Responses to Editor's comments

We are grateful for the careful review provided by the Editor. Below, we have provided our point-by-point responses to each of the comments and have detailed the associated revisions made to the manuscript. Comments from the Editor are marked in *italics*, and our responses are indicated by blue-coloured text. Revisions made to the manuscript are highlighted in yellow for your convenience. We hope that the revisions we have made to the manuscript address the Editor's concerns.

Comment 1: *This title seems to me too general (and also because there exist many similar studies), and does not reflect the novelty of this paper which is mainly on the different response to insolation between China and Japan. I would suggest to change a title to reflect more the novelty of this study.*

Response to comment 1: We appreciate the Editor's constructive feedback. We have changed the title of the manuscript as follows:

"**Contrasting responses of summer precipitation to orbital forcing in Japan and China over the past 450 kyr**".

Comment 2: *are they eccentricity and obliquity cycles or ~100-kyr and ~40-kyr cycles?*

Response to comment 2: We have corrected the text to 100-kyr and 40-kyr cycles. (Line 50 in the revised manuscript)

Comment 3: *It is not clear for me. Could you give more information on the vegetation model and the ice sheet component?*

Response to comment 3: In this model, ice sheets are treated as one of the vegetation types which is reflected in the albedo in the simulation. Vegetation is fixed as a boundary condition in each simulation. The text has been modified to clarify these points. (Lines 102−103 in the revised manuscript)

Comment 4: *this is a fact. This sentence might need to be rephrased.*

Response to comment 4: The phrasing has been revised to state this as fact. (Lines 163−164 in the revised manuscript)

Comment 5: *56 kyr is one of the periodicities of precession although its amplitude is much weaker than the 19 and 23 kyr (See Berger, 1978, Table 2)*

Response to comment 5: Thank you for pointing this out. We have added your remarks to the revised text. (Lines 167−168 in the revised manuscript)

Comment 6: *This expression is not understandable for me.*

Response to comment 6: The text has been revised for clarity. (Line 215 in the revised manuscript)

Comment 7: *precipitation change on land is not shown on Fig.6a*

Comment 8: *Fig.6a shows decreasing precipitaiton over the Indian Ocean*

Response to comment 7 and 8: Thank you for pointing this out. During the last revision, We mistakenly plotted the spring (MAM) SST deviation (same figure as Fig. 6c) in Fig. 6a; we have thus replaced Fig. 6a with the correct figure. The corrected Fig. 6a now shows precipitation anomalies over land, as well as the increase in precipitation in the Indian Ocean.

Comment 9: *is it shown in Fig.6?*

Response to comment 9: In the corrected Fig. 6a and Fig. 6b, anomalous easterly winds are observed from the Indian Ocean to the western North Pacific around Philippines. We have revised the text to clarify these points. (Line 236−237 in the revised manuscript)

Comment 10: *why spring?*

Response to comment 10: We checked the climate anomaly in spring because negative SST anomalies in the tropical northwestern Pacific during spring can lead to the formation and maintenance of sub-highs through wind evaporation SST (WES) feedback. These mechanisms are referred to as the Indo-western Pacific Ocean Capacitor (IPOC) mode. In WES feedback, SST cooling over the western North Pacific suppresses in situ convective heating, exciting a westward-propagating Rossby wave to form the sub-high over the Philippine seas. The intensified northeast trade winds at the eastern edge of the sub-high amplifies the initial SST cooling via evaporation and wind stirring. It has been suggested that the Indian Ocean warming and sub-high intensification in summer occur when the initial disturbances that form the IPOC mode (e.g., tropical Northwest Pacific SST lowering) occur in the spring season. Thus we elected to analyse

the climate in spring. We have revised the manuscript to clarify these points. (Line 241−252 in the revised manuscript)

Comment 11: *Do you see a westward-propagating rossby wave in your result, which seems to be critical in the WES feedback explained above.*

Response to comment 11: As a Rossby response, we see an anomalously high pressure over the Philippine Sea. We have revised the manuscript to clarify this point. (Lines 247 and 254−256 in the revised manuscript)

