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Climate of the Past Discussions

Interactive comment on "Historical droughts in Mediterranean regions during the last 500 years: a data/model approach" *by* S. Brewer et al.

S. Brewer et al.

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Reviewer 1

Specific comments. 1) The same forcings were used in the two models. We have specified this, and the exact forcings used. 2) Precipitation is difficult to simulate as it is a noisy variable and has a less well-defined spatial structure than temperature. The lower resolution model (ECHOG) may be expected to have smoother simulated precipitation fields, and this smoothing may account for the better fit between ECHOG and the data. This would suggest that in this region, precipitation has a greater influence on the PDSI index than temperature. 3) Different soil moisture models were used in the two mod-

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els (HadCM3 - Cox et al., 1999; ECHOG: Sellars et al., 1986). Whilst we accept that this may have an effect on the evolution of the simulated climate, we have estimated the PDSI values using the same set of equations (Wells et al) for the two models, and using only simulated air temperature and simulated precipitation. The estimated PDSI values should therefore be comparable between the two models (and with the data). 4) We have added references to papers describing the simulations and assessing their fit to observed climatic patterns. 5) Fuzzy logic is used as a method to compare groups of values, in this case groups of observed or simulated PDSI values per gridcell for the same cluster. Rather than a Euclidean distance, which is between two values, the fuzzy distance takes into account the spread of values around the centroid when comparing two distributions. Two groups that overlap are considered as closer than two that do not overlap, even if the centroids do not change. We have expanded slightly the description of this section to take this into account. 6) We have added a brief summary of the change in SLP patterns during the study period. 7) The comparison with model SLP data is not based on a year-to-year comparison, but with the best matching PDSI patterns from the simulated run. As we do not have PDSI values corresponding to the Luterbacher reconstructions, we cannot use the same method.

Technical comments. 1) p. 773. We have added a sentence discussing the start of the LIA. 2) p. 777. Confidence intervals have been added. 3) p. 778. The drying in the HadAll run in the 20th century is relative to the control and natural values - The text has been altered to reflect this. 4) p. 779. As much of the analysis and discussion is dependent on the clusters, we have felt it was important to give a full description of how they were chosen, and would prefer to keep this section. If it is felt necessary, we can reduce/remove this. 5) p. 780. This was an error and has been changed to LIA. 6) p. 796. The echonat simulation is a fork from the Erik1 (echoall) simulation at 1756, without the anthropogenic forcings. PDSI values prior to 1756 will be equal to those shown for the echoall run. 7) p. 800. We have added a brief discussion about the regime changes.

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