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.”
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 $L_{MM}$ 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 $L_{MM}$. 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?”

C2
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 ‘$\approx 1$’ in the statement/second bullet point; the statement goes on to say that $L_{MM}$ 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).