Comment 12: *Please explain how spring climate is linked to summer insolation.*

Response to comment 12: Instead of solely responding to strong summer insolation, the spring climate may reflect the effects of increasing seasonal variations in insolation (e.g., weak winter insolation), suggesting that the East Asian summer monsoon can be influenced not only by summer insolation but also by variations in insolation distribution across other seasons. However, the mechanism linking insolation variation to SST variability is not yet completely understood and remains a challenge for future research. We have added explanations of these points to the revised text. (Lines 257−260 in the revised manuscript)

Comment 13: *this is related to a negative anomaly in the sea level pressure in northern Pacific (Fig.6a), but a intensification of the NPH is suggested in the rest of this section. Please explain.*

Response to comment 13: Thank you for your careful review of our manuscript. As mentioned in our responses to comments 7 and 8, we have replaced Fig. 6a with the correct version. The corrected Fig. 6a now shows the intensification of the NPH.

Comment 14: *Copernicus Publications requests depositing data that correspond to journal articles in reliable (public) data repositories, assigning digital object identifiers, and properly citing data sets as individual contributions.* see https://www.climate-of-the-past.net/policies/data_policy.html

Response to comment 14: The output data from the climate simulations conducted in this study (91 global climate simulation runs) occupy several terabytes of data in total and are therefore difficult to share publicly and free of charge through data repositories. However, we can consider providing the data individually upon request to the corresponding author. The area-averaged precipitation and temperature data used to create the time series and scatter plots will be made

available as a Supplement to this paper. These points have been specified in the Data Availability section of the revised manuscript.

Comment 15: *simulated? Isn't the insolation value obtained from Andre Berger's calculation?*.

Comment 16: *Explain how was this average done. and the anomaly is relative to present day?*

Response to comments 15 and 16: Using orbital parameters taken from Berger and Loutre (1999), we simulated the surface solar radiation in the model and averaged it over grid cells ranging from 20°N to 40°N. We have revised the text to clarify these points. The anomaly is relative to present day.

Comment 17: *at least the 100-kyr cycle in the proxy records could be related to glacial condition changes, not to eccentricity..*

Response to comment 17: The text has been revised as per your suggestion

Comment 18: *Please also explain the shaded curves on the top and to the right.*

Response to comment 18: The shaded curves show the normal distribution obtained from the mean and standard deviation of each data. The text has been revised to more clearly state this point.

Comment 19: *See my comment and modification for Fig 2's caption. please make similar modification for Fig.4's caption.*

Response to comment 19: The text has been revised as per your suggestion.

Comment 20: *See my comment and modification for Fig 2's caption. please make similar modification for Fig.4's caption.*

Response to comment 20: The text has been revised as per your suggestion.

Comment 21:

1. *Please plot precipitation change also over land, including significance level.*
2. *I would suggest to show the same figures also for the reference experiment.*
3. *why are the sea level pressure and surface wind anomalies not the same between Fig.6a and 6b although they are supposed to be the same variables?*

4. *The color bar is very confusing. In all three figures, I suggest to use blue for decrease and red for increase. For same variables (sst, wind stress), better to use the same scale.*

Response to comment 21: We appreciate the feedback.

1. We have replaced Fig 6a with the correct version (please see our responses to comments 7 and 8).
2. We have added a supplementary figure (Fig. S1) to show the output of reference run (0 ka climatology).
3. We have replaced Fig 6a with the correct version (please see our responses to comments 7 and 8).
4. The figures have been revised according to your suggestion. Brown is used to indicate a decrease and green to indicate an increase in precipitation (Fig. 6a), while blue represents a decrease and red an increase in SST (Fig. 6b and Fig. 6c). The figures now use the same scale for SST and wind.

Additionally, to address the difficulty in seeing some deviations (e.g., SST anomaly in MAM) due to the uniformity of the color bars, we have added a new figure plotted over a wider area to the supplement (Fig. S2).

Comment 22: *Figure 7?*

Response to comment 22: Thank you for the feedback. The Figure number has been revised accordingly.