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Climate of the Past Discussions



# *Interactive comment on* "Mid-Holocene climate change in Europe: a data-model comparison" *by* S. Brewer et al.

**S. Brewer et al.**

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Major points:

Different scales of data. We agree that this is an important point, which was overlooked in the original paper. We have attempted to reduce the problems caused by differences of scale, by using a gridded dataset of proxy reconstructions, and comparing each model using values of changes in climatic parameters that are relative to the overall changes simulated by that model. This is intended to provide a method of comparing the sign of climate change, without this being obscured by differences in the magnitude of change. The differences in magnitude of change are now included as a separate comparison between data and model. We have also included a discussion about the different scales of the data and model.

Lack of quantified analysis of geographical patterns. The original goal was to cluster the data using only the climatic information, to obtain clusters that had a purely climatic sense. However, we agree that much of the interpretation was made difficult by a lack of clear spatial patterning in the data. We have included the coordinates of the data points in the cluster analysis (and used a gridded dataset) to force a coherent spatial structure in the clusters of climate patterns. We believe that this helps to improve the visual comparison between the maps of clusters (figures 3 and 5), but also has provided an extra quantified test, in which the distance is measured between a model gridpoint and its corresponding cluster.

Use of Hagaman distance over Euclidean distance (with log-likelihood errors). We have extended the description of the use of Hagaman distances, explaining why this method was chosen. The use of fuzzy numbers allows a distance to be calculated between values, taking into account their uncertainties. The use of the triangular membership function provides a way to represent the proxy errors, which are frequently asymmetric and non-Gaussian.

Minor problems

1) We have rewritten the description of the methods used. In particular, we hope that the description of the k-means clusters is better explained. The test for centroid stability is based on a set of 1000 runs and for which centroids are calculated. As the reviewer points out, each run has a different random start and the final order of the clusters will not necessarily be the same between any two runs. In order to overcome this, we obtain a set of five clusters on the first run. The clusters obtained on subsequent runs are simply assigned to the most similar of these original clusters, using a simple Euclidean distance

2) Table 3 now only has white boxes for cluster absence and black boxes for cluster presence

3) The scales in figure 1 have been corrected



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4) We have changed the caption to figure 3 (now figure 4)

5) We have changed the caption to figure 4 (now figure 5)

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Interactive comment on Clim. Past Discuss., 2, 1155, 2006.