Atmos. Chem. Phys. Discuss., 13, C391–C393, 2013
www.atmos-chem-phys-discuss.net/13/C391/2013/

Atmospheric Chemistry and Physics Discussions

Interactive comment on "Extreme winds over Europe in the ENSEMBLES regional climate models" *by* S. D. Outten and I. Esau

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Received and published: 7 March 2013

Firstly, I'd like to thank the reviewer for their time and their useful comments.

I agree that the terms projection and prediction are often used interchangably and I must confess that I have used them in this way having never considered the distinction in detail before. The reviewer's argument makes good sense and I am very happy to change my style accordingly, both in this paper and in the future.

The introduction has already been rewritten to include some of these papers, but I feel that the introduction should include an extra paragraph (possibly two) which details the previous works and relates my work to them. This would be done for the final version.

p.1182, 1.10 This is of course correct. The Weibull method provides no analytical

confidence intervals, and I am happy to rephrase the sentence to make this clear.

p.118, 1.15-20 The sample sizes are different at different locations. This is nearly always true when using the peaks over threshold method. Even if the threshold's used were the same, the number of events above the threshold would be different and so the sample size would be different. This is why in figure 2 I show the confidence intervals for the wind estimates. These are also calculated at each grid-point seperately and so are relevant to the estimates of the 50-year return wind.

p. 1186, top This is an excellent point and something I have been considering for current work I am undertaking. In many cases the 24 hour seperation should be sufficient to ensure independence but possibly not eveywhere. I have considered using a larger seperation time e.g. 48, 72 hours etc. This has the problem that it may still not ensure true independence. A high-pressure blocking situation over Scandinavia can result in a cyclone in the North Atlantic remaining over a single location for a considerable time. Another problem with this approach is the assumption that one cyclone is independent from another. As an example of where this might not be true, consider the cyclogenesis that occurs around Greenland. It is possible for a cyclone to move from the Gulf of Mexico towards Cape Farewell in Greenland and trigger the formation of a new cyclone between Greenland and Iceland. If these two low pressure centres cause high wind speeds over Iceland, for example, the events could be seperated by a few days as the new cyclone moves off and the original cyclone moves into the area and still be related. As an alternative, I have been considering the idea of using a method that states that the wind speed must drop below a certain threshold between events. Obviously, this lower threshold would need to be different for each location since it would need to be relevant to the local wind climate. However, I realised that this method would not take into account the eye of a storm, where wind speeds could be very low. In summary, I believe that the 24 hour seperation ensure independence in most cases but I am aware that it does not work everywhere and I am investigating various alternative methods for my future studies.

Figure 2 is too small. It was uploaded as a full page image and should be published as such. In the printer friendly version of the paper, the figure has been reduced to be approximately one third of the page in size. This is an issue to be discussed with the copy editor (as it should be a full page in size). I will ensure that it will be the correct size in the final version.

The final two points you have raised are related to the effect of natural variability between the current and the projected period. I agree that this needs to be discussed in terms of extreme winds. This is quite a small study however, and the debate regarding the seperation of natural variability from climate change is vast. I am aware that models do a poor job of capturing the phase and amplitude of multidecadal signals, so the question of the quality of the natural variability within these simualtions could be addressed. That would however be another study in itself. I will include a comment in the final version stating that the seperation of natural varibility from anthropogenically induced changes has not been considered in this study and remains open for future studies. But I am not going to discuss the matter much beyond that as it is a large topic that is beyond the scope of the current study.

Interactive comment on Atmos. Chem. Phys. Discuss., 13, 1179, 2013.