

## ***Interactive comment on “Post-Pliocene establishment of the present monsoonal climate in SW China: evidence from the late Pliocene Longmen megaflora” by T. Su et al.***

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This study used the assemblage of fossil leaves to quantitatively reconstruct paleoclimate of the late Pliocene Longmen flora in western Yunnan. It could fill the gap for our understanding of the monsoonal climate during the late Pliocene in southwestern China and provide important data for the evolution of the monsoon since Miocene in southwestern China. We thank Dr. Bruch for all these constructive comments on our manuscript. We have listed the full point-to-point response as below and will modify the text based on all these comments in the revised manuscript.

(1) Comment: This manuscript deals with the reconstruction of Neogene monsoon his-

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tory in SW China as a prerequisite for understanding the forces and mechanisms of the monsoon system in general. The topic is well within the scope of CP. Based on climate quantifications of several leaf floras on an east-west transect in western Yunnan the study documents spatial differences in precipitation development and thus the monsoon history related to mountain uplift. The manuscript is well-written and clearly structured. I have no concerns about the publication of this manuscript except the minor remarks below. For me only one question still remains that might be discussed in more detail: Can the observed differences between the fossil and the modern situations be explained also by uplift alone? Especially in the last paragraph of the discussion (page 1688) please state why rain shadow effects could not cause such differences in precipitation as they are explained here by an increase of East Asian Winter Monsoon?

Response: The uplift of mountains in western Yunnan could block the moist air and cause the spatial difference of precipitation between two sides of the mountains. In our manuscript, we have discussed it (Page 1686, lines 25-29 to page 1687, lines 1-2). This rain shadow effect could mainly decrease the total amount of precipitation around the year (namely mean annual precipitation; Fig. 3 in the manuscript) instead of the seasonality of precipitation. In the manuscript, we pointed out that the intensification of winter monsoon played an important role on the seasonality of precipitation, because the predominantly north–south alignment of the mountains in Yunnan can only partly block eastern Asian winter monsoon, much drier winters nowadays occurs. Generally speaking, the rain shadow effect caused by the uplift of mountains in western Yunnan existed as we illustrated in the manuscript, which contributed to the decrease of mean annual precipitation. Meanwhile, the intensification of the eastern Asian winter monsoon lead to the more seasonality of precipitation. We will revise this content in Discussion Part 4.3.

(2) Comment: page 1678, line 27. Replace 'and' with 'or' or 'and/or'

Response: We will replace 'and' with 'by using' to make this sentence more clear.

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(3) Comment: page 1684, chapter 4.1. The warmer than present climate is not significant for MAT and CMMT, this should be mentioned.

Response: Yes, we will add one paragraph to explain why CMMT stays quite similar in the revised manuscript.

(4) Comment: page 1685, lines 1-4. This sentence is not clear. what means 'forms the rain'? and why is summer temperature affected more pronounced than the other parameters? it may be mentioned and discussed that Yao et al observe cooler (also not significant?) than present temperatures.

Response: We have discussed WMMT in this paragraph. CMMT will be discussed in the next paragraph which will added in the revised manuscript. We will add one sentence to explain Yao et al.'s result : 'One exception is the late Pliocene Wanbao flora in central Yunnan: a cooler climate during the late Pliocene was proposed, which might be due to the local tectonic change, forming a dry-hot valley nowadays (Yao et al., 2012).'

(5) Comment: page 1685, line 22. 'leading to higher altitudes' delete 'a'

Response: Yes, we will replace it by 'leading to the higher altitude and cooler temperature.'

(6) Comment: page 1686, line 25-29 is not clear. Please explain what you mean by 'consequently'.

Response: We will rephrase the paragraph (page 1686, lines 25-29 and page 1687, lines 1-2) in the revised manuscript by 'We also notice that the precipitation of the late Pliocene Longling flora is lower than the present day (Kou et al., 2006). Longling is on the western slope of the Mt. Gaoligong, the Indian summer monsoon bringing moist air is blocked by Mt. Gaoligong and forms heavy rain there (Fig. 2). A lower altitude of the Gaoligong Mountain during the late Pliocene could not block such high moisture on the western slope, leading to a lower precipitation.'

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(7) Comment: page 1688, line 6-8. This sentence makes no sense to me. please rephrase.

Response: We will rephrase this sentence by 'As far as 3DRY is concerned, it shows the greatest decrease among all these precipitation parameters over time'.

(8) Comment: page 1688, line 16. 'drier winters' or 'a drier winter'

Response: Yes, we will replace 'drier winter' with 'drier winters'.

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