Clim. Past Discuss., 4, S272–S274, 2008
www.clim-past-discuss.net/4/S272/2008/

Climate of the Past Discussions

Interactive comment on "Influence of orbital forcing on the seasonality and regionality of the Asian Summer monsoon precipitation" *by* M. E. Hori et al.

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Received and published: 25 June 2008

This paper compares monsoon features, mostly precipitation, but also temperature and wind, for two or three climatic situations. The authors are using a GCM to simulate the climate under three orbital forcings, i.e. climate forcing at present, at 115 ka BP and at 125 ka BP. Everything else is kept the same for the three simulations. They are putting forward changes in the seasonality in the Asian monsoon as well as changes in its spatial pattern. I fully agree with one of their conclusions that "it may be suitable to take such changes in seasonality into account rather than assuming that all precipitation occurs during the boreal summer".

General comments

1. The design of the experiments allows the authors discussing the climate response (in term of monsoon) under very different distributions of insolation. However, this design does not allow identifying the role of each astronomical parameter in this response. Indeed, even when compared two by two the experiment (orbital) forcing differs largely in two of the three parameters taken into account. Moreover, the analysis is focused on two experiments that are showing large differences in both obliquity and climatic precession forcing. Attribution is therefore very difficult.

2. The authors claim several times that "the heating over the continent is due to obliquity forcing". However I do not find any convincing proof of that statement.

3. I disagree with the interpretation of the changes in insolation distribution between the three chosen periods. The changes in insolation in boreal summer at 115 ka BP and 125 ka BP cannot be attributed to obliquity. Obliquity is neither the only nor the dominant factor for this change. This is explained in another comment. Moreover, the discussion about seasonality is more complex than the authors suggest. Indeed the pattern of the seasonal cycle is changing from latitude to latitude in the tropical region (see the other comment). A more detailed analysis of the seasonality could lead to a revised interpretation of the model results. At last, the author focuses on the tropical insolation. It means that they assume that the local insolation is the main driver for the monsoon. This should be explained.

4. Just like me, the authors are not English native speakers. The language is a problem in their paper. Some sentences are very difficult to understand. In some cases, you can only guess what the authors meant or what is the most sensible. For example, the authors write "the longitude of perihelion was almost the opposite compared to 115ka". Strictly speaking, this is wrong. Actually the two angles differ by (more or less) 180 degrees. They also write "the warmest period in the Eemian glacial minimum". Usually, the Eemian is named an interglacial, not a glacial minimum.

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Detailed comments

1. The authors are using kya for "thousand years". It is NOT usual. I suggest them to use either ka or kyr.

2. Some features about the spin-up could be added, in particular regarding the ocean circulation.

3. Sentences like "increase in insolation" or "forcing is more dominant" should be more precise. For example, which insolation is considered, where and when? What is the reference for the comparison? It is more dominant than what?

4. The authors suggest that the obliquity is playing an important role in the tropics. I would like to have some proofs of that assertion.

5. End of section 3, the authors mention that "This large difference in SST seasonality is closely tied to the difference in tropical seasonality of insolation". I do not fully agree with that. Indeed, their figure 2 shows that the maximum of insolation occurs in boreal spring (AM) at 115 ka BP and in boreal summer (JJ) at 125 ka BP. On the other hand, they explain that the SST maximum occurs in boreal spring (MAM) at 115 ka BP and in boreal summer (JAS) at 125 ka BP. In other words, it means that SST is leading insolation at 115 ka BP and insolation forcing is leading SST at 125 ka BP. An explanation is really needed for this difference in behaviour.

6. Table 1. It should be interesting to add the present-day values in this table.

7. Figure 5. "not" instead of "now".

8. Figures 8 and 9. It would have been more convenient to plot a figure 9 (for precipitation) similar to figure 8, i.e. the actual values for 115 ka BP and 125 ka BP. Alternatively, an additional figure with the difference in SST (similar to figure 9) could be useful.

Interactive comment on Clim. Past Discuss., 4, 719, 2008.