Wind Energ. Sci. Discuss.,
https://doi.org/10.5194/wes-2018-13-RC1, 2018
© Author(s) 2018. This work is distributed under
the Creative Commons Attribution 4.0 License.

Interactive comment on "Generating wind power scenarios for probabilistic ramp event prediction using multivariate statistical post-processing" *by* Rochelle P. Worsnop et al.

J. W. Messner (Referee)

jwmm@elektro.dtu.dk

Received and published: 14 March 2018

This paper presents and compares different multivariate approaches for probabilistic wind power forecasting to forecast ramp events. Accurate ramp forecasting is a very relevant topic in the wind power forecasting community and I think this manuscript is a valuable contribution to this topic. The manuscript is well written and I enjoyed reading it very much.

Even though, the data sets in the case studies are rather small, the results indicate advantages and disadvantages of the different methods, which are then investigated more closely in a simulation study. I like that the authors do not provide too many tech-

nical details, this facilitates the reading and I believe that it is still possible to reproduce most of the results.

There is not much to criticize and I only have a few minor comments that I listed below.

More specific comments:

1. The result section focuses mainly on the differences between the different Schaake shuffle methods. Although this is certainly interesting I think the differences between the Gaussian copula nad the Schaake shuffle are also very interesting and could be investigated and discussed a bit more. The Gaussian copula approach is probably better known in the wind power forecasting community and it would therefore be great to have a more extensive discussion on when and why this approach fails and Schaake shuffle approaches should be preferred.

2. In the definition of ramp events, it is not fully clear to me how Δp_{max} and Δp_{min} are derived. From Figure 1 it appears to be the sum of consecutive power differences that have the same sign. Related to that, if e.g., there is an up-ramp that is interrupted by a short down-ramp (e.g. 0,0.5,0.4,0.9), , is it then not classified as ramp?

3. The description of the fitting approach for the predictive distributions (Section 3.2) is also a bit unclear. As far as I understand, ordinary least squares regression is used to fit the transformed observations to the forecasts (and the forecasts to the seasonal cos and sin terms). Forecasts from this OLS model and its residual standard deviation are then used to derive parameters of truncated normal, truncated logistic or gamma distributions. How are the OLS outputs related to the distribution parameters? Did you simply use the method of moments? Somehow OLS assumes the residuals to follow a normal distribution and therefore this approach, if I understood it correctly, seems a bit weird. Why are you not using a distributional regression (i.e. EMOS like) approach where you directly fit the

distribution parameters as functions of the NWP forecasts and use a maximum likelihood or minimum CRPS framework?

Minor comments:

1. L70, why is it a disadvantage to use nonparametric methods.
2. Section 2.2: What are the lead times that are regarded. 1-12h? How long does it take the HRRR model to compute these forecasts and when do they become available? I.e., if the computation takes more than 1 hour the 1h forecast is not very useful.
3. Caption of Figure 1: I think a window size of h=4 not h=3h is shown
4. P9L219: Not only the red dots but also black dots show the annual cycle.
5. P12-13: In the description of the Gaussian copula approach, it should be clarified that the exponential covariance model (ECM) is an estimate of the covariances and that random number generation is based on a multivariate Gaussian distribution with these estimates as covariance parameter.
6. Section 3.3.3: I expect η to be a quite important parameter and its optimal value clearly depends on the size of the data set. How did you select $\eta = 50$ and did you test the effect of this selection on the results?
7. P19,L451-452: "On the other hand, we have shown that systematic over- and under-forecasting biases can be reduced with statistical post-processing". I did not find any results showing this in the manuscript.
8. Last paragraph on page 24: I do not fully agree that StSS is more competitive than MDSS and MDSS+. The differences mostly do not seem to be significant and e.g., for down-ramps at PNW StSS actually performs worse.

9. Caption of Figure 11: There are no Gaussian copula results shown
10. Summary and discussion: It could be summarized here again, why multivariate methods are required to predict ramp events.

Interactive comment on Wind Energ. Sci. Discuss., https://doi.org/10.5194/wes-2018-13, 2018.