

Interactive comment on “Variability of daily winter wind speed distribution over Northern Europe during the past millennium in regional and global climate simulations” by S. E. Bierstedt et al.

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Received and published: 22 June 2015

We thank the reviewer for his carefully reading of the manuscript and providing very constructive criticism. Below is an overview of how we would revise the manuscript. Note that we discuss only the major drawbacks. All minor comments will be addressed as well in the way suggested by the reviewer.

General comments: However, two out of three GCM simulations are driven with changes in land-use, which seems to have the overwhelming effect. Hence, the authors state themselves that correlations established with the temperature in the first part of the manuscript are “a statistical artifact mediated by deforestation”.

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P 1500 | 15: Why did you use transient simulations?

This is a fair point. Indeed for the second half of the simulation with prescribed land-use variability the correlation between the wind distribution and temperature could be masked by the effect of land-use change, since both have a long-term centennial trend. But this is precisely why we also included an analysis of two time slices. The period prior the deforestation enabled us to analyse the link between temperature and wind independently from the land-use change forcing, thus we can compare these two model setups with the other data sets. Nevertheless, it has to be borne in mind that the common long-term trend may explain only part of the total correlation. The interannual and interdecadal variability will also affect the value of the correlation, and at these time scales the changes in land-use should not have an influence, since its rate of change is much slower. We use the transient simulations as the included deforestation is supposed to represent the actual land-use change, and therefore these two simulations consider an important aspect which influences the link between temperature, NAO and the wind speed distribution. This allows for the identification of the additional aspect of deforestation. Note that one of the goals of our analysis is to answer the question of whether large-scale temperature affects the distribution of surface winds. In the past and in the future, temperature is affected by transient forcings, and thus transient simulations should yield a more realistic answer. For instance, an analysis of a control simulation with constant forcing would have identified correlations between the wind distribution and variations in the temperature gradient which may bear little relevance for temperature changes caused by the external forcing. In addition, the analysis of proxy records representing past conditions will be affected by all forcings. Our analysis has, for instance, identified that deforestation can be an important factor for the wind distribution, which can be important when interpreting natural proxies based on lake sediments or coastal dunes.

P 1488, I 17: You average over the entire selected area as far as I understand. I am a bit concerned about the impact of the ocean and the corresponding land-sea-mask

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(see comments below). How would your results look like if you distinguish between land and ocean points?

P 1491, l 6: [...] More general, it might be interesting to see the correlations of table 2 split into ocean and land points. By doing that, you would also get correlations that are almost independent of the forest cover – namely the ones over the ocean.

Although the table referred by the reviewer includes the spatially averaged data as a summary of the correlation analysis, the subsequent figures and the corresponding discussions do show the spatial correlation maps without spatial aggregation, and include the land and ocean areas. Thus, the authors assume that these figures already include the information requested by the reviewer.

Interactive comment on Clim. Past Discuss., 11, 1479, 2015.