Dear Jacob Berg,

thank you very for your remarks and comments on the manuscript as well as for the discussions at the conferences in the past years.

One could say that some remarks targeting e.g. representation are a question of taste. In these cases we respectfully preferred to stick to the original manuscript.

Comment from Referee 1:
Exactly how is this correlation constructed?

How is the associated coherence related to atmospheric turbulence?

Authors response:

The focus in this work is on the temporal statistics of the wind. We were able to generate time series with very specific properties and faced the challenge to assemble wind fields based on these very time series.

In one of the extreme cases we prescribe one and the same time series in every of the wind fields grid points in the rotor plane (fully correlated). In another extreme case (delta correlated) we prescribe completely independent time series in every of these grids points, which results in an uncorrelated or delta-correlated field (delta correlated). In order to provide wind fields in between both of these two extreme scenarios, we designed fields in which sub-regions of the grid in the rotor plane are defined, in which we prescribe fully correlated fields. For example, the grid can be sub-divided into 9 regions of a thee by three grid. In these regions the exact same wind time series will be prescribed.

The resulting correlations and coherence must be understood as a simplification of atmospheric turbulence, since atmospheric turbulence features a varying range of temporal and spatial scales.

Comment from Referee 1:
P1,l3-6: which two types? You just say two types of wind fields. Please specify

Authors response:

Gaussian and non-Gaussian

Modifications to the manuscript:

This has been edited in the manuscript.

Comment from Referee 1:
P1,l3. In IEC – the Kaimal model must be accompanied by a coherence model to account for the spatial correlation – much in connection to your work.

Authors response:

There seems to be typo with respect to line you indicate.

We mention the Kaimal model in the introduction as one of the examples for a wind model listed in design guidelines. It is true and we are aware of the fact that the Kaimal model targets the spectral properties and is used in combination with a coherence model. However we are of the opinion it is sufficient at this part of the manuscript to simply refer to wind fields constructed in such a fashion as „Kaimal wind fields“ or based on the „Kaimal model“.

Comment from Referee 1:
P6,l25. Can you say something about the physical time scales in the wind model (here defined with constants of physical units). How does for example the integral timescale compare to characteristic time scales of velocity fluctuations in the atmospheric boundary layer like ~10min.

Authors response:

We believe some of the aspects you are asking for are addressed in section 2.1.2. The time series are correlated for roughly 12 seconds, which in comparison to atmospheric turbulence is very short. An integral time scale was not calculated. In our opinion the reason for this is a lack of low frequent dynamics in the velocity signal. As can be seen in e.g. Fig. 1 & 2: There are not too much low frequent dynamics present in our signals. The lack of those might potentially affect the presented results quantitively, but not qualitatively, as the differences in the presented results stem from the intermittency.

We tried to incorporate lower dynamics the velocity signals with our CTRW approach, but essentially found that it would have spoiled other properties of our time signals. Important is to keep in mind that it is our highest priority to have highly comparable Gaussian vs. non-Gaussian fields. We therefore had to trade-off some wind field properties.

Comment from Referee 1:
P7,l5. 1% error in standard deviations of the wind velocity leads to approx. 1% in fatigus loads . Can you please elaborate – or add reference. So a linear response? – and for all load channels?

Authors response:

We were aiming to provide some reference for the reader how a 1% change in fatigue load can be understood.

The idea was to give a quantitative estimate on how big an offset in turbulence intensity must be, in order to provoke a 1% difference in fatigue loads. We conducted some test simulations with our set-up and found that a 1% increase in turbulence intensity yields roughly a 1% increase in fatigue loading. This is of course highly dependent on the actual turbine, the load sensor, other wind field etc. This is why we added a footnote to emphasize that this result is simply a rough estimation.

Comment from Referee 1:
P7,l13. In principle also in the third moment (zero in gaussian stat).

Authors response:

Both of our wind signals (the Gaussian and the non-Gaussian) feature zero skewness. Strictly speaking this is another simplification and deviation from atmospheric turbulence, however it is the aim of this work to focus on the fourth moment and to have no differences in any of the lower order statistics, including the third moment of the 2P statistics.

Comment from Referee 1:
P8,l1. In general, for most figures (fig 1b and 2b, 3 and 4) – if you want to compare two curves, in this case two pdf of velocity, u'(t), then plot the curves in the same coordinate system. Makes it much easier to observe any likely differences.

Authors response:

Thanks for this advice. Aside for the spectrum we decided to have two plots and make them comparable by having the exact same scaling. Since the content is so much alike both graphs would practically be on top of each other, which in return would also hamper visibility. If you would put e.g. both time series in one plot, this would make it very busy.

Comment from Referee 1:

Figure 5a. Is it possible to get the numbers on the x-axis as a function of standard deviations (\sigma_{\tau}). That makes it easier to judge how much non-gaussian the velocity increments at the different time delays are.

Authors response:

It is indeed common to normalize the x-axis by the respective standard deviation.

However, we are of the opinion it is much more intuitive for readers who are new to this topic to understand the actual increments in m/s. For instance, it becomes evident from Fig. 5a that there are no velocity increments with an amplitude of the value 2 m/s in the Gaussian signal, whereas there are some of these events in the non-Gaussian signal. We are of the opinion this provides a more intuitive understanding of the actual velocity differences.

For the purpose of judging / quantifying the non-Gaussianity Fig. 5b is provided, which shows the fourth moment of the velocity increments.