

Wind Energ. Sci. Discuss., referee comment RC2  
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## **Comment on wes-2022-48**

Anonymous Referee #2

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Referee comment on "Predicting power ramps from joint distributions of future wind speeds" by Thomas Muschinski et al., Wind Energ. Sci. Discuss.,  
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The manuscript, "Predicting power ramps from joint distributions of future wind speeds" describes a novel statistical postprocessing method called the multivariate Gaussian regression (MGR) to provide calibrated and sharp hourly ECMWF 100-m wind speed forecasts for lead times +24h to +47h. Observations from three offshore meteorological towers are used for verification. The main advantages to the new method are that it can explicitly model temporal dependencies across multiple lead times and is not limited to the number of members available in the raw ensemble, unlike the various other multivariate postprocessing methods discussed in the paper and compared against in the figures. Skillful modeling of these joint distributions across lead times is essential for reliable power ramp predictions and consequently the balancing of a power grid with wind energy resources. The authors found that the new method outperformed the various other methods commonly used in the literature when assessing the scores and skill scores of wind speed and wind power forecasts. The paper is overall well-written, interesting, and valuable to the wind energy field. Here are my recommendations for further clarity.

### **Scientific and clarification comments:**

L48: I'm not sure what was meant by the phrase, "and not supported by the....." Can you please reword for clarification?

L59 and throughout: the use of *higher resolution* may be confusing to readers in this context as higher resolution when referring to NWP forecasts typically means higher temporal or spatial resolution for numerical integration. Here, it seems to mean more ensemble members. Can you replace with another term or distinguish for the reader the meaning in this paper's context?

L83-87: Please mention somewhere in here that the forecasts are initialized at 00Z. It's mentioned later, but I found myself asking that question in this section.

Sect 3: Wind speeds can only take on positive values. Why not use the truncated Gaussian distribution truncated at zero rather than the untruncated Gaussian distribution?

Equations and equation explanations in the text: Some of the equations and explanations of variables in the text reuse symbols which I found difficult to keep track of while reading. For example,  $i$  and  $j$  referred to lead time and next lead time, respectively in some earlier places in the paper while  $i$  referred to ensemble member in other parts (e.g., equation 5) and a new variable,  $m$ , became the new lead time variable. The definition of  $N$  also changed as well. For better readability, please make the variable symbols unique and consistent throughout the paper.

L253: Can you please provide more details about what the DSS score tells the reader about the forecast? Does it inform about the performance of the calibration and sharpness, just one, or some other aspect of the forecast?

L295: Can you please state why the COP(Err) was selected as the reference method for wind speed as opposed to the other methods?

Figure 1: How were the 50 members out of 1000 selected? Would the gray lines show comparable spread or much more spread if the full 1000 members were shown?

Figure 2: The caption says that the data were aggregated by month and year. Is it just showing December data like Figure 1 or all months? If all months, do you expect there to be differences in the scores, and thus optimal method, if all months were not aggregated?

L323: Can you please state why the ECC method was selected as the reference method for power ramps as opposed to the other methods?

**Technical comments:**

L148: Spelling of *seasonally*.

L160L Spelling of *postprocessed individual*

Eq(5): Please define symbol

L 208: I think you can remove 'on' before 'become'

292: Spelling of *smooth*

Figures 1 & 4: Please put the corresponding forecast hour along the horizontal axis or state the forecast hour range of the figure within the caption.