

Interactive comment on “A regional climate simulation over the Iberian Peninsula for the last millennium” by J. J. Gómez-Navarro et al.

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We thank the reviewer for his/her detailed comments on this manuscript. We have taken into account the reviewer suggestions. In this letter we will comment some of the more important, and explain which modifications have not been accomplished and why:

The reference list has been improved, including all the citations suggested by the referee.

In the present version of the paper we have tried being less loose, giving numbers to all affirmations: estimations of variability, correlation, etc.

The referee suggest that the part of the paper when we compare with available data
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or with hindcast simulations could be condensed, whereas the comparison with proxy could be extended. We believe however that the focus of the paper should be the added value by the RCM to the ECHO-G simulation. In fact, it is not self-evident that this simulation represents an added value with respect to the ECHO-G alone simulation. This is especially true for the links between synoptic conditions and regional climate events, such as the NAO influence detailed in the present version of the paper. We also think that the fact that main variability modes in the ECHO-G and ERA40 driven simulations are similar is an important message, since it represents a clear improvement, which is due to the higher spatial resolution of the RCM. In fact, the rest of the referees agree about this point. On the other hand, climate reconstructions of temperature and precipitation related variables for diverse periods within the last millennium are available over the Iberian Peninsula that would potentially allow for comparing model output and reconstructed climate (Barriendos, 1997; Buentgen et al., 2008; Rodrigo et al., 2008; among others). However, this information is spatially sparse and very local in character, targeting different seasons that the proxy or documentary source is sensitive to and subject to the uncertainties of the proxy record in question that may emphasize even different timescales of variability. Having this in mind, a comprehensive comparison to the available information taking into account the potential and limitations of each single reconstruction would be of undoubtful value although not be feasible within the domains of this text. Alternatively, the use of information integrated into available gridded climate field reconstructions that already incorporate much of the previously cited local proxy reconstructions provides a more practical frame for the comparison with model output. This is the underlying reason why in this study we focus on the gridded reconstructions of monthly, or seasonal, temperature and precipitation for the Western-European region by Luterbacher et al, (2004) and Pauling et al. (2006).

We believe that the IP is indeed a good test bed due to its complex orography and different climatological regimes. This allows us to assess the improvements due to a RCM in a complex area, since it is expected that in flat areas the coarse resolution of a GCM can reproduce quite realistically the observed climate. In the reconstructions

side, to date there are several studies available, but as commented above further work should be devoted by this community before we can successfully use these data.

The present version of the paper states more clearly which is the added value of the simulation. For example, it is stated that the differences between ECHO-G and MM5 are more apparent in precipitation than in temperature. We also show explicitly now the improvement in the simulation of the link between large synoptic condition and the regional climate. Nevertheless the use of the RCM does not tend to narrow in general the differences between simulation and observations. This does not mean that the RCM is useless, since we cannot consider that the reconstructions are perfect, and the internal variability in the simulations difficult the comparison. This is now clearly acknowledged and discussed in the conclusions.

The exercise of comparing the anthropogenic forcings with the internal variability is indeed outside the aim of the article, since with only one simulation is hard to address this important point. Nevertheless we are performing at this moment more simulations which could be very helpful to answer this question. Thus, this aspect will be explored in future studies.

The abstract has been rewritten to be more explicit about the main findings.

The reviewer's comment respect to the lack of anthropogenic aerosols have been included in the context of the warming trends in the 20th century.

More discussion about the skill of ECHO-G in reproducing the present climate, compared to other IPCC models have been included in the introduction.

In the comparison of proxy and model series (Fig. 15 in the new version) we have not taken into account sea grid points. This makes the series comparable avoiding systematic biases. Thus, we do not understand the reviewer's comment.

The Medieval Warm Period has been defined homogeneously across the text. All minor comments respect typos, wrong references, bad phrasing, and mistakes in general

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have been taken into account.

We hope these changes satisfactorily address the reviewer's points.

REFERENCES:

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