

## ***Interactive comment on “Contribution of oceanic and vegetation feedbacks to Holocene climate change in Central and Eastern Asia” by A. Dallmeyer et al.***

### **Anonymous Referee #2**

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#### General comments:

This paper evaluated the Asian monsoon activity (all through the seasons) differences between present-day and mid-Holocene using the Earth System Model ECHAM5/JSBACH-HPIOM, and examined to separate contributions from different factors, i.e., insolation, ocean, and vegetation, for different parts of the Indo-Asian monsoonal region. The modeled difference in Asian monsoon between present-day and mid-Holocene appears reasonable in general. The factor-separation technique provided a good and valid tool to lead quantitative analysis on the relative contribution of the factors (results clearly showing the lagging effect of the ocean on the seasonal

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warming is striking). Results are shown in a systemized order and figures are mostly clear in presentation (figure 9 is a very good summary of the results), although there found some gaps between the evidences provided and speculations/discussions (e.g. discussions that relate to the results from AV and AO runs). Overall quality is good, and will be appropriate to be published in *Climate of the Past* when the following issues are well-addressed.

Specific comments:

1. Sections 3.1 and 3.2: It described well about the modeled results, per se, but some sentences for comparison (similarities, differences, improvements) with the previous models and/or simulations or reconstructions would be very beneficial for readers, as shown for vegetation in section 3.4.
2. Sections 4.1: Description of the results, i.e. the factorial changes and contribution, are very good. The discussions on causes for changes in near-surface air temperature, however, may need more quantitative consideration on total heat balance between eddy heat fluxes (sensible and latent (or evaporation)), and incoming and outgoing radiations (including effect of cloud cover change, etc.) at surface, supported by evidences (figures, tables and so on).
3. Section 4.2: Similarly, some in-depth discussion with supporting evidences on cause for the changes in precipitation that could be local (more evaporative) or large-scale (convergence; either because of changes in moisture content  $q$  or circulation  $v$ ) may help readers to understand the results.
4. Partly, the feeling that the manuscript lacks some solid foundations for its arguments (including the above issues #2 and #3) may result from the fact that almost nothing is shown (either as figures or tables) for the results for AO runs and AV runs within the manuscript. For A runs figures 7 and 8 give good references to validate (or at least judge to validate) the discussions for the contribution from the atmospheric direct response. It appears that, although they are neatly presented, the summarizing fig-

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ures of figs 5-6 and the related discussions/speculations in section 4 are not properly understood or supported only by figs 2-4.

Technical corrections: 1. There are some mismatches between the cited reference and entries in the reference list. E.g Ren, 2006 (page 2361, 2nd line from the bottom; it is Ren (2007) in the list). Please check it through.

2. The following sentences are not clear or easy to understand. Please consider reformulating, or provide additional clarification or evidences.

(1) P. 2361, ll. 27-29. What is the domain of the forest decrease? The whole are or a specific region as shown in figure 1?

(2) P. 2362, ll. 23-27. These sentences are not clear to me.

(3) P. 2368, ll. 20-24. It seems to need more clarification. It is not easy for a reader to tell whether it is due to decrease in cloud cover and snowfall, or even whether cloud cover and snowfall did decrease.

3. Title: I agree with the first reviewer to drop “Central and Eastern: from the title. Or, otherwise, “in monsoonal Asia.”

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