I agree, and for this reason, I stress the importance of being as concise as possible to enhance readability and ensure the key messages are communicated.

L258-266: Why is this paragraph here? This can be discussed later. In any case, I agree that defining extreme fires is challenging. Your title indicates "wildfires," but you consider all fires in the BA statistics, including agricultural fires. A possibility is to use "fires" instead of "wildfires" in the title and reduce the discussion on the definition of "extreme fires" here and later in the paper.

L270: I suggest moving before "This inaugural edition [...]".

L275: "March 2023 to February 2024"? I suggest indicating briefly in the introduction why this period.

L284: Which fire season? Please be specific.

L290: I suggest including a broader range of sources, not just publications.

L292-315: This can be merged within the Method section.

L297: The term "fire risk" is used here. Please ensure consistency and be mindful of the distinction between "risk" and "danger" in natural hazards studies. It is important to use these terms accurately to avoid confusion.

L298: All acronyms should be expanded at their first appearance or included in an auxiliary table for reference. This will help ensure clarity for all readers.

L324: You consider BA values since 2001 while the combined Terra and Aqua datasets started in 2003. Could the trend be affected by this inhomogeneity? Please address this potential issue.

L382-283: Not clear, please reformulate.

L396-405: I suggest explaining the target season shortly in the introduction.

Table 1: For the IPCC regions, you can reference: Iturbide M. et al. (2020). An update of IPCC climate reference regions for subcontinental analysis of climate model data: definition and aggregated datasets. *Earth System Science Data*, 12(4), 2959-2970.

L429: "(2003 for C emissions)" applies also for points "I" and "II"?

L430: "and;"?

L442-444: Not clear.

L451: Always using the March-February years?

L486: For future updates, I suggest correcting the p-values of the Mann-Kendall test for multiple testing using a false discovery rate test, as described in Ventura et al. (2004). "Controlling the proportion of falsely rejected hypotheses when conducting multiple tests with climatological data." *Journal of Climate*, 17, 4343–4356.

Table 2: There are some typos (e.g., "Ang'ila"), inconsistencies (such as country names being abbreviated or not), and repetition (the Africa region). Please correct the typos, ensure consistency in the formatting of country names, and eliminate the repetition in the Africa region.

L607: I think the comparison should be made fairer by using observed Fire Weather Index (FWI) data. This will ensure a more accurate assessment.

L612: I believe the seasonal skill is limited to less than 2-3 months in most regions. Please verify this information and adjust accordingly.

L614: "Predictability" or skill?

L618-621: Not clear. As I previously indicated, observed FWI should be the target for the verification.

L632: “Shapley values”?

L644: “and;”?

L658-659: Not clear.

L755: Please update the references considering the latest one: Forster et al. (2024). Indicators of Global Climate Change 2023: annual update of key indicators of the state of the climate system and human influence. Earth System Science Data, 16(6), 2625-2658. Also, please clearly indicate the quantity and reference for the temperature increase. For instance, Forster et al. (2024) wrote “The indicators show that, for the 2014–2023 decade average, observed warming was 1.19 [1.06 to 1.30] °C, of which 1.19 [1.0 to 1.4] °C was human-induced. For the single-year average, human-induced warming reached 1.31 [1.1 to 1.7] °C in 2023 relative to 1850–1900.”

L805: Which models?

L827: There appears to be an issue with the numbering. I suggest referencing the first supplementary figures first to ensure a logical sequence.

L828: I suggest replacing “correct” with “adjust”.

L854: I suggest explaining here why two thresholds.

L870: Please ensure proper formatting for citations, correcting any issues with parentheses.

L943: Burton et al. (2023) is a preprint, so I'm not sure if the methodology could be applied here without a proper examination and discussion. Is this approach mature enough to provide reliable information for this inaugural report and potentially for the next ones? I suggest a thorough review and discussion to ensure the methodology's robustness and suitability.

L951: I suggest comparing the results also against a standard no-weighted ensemble.

L963: The term "decadal outlook" might be misleading as you are considering decadal projections and not decadal predictions. Please adjust the terminology accordingly to avoid confusion.

L967: I suggest removing the ENSO description. An appropriate reference should suffice.

L967-996: The description is not clear. Is this the application of an already verified method or a new method? Additionally, please clarify how you establish significant teleconnections.

L1063: It might be useful to include a brief introduction to prepare the reader for the following section. Additionally, I notice that for some continents you provide specific quantities, while for others you only indicate "above" or "below." I suggest maintaining consistency in this section by providing quantities or clear indications for all continents.

L1076: Is it possible to provide an estimation of this contribution?

L1082, L1087, L1340, L1679, etc.: It might be useful to include a reference to demonstrate that the main driver here is drought, as this will substantiate your assertion. If such evidence is not robust or widely agreed upon, consider softening the statement to reflect the complexity of the factors involved.

L1085: I suggest using "BA" or "burned area" consistently throughout the text instead of terms like "fire extent," "burned areas" (at L1111), "Burnt Area" (at Figure 11), or similar, to avoid confusion.

L1096: How do you define "wildfire extent" here?

