Nonlinear Processes
in Geophysics
Discussions

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**Interactive
comment**

Interactive comment on "Vertical profiles of wind gust statistics from a regional reanalysis using multivariate extreme value theory" *by* Julian Steinheuer and Petra Friederichs

Anonymous Referee #1

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This manuscript describes a methodology to predict vertical profiles of wind gusts based on a number of covariates that are taken from a reanalysis (which only includes wind gust diagnostics at 10 m). It is interesting, well written, and technically sound. My only major complaint is that the test setup used here is still several steps away from a setup that would be used in operational forecasting. While replacing the reanalysis data by forecast data is straightforward, it would be interesting to see how much skill over climatology is retained when forecast uncertainty is added to the uncertainty in the statistical model presented here, that links covariate information to wind gusts at various vertical levels. An even more interesting question is only briefly discussed in the conclusions: in how far can the model estimated here be transferred to other locations?

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Discussion paper

That question is highly relevant for practical application of this method since wind gust observations at several vertical levels like the ones used here are rare, and the model would have to be transferable for this methodology to provide wind gust predictions at a wider range of locations. That being said, I certainly understand the challenges involved in investigating this transferability, so I am not suggesting that adding this to the manuscript is mandatory.

Specific comments:

85-90: Since references are provided, I don't think it is necessary to restate the theorem here.

94: I would suggest to be slightly more precise and state explicitly that G and G_u are the CDFs of the respective distributions

99: Here and later, the terms non-homogenous and non-stationary are used in a somewhat sloppy way. Based on the conext I understand that the authors basically want to say that these parameters are non-constant, i.e. they depend on covariates. I find especially the term non-stationary confusing and misleading here (and in 127)

99: I also find it strange to refer to height as 'space'. To me, the term 'space' implies at least two dimensions.

105: What is 'generalized height', where is this defined? Or do you just want to say 'normalized height'?

136/137: I feel the term 'stationary' is again misused here, now in a different way. To me, 'stationary' is not synonymous with 'unconditional'. Did you mean to say 'climatological distribution'?

180: How exactly is this 5-h time window defined? 5-h before the time t? Or centered around t? Please clarify, because this also has implications on using this methodology in a forecast (i.e. forward in time) context.

218: How is lambda determined? Also via cross-validation? Presumably some sort of data driven routine must have been used because the results are typically quite sensitive to the strenght of regularization.

Language and typos:

272: appropriate what? Some word seems to be missing here

283: This sentence essentially repeats the statement of the previous sentence

292: May -> March

322: climatorlogical -> climatological

333: therefor -> therefore