We sincerely thank both two reviewers for their comments. The point-to-point responses are shown below. The reviewers' comments are *in red,* the answers are in black.

For reviewer #1

The authors have analyzed the wind, temperature and precipitation over China based on model simulations of PlioMIP. This study may contribute to more knowledge about the mid-Pliocene climate in China and about the differences in regional behaviors of the PlioMIP models. However, my general impression is that this paper is too descriptive and lacks in-depth analysis/explanation about how the mid-Pliocene boundary conditions have caused the climate anomalies which are described in this paper. I strongly suggest the authors to give more analysis and discussion on processes and mechanisms.

Answer: In this paper, we paid more attentions to summarize the PlioMIP simulations of East Asian monsoon. Moreover, we presented the mechanism (Fig. 6 in main text) behind the different responses of East Asian monsoon simulated with these PlioMIP models.

Changes in East Asian monsoon are essentially controlled by variations in land-sea thermal contrast. The surface air temperature contrast, as shown in Fig. 6 in main text, is often used to illustrate changes in land-sea thermal contrast. For example, in boreal winter, the six-model ensemble mean shows surface air temperature (SAT) increases greater over China than over ocean, indicating the decreased land-sea thermal contrast, which causes the weakened East Asian winter winds. On the contrary, other nine models do not simulate such largely decreased land-sea thermal contrast in boreal winter, thus do not produce the weakened winter winds.

In the revised version, we further illustrate the relationship between changes in wind indice and changes in zonal gradient change of sea level pressure (SLP, averaged within the region of 20°–50°N and 90°–160°E, Fig. 1a and 1b). Almost all models show that the increased mid-Pliocene summer winds in East Asia are caused by the increased SLP gradient (Fig. 1a). For winter winds, the models, which simulate the larger decreased SLP gradient, produces the weakened winter winds in East Asia (Fig. 1b). The changes in SLP gradient are linked to the changes of land-sea thermal contrast, which can be partly reflected by the changes in zonal SAT gradient.

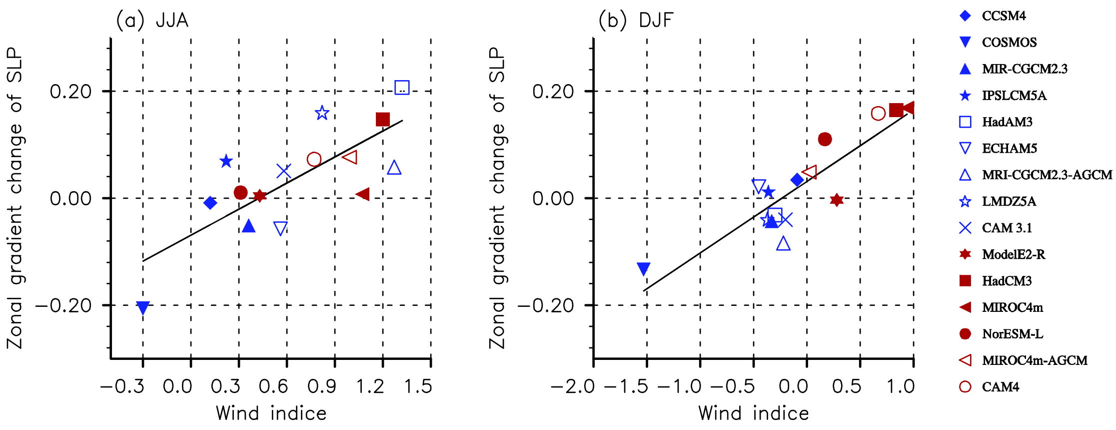

Fig. 1. Changes in zonal SLP gradient averaged within the region of 20°–50°N and 90°–160°E versus changes in wind indice, (a) for boreal summer, (b) for boreal winter. In (a), positive values indicate increased SLP gradients and intensified EASW. In (b), positive values indicate decreased SLP gradients and weakened EAWW. The black solid lines are the regression lines.

However, the detailed mechanism behind the different responses of land-sea thermal contrast and SLP gradients is still complicated, and out of the scope of this model intercomparsion study. Such different responses are highly likely caused by independent physical processes and parameterizations in these PlioMIP models.

Other major comments:

1. Abstract gives only the description of the modeled results. The reader would expect some explanations on the causes of these climate changes. Also, no real "conclusion" is given. The last paragraph of this paper is just repeating the abstract.

