

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

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

*We thank the reviewer for his/her helpful comments. Your suggestions are greatly appreciated and lead to an improvement of the article. In the following we respond point-by-point (in italic) to your comments (in normal font).*

C1

### **Anonymous Referee #2**

Received and published: 11 January 2020

The authors present a novel approach to modelling hourly peak wind speed using a generalized extreme value (GEV) distribution with height and time dependent parameters. These GEV parameters are functions of several covariates from the COSMO-REA6 reanalysis. The presented results are convincing and the paper is well written. There are only minor inaccuracies requiring clarification:

*Thanks!*

P2,L44-46. Ensemble model output statistic is often referred as non-homogeneous regression, so I don't see any reason for treating the two notions here separately.

*You are right. We changed the sentence accordingly. It now reads:*

*44-46: “Probabilistic methods employ non-homogeneous regression, e.g., Thorarinsdottir and Johnson (2012) for wind gusts, and Lerch and Thorarinsdottir (2013), Scheuerer and Möller (2015), or Baran and Lerch (2015) for wind speed.”*

P4,L85. I don't see the reason of formulating Gnedenko's theorem. I would just cite it and define the GEV distribution.

*We agree with you and the first reviewer and removed the theorem. Instead we now just give the definition of the GEV:*

*83-86: “The asymptotic cumulative distribution function (cdf)  $G$  is defined by*

$$G(y; \mu, \sigma, \xi) = \exp\left(-\left[1 + \xi\left(\frac{y-\mu}{\sigma}\right)\right]^{-1/\xi}\right) \xi \neq 0$$
$$= \exp\left(-\exp\left[-\left(\frac{y-\mu}{\sigma}\right)\right]\right) \xi = 0,$$

C2

on  $\{y : 1 + \xi(y - \mu)/\sigma > 0\}$ , where  $-\infty < \mu < \infty$ ,  $\sigma > 0$  and  $-\infty < \xi < \infty$ . The parameters are denoted as location for  $\mu$ , scale for  $\sigma$ , and shape for  $\xi$ ."

P4,L105. What do the authors mean by "generalized height".

*We agreed that this was misleading. We now use the term 'normalized height' and added its definition:*

101-102: "where  $\eta \in [0, 1]$  is a normalized height equal to 1 at 250 m and 0 at 10 m height."

P10,L271. Please clarify the sentence "We conclude ... " as something seem to be missing here.

*The word model is missing.*

270-271: "We conclude that the Legendre model represents an appropriate model for all layers."

Typos:

P2,L47. "In order to generate" instead of "In order generate"

*Thanks!*

P3,L78. "We pre-select" instead of "We pre-selection"

*Thanks!*

P5,L138. "All scores are evaluated" instead of "All scores are evaluation"

*Thanks!*

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P7,:181. "COSMO" instead of "COMSO"

*Thanks, so we changed here (and lines before, where we made the same mistake).*

P11,L33. "therefore" instead of "therefor"

*Thanks!*

P26,Figure 11. In the legend I would write "30% neutral (b), and 11% unstable (c) cases.

*Yes, '(c)' is missing here, so we changed:*

*Figure 11: "According the LI, the data are classified in 53 % stable (a), 36 % neutral (b), and 11 % unstable cases (c)."*

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Interactive comment on Nonlin. Processes Geophys. Discuss., <https://doi.org/10.5194/npg-2019-60>, 2019.

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