

## ***Interactive comment on “Detection and characterization of extreme wind speed ramps” by Ásta Hannesdóttir and Mark Kelly***

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### **Responses to reviewer Anders Wickström**

We want to start by thanking you for the positive general comments and good specific suggestions that we can use to improve the paper. We will address your comments in a chronological order, where the reviewer comments are with blue italic font.

*General comments The design load case ECD is part of the international design standard for wind turbines, IEC61400-1, which makes the topic of the paper of broad international interest. It is very good that the deterministic wind conditions are*

C1

*analysed and compared to real measurements. Especially the ECD seems to be rather arbitrarily defined in the early days. The conditions at ECD are normally not a design driver load case. Maybe that is a reason the parameters and conditions for EDC have not attracted the most interest amongst wind turbine designers or manufacturers. Finding methods to validate the ECD seems also difficult, which is discussed in the paper. One method is proposed and presented, which is a good attempt to get clarification in the subject. The focus is on large-scale, high-amplitude fluctuations, which are coherent across the rotor of multi-megawatt wind turbines, which is relevant as the turbine sizes has increased significantly since the ECD was first proposed for wind turbine design.*

*The measurements used for the characterization of the ramp-like events come from three different sites, located in a quite narrow geographical area of southern Scandinavia. What is the motivation for selecting these sites? What global wind measurement data is available for this kind of research?*

There was not a specific motivation for choosing this geographical area. The reason is rather that at our university we have access to data from these sites and unfortunately not many others. Data is most often privately owned and not freely available.

*When the methods are specified and algorithms are coded, it seems relatively straight forward to compile a larger amount of data, to get even more reliable base for conclusions.*

Yes, we agree and would very much like to have access to more data sets with long term high-frequency measurements at different geographical areas.

*For further discussion: It would be interesting to check if there are correlations with ECD severity and the turbulence intensity at the specific site?*

C2

Yes, this is an interesting point. We do actually get some indication that this is not the case. From the description of the different sites the reference turbulence intensity at Høvsøre is 0.065 and at Ryningsnäs it is 0.18, yet the average ramp amplitudes are of similar magnitude. This is likely because these large coherent structures are caused by mesoscale phenomena, observed at heights above the surface layer.

*Technical corrections Figure 2 should maybe be moved further down in the article, when the high pass filter has been introduced, e.g. after line 13 or before just 3.2.*

Yes, good point. We will change the placement of the figures as far as the Copernicus latex template allows.

*Page6, line 6 “We define the rise time of the ramp from the interval where the wind speed rises from 0.025ub to 0.975ua.” 0.025ub seems very low!? Should it be 0.025ua?*

Thank you for pointing this out. This is an error that will be corrected. It should actually be from 0.0125 to 0.9875 of the total amplitude ( $u_a - u_b$ ).

*No Nomenclature.*

Do you suggest a list with acronyms and/or symbols? This can be included in a reviewed version.