

## Review response to 22-Dec-2025 (RC2)

### Reviewer Comments

Black – reviewer; Blue – response

The study "Seasonal influence on post-fire debris flow likelihood after 2020 Lake Fire" is relevant and interesting, and I support its publication after major revisions, primarily aimed to improve how the information is presented to the reader. I agree that incorporating seasonality in predicting PFDF initiation is important. However, I don't see this idea developed as it should along this manuscript. In addition, the method section needs to be more descriptive and the results need to be better developed and clearly separated from the discussion. Several results currently appear only in the discussion, and some methodological steps are not clearly explained. The description provided of the model is particularly poor, which prevents me to give a proper assessment of the robustness of the applied methodology.

Below I provide some detailed comments:

3.2 Precipitation records – since the manuscript focuses on how seasonality will improve PFDF prediction, I recommend a better characterization of the precipitation regime for each season. This can include cumulative precipitation, average – max rainfall intensity. In addition, I will clearly define what you mean for wet and dry season

Thank you for the comments. In the first year after the fire, drought conditions made classifying wet and dry season difficult to define. Rather, here because of the general climatology of the southern California Coast Range, we consider the winter months (November-March) and summer months (April-October) to be wet and dry respectively. In the next iteration, we will provide more information regarding the total, average and max intensity based on seasonality.

3.3 Differenced Normalized Difference Vegetation Index (NDVI). At line 145, dNDVI is presented as the difference between post and pre. While Table 1 clarifies that pre-images are from the previous year of interest, this may be confusing for the reader. I suggest rephrasing this section to better describe the timing of pre- and post- imagery.

Thank you for the comments. We will clarify this point in the main text. In this study, “pre-imagery” refers to the earlier-date image, and “post-imagery” refers to the later-date image used in the comparison, rather than indicating images acquired before or after a specific event.

3.4 Numerical modeling inputs. The model used should be described better.

Line 179 - You assumed a fractional vegetation cover of 0 immediately after the fire (Year 0). Why not use dNDVI to estimate the vegetation cover for this year as well?

Thanks for the comment. This value is indeed from the dNDVI where there is no vegetation (Figure 2) which we then used “0”. We will rephrase this for clarity in the main text.

Line 249 – it is not clear how these results were obtained. The method section focuses heavily on dNDVI but provides little detail on precipitation intensity analysis. Thus, these results are without sufficient methodological context. Is PFDF initiation based only on intensity? What about rainfall duration? Is seasonality affecting these thresholds?

Thank you for the comment. We did not vary the rainfall duration as PFDF initiation is mostly triggered due to the intensity. We acknowledge that some studies have observed different triggers related to the rainfall pattern, but such variables were not included in this study. We maintained the same rainfall pattern for all the models directly test each variable’s ([list variables tested]) effect on the modeled PFDF likelihood.

Line 266 – I15 of 80 mm hr-1 needed to trigger PFDF in the dry season. This value is presented for the first time in the discussion, it should be moved in the result section.

Thank you for the suggestion. The move will be made.

Line 266 – highly variable rainfall ID threshold among adjacent basins. I can’t find where this variability is shown or quantified.

Thank you for the comment, we hope the following clarifies the meaning.

“The fact that the rainfall ID thresholds for PFDF likelihood for the different basins varies despite being adjacent to one another, could potentially be due to the basin topography”

Line 296-304 - A sensitivity analysis is discussed, but not introduced in the methods or presented in the results section. This makes it difficult to understand how it was performed and which variables are analyzed. All analyses should be described in the methods section and presented in the results sections before introducing them in the discussion.

Thank you for the comments. We will add a section on the sensitivity tests in the methods section of the paper.

Line 315 – This statement should be moved in the result section.

Line 335- 337 – This statement should be moved in the result section.

Agreed. We will move discussion of these points to the results section of the manuscript.

Figures

Figure 3 – I suggest removing the date boxes and instead including the dates directly in each panel title. If you choose to keep the boxes, please clearly explain which dates correspond to pre-

and post-fire conditions. Since “pre” and “post” are commonly used to indicate pre- and post-fire periods, alternative wording may reduce confusion. Also, the date box is missing in Figure 3d.

Thank you for the suggestion, we will implement the changes.

Figure 4 – I don’t understand what the small numbers near watershed outlets represent. Are these median grain sizes? Table 3, referenced in the caption, does not appear to include grain-size information.

We will correct the caption in Figure 4.

Figure 5 – The caption is confusing and should be rewritten for clarity.

We will change the caption for clarity

Figure 6 – the variables shown are difficult to interpret. Please describe them more clearly in both figure and caption.

We will improve the description of the variables for clarity.

Figure 7 – is this figure necessary? It is introduced only in the discussion and appears to be connected with future research rather than this study.

We hope to use the final figure to visualize future research to show how short-term trends and long-term trends could influence the PFDF likelihood.

## Tables

Table 1 – Year 0 appears to be missing.

Thank you for pointing this out. We will update the table accordingly.

Table 2 – Please clarify whether D50 represent an average? Consider to add “Wet” and “Dry” after the month and year in column “Months since fire”.

Thank you for the comment, it does represent the mean, and we will include the wet and dry months.

Table 2 - Please correct in the caption 50 with 5.

Thank you for pointing this out. It will be corrected in the final version.

Table 4 – Similar to Figure 6, the variables listed need to be explained.

Thank you for pointing this out. It will be corrected in the final version.

Supplementary material

Table S2 is very similar to Table 2, why you don't merge them? Same for Table S3 and Table 3

Thank you for the suggestion, we will remove the Table S2 and S3 to avoid confusion of the same information. Previously Table S2 and S3 also included the properties in the years without field survey.