Answer: In the revised version, the last paragraph is rewritten：

In summary, based on the PlioMIP multi-model intercomparison, the mid-Pliocene climate of East Asia (focusing on China) is investigated from simulations with the seven AGCMs (CAM3.1, HadAM3, LMDZ5A, MIROC4m-AGCM, MRI-CGCM2.3-AGCM, CAM4 and ECHAM5) and the eight AOGCMs (ModelE2-R, CCSM4, HadCM3, IPSLCM5A, MIROC4m, MRI-CGCM2.3, NorESM-L and COSMOS). The MMM of these models shows that EASW largely strengthens in monsoon China, and EAWW strengthens in south monsoon China, but slightly weakens in north monsoon China. The simulated weakened EAWW and intensified EASW agree better with geological evidence. The wind change in boreal summer and boreal winter is largely due to the changed land-sea thermal contrast and SLP gradient between the East Asian continent and Pacific. In addition, the MMM of all these models also illustrates a warmer and wetter mid-Pliocene climate in China, which agrees with most reconstructed data in China. The mid-Pliocene SAT averaged over China is 2.64 °C higher than the pre-industrial, with a range of levels from 1.46 °C to 4.49 °C among individual models. The mid-Pliocene precipitation averaged over China is 0.25 mm day^{-1} larger, with a range of levels from –0.51 mm day^{-1} to 0.75 mm day^{-1} among individual models. However, the model-model discrepancy in simulating mid-Pliocene East Asian climate, in particular the mid-Pliocene EAWW, can not be neglected. Six models (CAM4, MIROC4m-AGCM, NorESM-L, MIROC4m, HadCM3 and ModelE2-R) simulated a weakened mid-Pliocene EAWW, whereas the other nine models did not. Although the simulation of weakened EAWW is supported by the mid-Pliocene geological evidence, the reason behind this discrepancy should be further addressed in the future work of PlioMIP.

2. I suggest giving the detailed information about how the topography and land cover are modified in the mid-Pliocene experiments.

Answer: We add the introduction to modification of topography and land cover conditions in the revision version：

The mid-Pliocene topography is increased in most monsoon China, the Tarim basin and the south margin of Tibetan Plateau, but decreased in most regions of Tibetan Plateau (Sohl et al., 2009). The mid-Pliocene vegetation indicates a generally warmer and wetter climate than today, and warm-temperate forests become dominant in East Asia in the mid-Pliocene (Salzmann et al., 2008).

3. The vegetation during mid-Pliocene must have been very different from today due to the changes in climate. Discussion on the possible impact of lack of vegetation feedbacks in the models on the monsoon is welcome.

Answer: In the PlioMIP, the changes in vegetation conditions have been included. However, in the first phase of PlioMIP, sensitivity experiments have been designed to address detailed vegetation feedbacks. This will be an interesting topic in the second phase of PlioMIP.

4. The authors have observed differences between the AGCMs and AOGCMs. It would be interesting to extend their discussion to the impact of ocean on the East Asia monsoon.

Answer: In the revision version, we will include the impact of ocean on the East Asia monsoon in the discussion:

When these models are classified into AGCMs and AOGCMs, the AOGCMs-MMM shows weaker intensified EASW, and further weakened EAWW in north monsoon China, relative to the AGCMs-MMM. In the AGCMs mid-Pliocene simulations, warming in ocean surface is fixed to the PRISM reconstructions. However, with AOGCMs, the simulated warming at the Pacific surface in boreal summer is stronger in the experiments than the reconstructions (Fig. 6a). The simulated stronger surface warming reduces the land-sea thermal contrast, thus limits the intensification of EASW in the AOGCMs-MMM, when compared to the AGCMs-MMM. In boreal winter, the stronger surface warming above China in the AOGCMs-MMM reduces the land-sea thermal, thus causes the further weakened EAWW in north monsoon China, when compared to the AGCMs-MMM (Fig. 6b).

5. The East Asian monsoon climate has strong seasonal behavior. Why is lengthy discussion (5.2, 5.3) given to the annual changes but nothing for the changes in seasonal temperature and precipitation? I also suggest to include figures of winter and summer temperature and precipitation changes (similar to figure 3).

Answer: In section 5.2 and 5.3, for the analyses of SAT and precipitation, we not only show the annual changes, but also analyze the seasonal temperature and precipitation changes. The information for the seasonal temperature and precipitation change are shown in Fig 5 and Fig 6. With these two figures, we also present the mechanism of East Asian summer and winter wind change.

