

Interactive comment on “How could phenological records from the Chinese poems of the Tang and Song Dynasties (618–1260 AD) be reliable evidence of past climate changes?” by Yachen Liu et al.

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Dear editors and reviewers,

Thank you very much for taking your time to review this manuscript. We really appreciate all your comments and suggestions which help us to improve our work. According to your comments, we make corresponding revisions to the original manuscript. Please find our point-to-point responses below.

Comment 1: The dating of some poems are not very precise. Please try to find more

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poems that clearly recorded the dates. This could greatly improve the reliability of this research.

Response 1: Thank you for the suggestion. We have added an example (Line 181-185 of the revised manuscript similarly hereinafter), in which the temporal information of year, month, and date were detailed recorded in the poem. However, due to genre constraints, the lack of temporal information in ancient Chinese poetry is widespread. Some poems may have precise temporal information, while the writing time of most other poems was not consciously recorded. One of the highlights of our study is how to convert ambiguous temporal information recorded in the poems into precise phenological dates and make them participated in climate reconstructions. For example, the missing temporal information can be deduced according to the principle of conservative (Line 211-217) and can be deduced by consulting the background information (Line 310-319).

Comment 2: The locations of some of the poems are not within the research area of this paper, e.g., Appendix A: No 1,3,4,17,19.

Response 2: We are grateful for the comment. There are two kinds of phenological records from poems used in this study. One of them is used as examples to illustrate the characteristics of phenological records in poems and the handing methodology in the studies of past climate changes. The locations of this kind of poem (No.1-29 in Appendix D) are across China. The other kind of phenological records from poems are used as evidence to reconstruct the temperature anomalies in Guanzhong Area during 618-902 AD. The locations of the second kind of poems (No. 12, 14, 21, 29, 30-93 in Appendix D) are all in Guanzhong Basin. To eliminate potential misunderstandings, we have listed all 86 pieces of original records of the temperature reconstruction in Appendix A of the revised manuscript with Gregorian dates, sites, phenophases, and the translations of the original verses. Also, we have labeled the modern names of cities mentioned in the poems in Figure 2.

Comment 3: As a whole, I would suggest the authors to try to find more records and expand the sample size.

Response 3: Thanks for the comment and we would like to make some explanations. The primary goals of this paper are to prove that the phenological records from poems can be useful evidence of past climate changes and to provide a scientific processing methodology or the extraction and application of phenological records from poems. The temperature reconstruction of 618-902 AD in Guanzhong Area is a case study to demonstrate the validity of the processing methods mentioned in the paper. Our future work will focus on extracting more records from poems, and developing integration methods for different phenophases at different sites to explore the overall phenological change and climate change over a large region. In the future work we will try to provide a comparable study on how climate changed in the Tang and Song Dynasties.

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