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# *Interactive comment on* "From standard wind measurements to spectral characterization: turbulence length scale and distribution" *by* Mark Kelly

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The author (MK) would like to thank reviewer #2 for the compliments and constructive suggestions.

Here I will respond to the points raised by the reviewer, copying their points (from their annotation of the draft manuscript) inside quotes using *italic font*, and including page/line numbers:

1. p.1, lines 14–17 *"This looks very useful during the design phase of a windfarm, particularly offshore."*



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Discussion paper

Thanks; I hope it's useful, and look forward to get more offshore measurements, at 'taller' heights, to further verify the model—as I extend it conditionally per wind speed.

2. p.2, lines 6–8 *"While $L_{MM}$ is certainly one of the central Mann model parameter, anisotropy parameter $\Gamma$ is also quite important. In the IEC standard, it is recommended to use $\Gamma = 3.9$, but its value also varies under different stability conditions. Therefore, I suggest to tone down the 'the most relevant' to 'critical', so that $\Gamma$ is not forgotten :-) "*
   As mentioned and referenced in the text, Dimitrov and others found that $L_{\mathrm{MM}}$ is more relevant than $\Gamma$ for modern horizontal-axis turbines (and control systems) analyzed; e.g. Sobol coefficients for $\Gamma$ have been found to be much smaller than those for $L_{\mathrm{MM}}$. But there is a (small) possibility that in some circumstance (turbine and/or control system configuration) for some component load that the sensitivity to $\Gamma$ could be higher than for the turbulence length scale. The variation in $\Gamma$ is also mentioned, to avoid 'forgetting' it as well—the text reads "most relevant load–driving parameters", and this includes $\Gamma$.
   But I change 'relevant' to 'crucial,' inspired by the reviewer's suggestion.

3. p.2, line 20 (equation 1) *"Please add a reference to this equation."*
   There is no reference for this equation; rather it is a generic finding of the author, which corresponds to/relates all of the different forms of $\tau$ found in the literature (and referenced). (Such an expression could be useful in the future for e.g. fractal turbulence considerations.)

4. Figures 1–2 (p.8,10) *"Please add a legend indicating magnitude of joint probabilities, which I guess is hidden in the color intensity."*
   Done.

5. p.12, lines 7–10 *"Is Eq. (13) then recommended to use instead of Eq. (15), by using the ratio in the bracket to be 1.11/1.13?"*

The value of 1.11 (or 1.13) corresponds to deviation from $\langle c_m u_*/\sigma_u \rangle = 1$ for an average including all recorded speeds between 4–25 m/s (or 7–25 m/s). If one wished to consider speeds only above 7 m/s at this site, then once could perhaps approximate the growth of this factor by the ratio 1.13/1.11—but this is found thus far only for this site and wind speed ranges. Later text (following this sentence) explains more about $\langle c_m u_*/\sigma_u \rangle$.

6. p.17, line 19 (second bullet-point in summary of conclusions/§4.2) *"On page 12 in the last paragraph, it seems that argument is made in favour of the ratio $>$1. Therefore, I suggest clarifying this in relation to those statements."*
   Note the ratio is '≈1' in the statement/second bullet point; the statement goes on to say that $L_{\mathrm{MM}}$ can then be *approximated* by $\sigma_u/(dU/dz)$.
   I have added a sentence to the end of the previous bullet-point, noting that this ratio can be 1–1.11 (or re-directing a reader of only the conclusion to check out the details).

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