Responses to Referee #2 comments:

Manuscript number: **egusphere-2025-4213**

Title: **Is earlier always better? A comparative assessment of an early-stage response window for rainfall timing in multiyear drought alleviation in China**

We greatly appreciate your valuable comments and suggestions, which have helped us further improve our manuscript. We have carefully considered each comment and revised the manuscript accordingly. Our responses to each comment are provided in blue text, while the referees' comments are in black. For clarity and ease of cross-reference, all figure and table numbers cited in this response correspond directly to the numbering used in the revised manuscript and Supplementary Material.

I would like to thank the authors for carefully addressing my comments. The revised version of the manuscript has an expanded analysis of the uncertainty, as well as of the significance of the observed differences. In addition, the authors have significantly improved the quality of the maps presented.

In my opinion, the current version of the manuscript represents a notable step forward compared to the previous iterations. I have only one remaining concern regarding the analysis: the authors adopted increments in precipitation up to 100% of the mean value. As previously pointed out in my review, it would have been more robust to frame these increases as fraction of standard deviation rather than average, as it is the std.dev that provides a quantification of what is likely to be expected as deviation from the mean.

In my original comment, I was assuming std.dev < mean, as it is common in many climates, so I was not sure if the authors have included precipitation values that were too extremes. However, now the authors provided (as supplementary material) the relationship between mean and std.dev, showing a roughly 1:1 relationship. If this is the case, it means that the maximum increase simulated in the experiment correspond to about 1 std.dev, which is not a very exception increase in precipitation (borderline in the norm).

I am not sure how strongly this assumption may affect the reported results, but I do think that it is a limitation that should be clearly pointed out. Ideally, the authors should further expand the analysis by considering even larger increases, as they are not fully covering the full range of likely precipitation values.

Response: We sincerely thank you for your positive assessment of the revised manuscript and for this thoughtful and constructive comment. We fully appreciate your concern regarding the range of precipitation increase scenarios and agree that the upper bound of this range represents an important limitation that should be clearly pointed out.

As you pointed out, we considered hypothetical precipitation increase scenarios ranging from 0 to 100% of the long-term mean monthly precipitation in 5% increments. This range was designed to provide a broad and physically interpretable set of potential drought-alleviation conditions. The upper bound of 100% was selected to ensure that, even under severe antecedent drought conditions, the additional precipitation could bring monthly precipitation to or above its long-term mean and

potentially shift conditions toward a relatively wet state. This consideration has now been clarified in the Methods section **(Pages 9 to 10, Lines 223 to 225)**.

Importantly, as shown in Fig. S3, the long-term mean and standard deviation of monthly precipitation are approximately comparable across the 199 grids. Thus, as you correctly noted, the maximum precipitation increase considered in our experiments corresponds approximately to an increase of one standard deviation. We have explicitly addressed this limitation in Section 5.4 by clarifying that precipitation increases beyond 100% of the long-term mean monthly precipitation would represent stronger anomalies that are less frequently encountered and were not considered in this study. We further note that future studies could assess the drought alleviation response under such conditions **(Page 25, Lines 559 to 563)**.