6. Statistic significance should be given in the figures of anomalies (including those in the supplementary). By the way, the size of figure 3 and 4 is too small.

Answer: In the revised version, we show the Statistic significance in scalars (SAT and precipitation), but not in vectors (winds).

More specific comments:

1. P1137, L15: How about the last interglacial? Is it not a more recent warm period than mid-Pliocene?

Answer: We mean the most recent warm period in tectonic time scale.

2. P1139, L6-8: The East Asian monsoon is basically a whole system whatever over China or over other East Asian countries. Therefore I do not think it is appropriate to use the argument that "China is the largest country in East Asia,…"

Answer: We will delete the sentence.

3. The argument about the changes in wind strength is not sufficiently convincing.P1139, L23: These geological records do not necessarily indicate weaker winter wind. They could also reflect stronger weathering caused by the warmer and wetter mid-Pliocene climate. P1140, L1: Why does stronger weathering suggest intensified summer wind? It could simply result from the globally warmer and wetter climate during mid-Pliocene, nothing to do with changes in summer wind. Also, the dust record of Rea et al 1998 could reflect a wetter condition in the source region instead of weaker wind.

Answer: The wetter climate is closely related with the changes in wind in East Asian monsoon area. The stronger weathering reflects the wetter climate, and more precipitation is brought by intensified summer winds in East Asia. Thus, these geological records for weathering indicate changes in summer winds. Besides, the reduced winter wind can induce the low dust record in mid-Pliocene in the dust record of Rea et al. (1998) and the wetter condition is also related with the weaker winter wind.

4. Section 4: The difference in CO_2 is about 100ppmv between preindustrial and today. So I am wondering whether it is plausible to compare the simulated preindustrial climate to observation, which would lead to an artificial bias in the model evaluation.

Answer: Although a bias exists in the evaluations due to the warmer modern climate than the pre-industrial, evaluation of pre-industrial simulations is often based on modern observations, since the observed pre-industrial SAT and precipitation is not available. In the revised version, we will mention this.

5. P1147, L9: Why "in particular in boreal winter"? Is it not in boreal summer?

Answer: The models that produce weakened East Asian winter wind generally simulate stronger mid-Pliocene warming over China than other models and the weakened East Asian winter wind is consistent with the reconstructions. So from this point, it is likely the heating in China is underestimated in other models. For East Asian summer monsoon, all models simulate increased summer wind, so the effects from heating are not as clear as the one in boreal winter.

For reviewer #2

This manuscript investigates the East Asian monsoon climate during the mid-Pliocene with the simulations from PlioMIP, accompanied by the intercomparision between models and reconstructions. The results show that the models reasonably simulated weakened East Asian winter winds in northern China, intensified East Asian summer winds, and warmer and wetter climate conditions over China during the mid-Pliocene. Their work provides useful information for deeply understanding the East Asian monsoon climate during the mid-Pliocene and the ability of the models in simulating the climate of this warm period. Overall, their results are of broad interest to the palaeoclimate community. My recommendation is that the paper should be published after the following revisions.

(1) In the evaluation of models, the authors use the modern observation to evaluate the simulated pre-industrial (PI) climate. As is well known, climate conditions are different

between the modern and PI. Such an evaluation may introduce biases. The authors should mention this point in the revised manuscript.

Answer: Although a bias exists in the evaluations due to the warmer modern climate than the pre-industrial, evaluation of pre-industrial simulations is often based on modern observations, since the observed pre-industrial SAT and precipitation is not available. In the revised version, we will mention this.

(2) The authors argue that the PlioMIP models have good skills in simulating East Asian winter winds in the pre-industrial experiments but show obvious discrepancies in simulating the mid-Pliocene changes in the East Asian winter winds. By contrast, these models have relatively low skill in simulating East Asian summer winds in the control experiments, but show almost consistent intensification of the mid-Pliocene East Asian summer winds. This result is very interesting. Does it mean that the monsoon changes in different models are less related to the model abilities in PI and more related to the boundary condition changes between two periods? More discussions on this would be welcomed.

Answer: Here, it seems that the modifications in boundary conditions play a more important role in controlling the mid-Pliocene monsoon changes than the model abilities in the PlioMIP. However, based on the intercomparsion study here, we do not have strong arguments to conclude that the monsoon change is less related to model abilities in PI. Actually, the changes in East Asian monsoon depend on the model sensitivity that is related to the model abilities. In the revised version, we only point out what we found, but do not give any explanation about this, since the explanation is complicated, and out the scope of this intercomparsion study.