L1132-1137: This paragraph is partly repetitive. Please revise it to eliminate redundancy and ensure the information is presented concisely.

L1162: Where can I see these results?

Figure 1: To enhance readability, consider using a plot with two y-axes. This could help present the data and make it easier for readers to interpret the information.

Figure 5 (BA): Why since 2003 and not from 2001?

Figure 7: The low quality of this figure makes it difficult to read the text inside it. Please improve the resolution to enhance readability.

L1788: A more specific reference is needed.

L1843: I suggest expanding the names of the months, maintaining consistency throughout the paper.

L1915: Which variables are being referred to here? Did you perform any tests to validate these links? Please provide more details or specify the tests conducted.

L2188: Did you calculate this correlation?

L2193: I suggest avoiding references to "not-shown" results. If the results are important, consider including them in the main text or supplementary materials for transparency and completeness.

L2210-2221: If I understood correctly, the FWI aligns with peak fire counts. This observation may merit additional comments to highlight its significance and implications.

L2225: All South America?

L2236: Is soil moisture derived from ERA5?

L2239-2256: This paragraph may not be entirely necessary. Consider condensing it to make the text more concise and to the point.

Figure 12: Do you think there is any added value in including relative humidity, which is a key ingredient of the FWI?

L2340: "arae".

L2358: The sentence mentioning "fuel load" appears incomplete. Please review and complete the sentence to ensure clarity and coherence.

L2381: Can you clarify how you estimate the statistical significance here?

Figure 15: "anomoly".

L2498: It is unclear whether this refers to the direct human influence on fires or the influence of human-caused climate change. Please clarify to ensure the distinction is clear.

L2499: The term "total climate forcing" is unclear. Please provide a definition or rephrase for better understanding.

L2501-2502: Not clear.

L2505: "total".

L2586: Why are two decimal places used here? It might be more appropriate to round to one decimal place or an integer to reflect the associated uncertainty more accurately.

L2607: Please expand the name of the month.

L2612: "(Figure 14)".

L2701: "PI"?

Table 7: Do two decimal places accurately reflect the uncertainties here? Consider rounding to one decimal place or an integer to better represent the associated uncertainty. The color bar is missing.

L3022: I agree, and for this reason, the comparison is not fair. A discussion of this limitation would be helpful to provide context and ensure clarity.

L3048-3057: Why not conduct a reforecast evaluation for 2023-24? Including this analysis would provide valuable insights and enhance the robustness of your findings.

L3111: I suggest clearly stating that a major limitation in assessing trends is that we only have global data for a few years. This limitation should be explicitly mentioned to provide context for the trend analysis and the definition of extreme events.

L3252-3258: I suggest adding that there are data-driven methods that work regionally and globally, but for this inaugural report, these methods are not included. This acknowledgment will provide a more comprehensive understanding of the current limitations and future directions for the report.

L3308: 2024 or 2023?

L3357: CMIP5?

L3393: "Impacts" is underlined.

L3547: IFN?

L3650: Agree, but you do not use many regional datasets that can provide very useful information.

L3669: Not sure if all of this paragraph is necessary here.

L3774: Agree, but you do not use many regional datasets that can provide very useful information.

L3798: Why do you use only the Global Fire Atlas and no other similar datasets?

L3809: Maybe a good possibility here is to mention datacube datasets (e.g., Alonso et al., 2022).

L3829: What about decadal prediction?

L3831-3838: I believe that throughout the paper, the important role of antecedent weather on fire activity is not adequately addressed. It would be beneficial to emphasize how prior weather conditions influence fire behavior and risk.

L3870: The science behind the rigorous detection and attribution methods used to assess the anthropogenic contribution to climate change is well established. However, when it comes to fires, as presented in this report, the approach is useful but still somewhat approximate. It would be helpful to acknowledge these limitations in this section to provide a more balanced and accurate perspective.

L3896: Only one? Which one?

L3944: "Ang'ila"

L4567: "System†"

L4620: Are there any scientific papers that can be used to replace this reference?

Supplementary Material

L176: “))”

FigS24: Bias adjustment with cross-validation?

L255: Is this the correct reference for this section?

L259-261: Not clear.

L348: “per (Barbosa 2024)”: Please check that other references are formatted consistently and do not have extra parentheses.

References:

Alonso, L., Gans, F., Karasante, I., Ahuja, A., Prapas, I., Kondylatos, S., ... & Cremer, F. (2022). SeasFire Cube: A Global Dataset for Seasonal Fire Modeling in the Earth System. Zenodo: Geneva, Switzerland.

Bowman, D. M., Williamson, G. J., Abatzoglou, J. T., Kolden, C. A., Cochrane, M. A., & Smith, A. M. (2017). Human exposure and sensitivity to globally extreme wildfire events. *Nature Ecology & Evolution*, 1(3), 0058.

Cunningham, C.X., Williamson, G.J., & Bowman, D.M.J.S. (2024). Increasing frequency and intensity of the most extreme wildfires on Earth. *Nature Ecology & Evolution*. <https://doi.org/10.1038/s41559-024-02452-2>