

Interactive comment on “Modeling sensitivity study of the possible impact of snow and glaciers developing over Tibetan Plateau on Holocene African-Asian summer monsoon climate” by L. Jin et al.

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The authors are grateful to Reviewer 1 for his/her comments and constructive suggestions of our submitted manuscript. Major revisions have been made in the revised version following Reviewer’s suggestion. Below we placed our reply to the questions raised by Reviewer.

Replies are corresponded to Reviewer’s comments.

Major issues: 1. Two figures showing CLIMBER-2 ability to reproduce large-scale climatology were added in the revised manuscript as suggested by Reviewer. One is

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the simulated climatology of CLIMBER-2 control run (0 kyr BP) for boreal summer and winter surface air temperature, precipitation, sea level pressure and 850 hPa winds (Figure 1 in revised paper). The other is vegetation cover for 0 kyr BP in CLIMBER-2. 2. Figure 2 is the spatial patterns of the difference between two AOV transient simulations (with ICE0 and ICE4) at 6 kyr BP and 0 kyr BP, so the difference is just a result of the difference from two time slices when the transient simulation reached at 6 ka BP and at 0 ka BP. We also performed a 30-year control run using CLIMBER-2 for 0 ka BP and 6 ka BP (forced with 0 ka BP and 6 ka BP orbital parameters) respectively, and then with 6 ka BP minus 0 ka BP, and find that the result of 6 ka minus 0 ka is almost the same as that from the slice difference of two AOV transient simulations. The significance of the difference between 6 ka and 0 ka is over 99% using t-test. 3. We add two figures (Figure 6 and Figure 9 in the revised paper) for the changes in absorption of solar radiation, latent heat flux (evaporation) and albedo and have an analysis of their effects. 4. We add the South Asian monsoon index (Webster-Yang index) as suggested by Reviewer to give additional analysis on South Asian monsoon changes. 5. We add one section (section 5 in the revised paper) to compare model simulation results with the proxy data and between the different scenario experiments.

Minor comments: 1. P1268 L1, the word "ca" means "about" as referenced in many papers, e.g. Brooks (2006, Quaternary International, 151, 29-49, P39, Line 13, left panel from bottom). 2. CLIMBER-2 (for CLIMate and BiosphERE, level 2) is the type of the Earth system Models of Intermediate Complexity (EMICs), which include most of the processes described in comprehensive models, albeit in a more reduced, i.e., a more parameterized form. They explicitly simulate the interactions among several components of the natural Earth system, mostly including biogeochemical cycles (Claussen et al., 2002, Climate Dynamics). Here CLIMBER-2 used for this study encompasses three modules, i.e., an atmospheric module, an ocean and sea-ice module, and a vegetation module. The vegetation module includes a simple carbon model in which allocation of carbon to four pools (short living matter such as leaves, long living matters such as stems and roots, humus, soil) is evaluated (Claussen et al., 1999, Environ-

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mental Modeling and Assessment). Therefore, CLIMBER-2 can be called either "Earth system model" or "climate (system) model".

References:

Brooks, N.: Cultural responses to aridity in the Middle Holocene and increased social complexity, *Quaternary International*, 151, 29-49, 2006.

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Interactive comment on *Clim. Past Discuss.*, 4, 1265, 2008.

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