Title: Spatiotemporal variation of growth-stage specific concurrent climate extremes and their yield impacts for rice in southern China

Response to Report #1:

Submitted on 03 Sep 2025

Referee #2: Faranak Tootoonchi, faranak.tootoonchi@gmail.com

Thanks. The paper has improved. I have a few more comments. Please note that the line numbers are related to the version in track-change mode and NOT the clean version.

RE: Thank you so much for your comments and suggestions on our manuscript. We have responded to the comments and suggestions point-by-point below (in blue). **The line numbers are related to the track-change version.**

Major Comments:

L14: To capture

RE: Thank you. We have revised the sentence accordingly as requested. The new sentence is: "Existing studies predominantly rely on the whole growing-season scale and relative thresholds, and limit the ability to capture crop physiological sensitivities and yield responses that vary critically across growth stages." (Line 15).

L204: Stressor

RE: Thank you. We have revised it as requested (Line 170).

L204: This concept

RE: Thank you. We have revised it as requested (Line 170).

L216: The trigger of is unclear.

RE: Thank you. We have revised the text by replacing "The trigger of" with "The threshold of" for clarity (Line 182).

L216-218: Not sure why we need this sentence about other studies having other threshold/cut-off values.

RE: Thank you. We have removed the sentence and retained only the references (Lines 183-184).

L251-261: Consider adding the suitable reference you used to extract these steps. https://wires.onlinelibrary.wiley.com/doi/10.1002/wat2.1579 could work.

RE: Thank you so much. We missed this reference (Tootoonchi et al., 2022) in the previous

version and have now added it (Line 206).

L264:269: These sentences are not needed in my view. The text is a bit encyclopedic and distracts the flow. Consider removing the section but adding references in the previous paragraph.

RE: Thank you for the suggestion. We have removed the corresponding sentences and incorporated the relevant references in Line 205. This revision ensures that the section remains focused exclusively on methodological content without unnecessary encyclopedic details.

L281-283: This sentence is unclear to me.

RE: In our definition, if no extreme event occurs in a given year, the severity score is set to "0". When fitting copula, we did not include these zero-severity years. However, when calculating the joint exceedance probability, these zero values must be considered again to ensure that all years (including those without extreme events) are accounted for. We have revised the text into a more straightforward description (Lines 226-228).

Eq 10 and eq 13: Why do you need eq10? Why not to directly use eq13?

RE: The two equations serve different purposes. Equation 10 was used to estimate the trend in the historical yield time series, while Equation 13 was to derive the statistical relationship between yield anomaly and compound severities. In the previous version, we have mistakenly used identical symbols for regression coefficients in the two equations, which was misleading. This has been corrected in the revision (Lines 293-296).

L551:552: Please rewrite the sentence.

RE: Thank you. We have corrected this sentence (Line 439).

A general comment: Please re-read the paper thoroughly to see if further technical language/ sentence modifications are required.

RE: Thank you. We have thoroughly re-read the paper and carefully checked all technical language and sentence structures. Corrections and improvements have been made for the lines 22, 52, 78-79, 104, 106, 141, 144, 359, 401, 404, 412, 469, 480, 504-505, 521.

References:

Tootoonchi, F., Sadegh, M., Haerter, J. O., Räty, O., Grabs, T., & Teutschbein, C. (2022). Copulas for hydroclimatic analysis: A practice-oriented overview. WIREs Water, 9(2), e1579. https://doi.org/10.1002/wat2.1579