

Interactive comment on “Atmospheric multidecadal variations in the North Atlantic realm: proxy data, observations, and atmospheric circulation model studies” by K. Grosfeld et al.

K. Grosfeld et al.

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Point by point reply to the editor’s comments: cpd-2-S370p.pdf

Dear Dr. van Ommen,

First of all we thank you and the reviewers for your careful reading of our manuscript and the helpful suggestions. We answered to all comments separately point-by-point. In the revised version of the manuscript, the argumentations and additions will be included.

T. van Ommen (Editor)

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Interactive Discussion

Discussion Paper

We have now a number of comments and suggestions raised by three thoughtful reviews of this paper. All reviewers suggest that the paper can be brought to publication, although two suggest that major revisions are necessary, with reviewer 2 indicating the most serious reservations regarding the content and structure. I agree that substantial revision will likely be necessary, but I think that the comments fairly clearly point the way forward. I have sought and encouraged discussion with my colleagues on this interesting paper and have some further comments that I pass on for the authors' response. These mostly echo comments made also in the official reviews.

There is a general thread of concern showing a need to look further at the role of the NAO, and the suggestion that the authors clarify whether the atmospheric pattern is barotropic, as raised by reviewer 1 seems a useful step towards doing so.

Answer: To clarify this point we calculated a new Figure for the warm-cold anomalous field for geopotential height at 500 hPa, indicating a barotropic structure of the dipolar pressure field. A discussion is given in the response to Reviewer 1.

Also, in looking at 20th century data, there is a question of contamination of data by anthropogenic forcing. If the authors were to explore the correlations, the significance and presence or otherwise of preferred multidecadal timescale for the variability in the data with 20th century excluded, this issue could be at least be probed.

Answer: We took the suggestion of the editor and calculate a correlation map of the Cariaco time series and the Luterbacher et al. (2002) SLP data for the common pre-industrial period (1659-1859), similar to Figure 5, to exclude the impact of 20th century climate variability from the data. A figure enclosed in the revised version will show a similar correlation pattern as for the entire period (up to 1990, Figure 5 in the manuscript), indicating that the 20th anthropogenic contamination of the forcing data has only minor impact on multidecadal time scales.

Mann and Emanuel are noted by Greatbatch in review three as questioning the existence of the AMO. In fact, it is not the existence or otherwise of the AMO, as I read it, but the role of the AMO relative to anthropogenic forcing that is questioned. Also, any argument about AMO and its relation to SST should account for seasonal variations, and it should be borne in mind that the Mann and Emmanuel analysis is for August-October. Still, it would be useful for the authors of the paper in consideration here to comment on this, as reviewer 1 suggests.

Answer: The paper by Mann and Emanuel suggests that on interdecadal time scales atmospheric variability in the tropics is driven by radiative forcing rather than by AMO. This can not be disproved with our studies. Since only a part of the Cariaco time series is explained by AMO, a wide range of variability can be related to other than AMO processes, including radiative forcing. This finding does not contradict to the Mann and Emanuel paper. The fact that we investigate boreal winter data instead of August-October data in Mann and Emanuel could also be a reason for the different importance of the forcing mechanisms that drive climate variability.

Interactive comment on Clim. Past Discuss., 2, 633, 2006.

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