

## ***Interactive comment on “Early and mid-Holocene climate in the tropical Pacific: seasonal cycle and interannual variability induced by insolation changes” by Y. Luan et al.***

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At first we thank the reviewer for the comments and suggestions, which helps to improve the paper. Specific replies are listed below each remark as follows.

1. In addition to the impact of local insolation which is analyzed in the paper, any discussion or analysis on the possible impact from extra-tropics on the tropical Pacific climate will be welcome.

We refer in the introduction to the possible impact of from extra-tropics on the tropical Pacific climate has been studied in the previous work (e.g. Liu et al., 1999, Chiang et al. 2009). It is not possible from our simulations to disentangle the role of extra-tropics

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vs tropics in the signal we discuss. We highlight that the changes in the mean state are driven by large-scale changes involving interhemispheric gradients and late summer increase in monsoon. In the revised version of the manuscript we added a few words on this point in the conclusion.

2. Page 520, lines 12-15: The statement that cooling in the eastern Pacific and warming in the western Pacific cause easterly wind anomalies and anticyclone wind stress anomalies outside the tropics needs more explanation, because the co-existence of these features does not necessarily mean they have causal-effect relationship.

We revised the sentence. We want to show the interaction between SST and wind stress.

3. Page 524, line 3: change ‘strengthens’ to ‘weakens’

Done (We revise the sentence into “A reduction in obliquity increases the meridional gradient of the annual mean insolation BUT WEAKENENS the magnitude of the seasonal cycle in both hemispheres.”)

4. Page 524, lines 18-20: I suggest adding a line after ‘: : .. high latitudes’: This is due to the in-phase relationship between annual solar irradiation and obliquity in high latitudes and anti-phase between them in low latitudes (Berger et al 2010, Quaternary Science Reviews 29,1968-1982).

Table 1: cold tongue; the line of Brown’s conclusion is not completed

Thanks. We added a sentence and modified the table as you suggested.

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