

Reply to the referee comments on “Analysis of the Relationship between Official Rain-Praying Rituals and Droughts in China over the Past 2000 Years” by Shuo Wang et al

Dear editors and reviewers,

Thank you for your valuable comments and thoughtful suggestions on our manuscript. Following your comments on the manuscript, we made careful revisions, and the point-to-point response of the comments is listed below. We hope these revisions would make this manuscript more acceptable for publication. Please feel free to contact me if you have any questions.

Many thanks again. With best wishes.

Sincerely yours,

Shuo Wang

Referee #3

(1) The manuscript frequently refers to Chinese dynastic periods as temporal anchors. For international readers unfamiliar with Chinese history, it would be helpful to provide the corresponding Gregorian years or centuries. This also applies to Figure 2.

Response 1: Accepted and revised. We thank the reviewer for this helpful suggestion. In the revised manuscript, we have added the corresponding Gregorian calendar years (or centuries) when dynastic periods are mentioned throughout the text. This modification is intended to improve readability for international readers who may not be familiar with Chinese historical chronology. The same revision has also been applied to Figure 2 and its caption, where dynastic labels are now supplemented with absolute time ranges (CE/BCE).

(2) What does “era” refer to in Section 3.1.1? Does it correspond to a decade, a year, or another author-defined time unit?

Response 2: Accepted and revised. We appreciate this comment. In Section 3.1.1, the term “era” refers to a decadal time unit (10-year) used for temporal aggregation of the reconstructed and documentary datasets. To avoid ambiguity, we have clarified this definition in the revised manuscript and replaced or supplemented the term “era” with “decadal interval (10-year)” where appropriate.

(3) In the Results section, three different units are used to report the frequency of praying rituals: times/10a (e.g., lines 336 and 398), years/10a (e.g., lines 374 and 387), and records/10a (e.g., line 420). Why are these units mixed rather than using a single unit?

Response 3: Accepted and revised. We agree with the reviewer that the use of multiple units may cause confusion. In the revised manuscript, we have standardized the unit system used to

report rain-praying frequency.

Specifically, all related metrics have been re-expressed using a unified unit of “records per decade (records/10a)”, where “records” refers to individual documented rain-praying events extracted from historical sources. The previously used expressions such as “times/10a” and “years/10a” have been revised accordingly to ensure consistency across all analyses and figures. This revision improves comparability across different sections of the Results.

(4) Lines 445–454 suggest that during turbulent periods with limited human and material resources, the government tended to prioritize practical measures rather than rain-praying rituals. However, lines 614–619 state that when fiscal constraints prevented the implementation of measures such as conservancy projects and disaster relief, the government relied more on rain praying. These statements seem somewhat inconsistent.

Response 4: Accepted and revised. We thank the reviewer for pointing out this apparent inconsistency. We agree that the original wording may lead to confusion. In the revised manuscript, we have clarified the interpretation.

These two statements refer to different levels of administrative and resource constraints. During periods of severe turbulence, when both human and material resources were extremely limited, governments tended to prioritize direct and practical governance measures. In contrast, when fiscal constraints specifically limited the implementation of engineering or relief measures, rain-praying rituals were sometimes adopted as a complementary or symbolic strategy.

Therefore, rather than being contradictory, these observations reflect a context-dependent and non-linear response of administrative behavior to varying levels of crisis intensity and fiscal capacity. We have revised the relevant sections to make this distinction clearer.

(5) In Figure 4c, what do the three bars in different colors represent? The same question applies to Figure 5c.

Response 5: Accepted and revised. We appreciate the reviewer’s comment. We acknowledge that the meaning of the three colored bars in Figures 4c and 5c was not clearly described in the original manuscript, particularly regarding the correspondence between color coding and different levels of correlation.

In the revised manuscript, we have clarified this issue in the figure captions to explicitly define the meaning of each color. In addition, following the reviewer’s suggestions, we have revised

the analytical framework by moving away from a single sliding-correlation approach and incorporating additional proxy records and alternative regression-based analyses to strengthen the robustness of the results.

Accordingly, Figures 4c and 5c have been updated and modified. We thank the reviewer again for this helpful suggestion, which has improved the clarity of the manuscript.

(6) The paper mainly focuses on rain-praying activities initiated by the government. Were there also other forms of rain praying, such as those initiated by local communities or organized through religious institutions? A brief supplement would be helpful.

Response 6: Accepted and revised. We thank the reviewer for this insightful suggestion. We acknowledge that rain-praying activities in historical China were not limited to government-led rituals, and could also be organized by local communities, religious institutions, or temples.

However, the present study primarily focuses on officially documented government-led rain-praying activities, because these records are more systematically preserved and allow for consistent quantitative reconstruction across long time scales. Non-governmental rain-praying activities are more fragmented in historical sources.

We have added a short clarification in the revised manuscript to acknowledge the existence of these alternative forms of rain-praying practices and to discuss this as a potential limitation of the dataset.