

## ***Interactive comment on “Order of operation for multi-stage post-processing of ensemble wind forecast trajectories” by Nina Schuhen***

**Anonymous Referee #1**

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This manuscript proposes and evaluates an extension of the RAFT (rapid adjustment of forecast trajectories) approach, which updates previously generated probabilistic forecasts based on new observations that become available as time elapses. While the original approach applied the RAFT approach only to the predictive mean, the extension proposed here combines the RAFT approach with ECC (ensemble copula coupling) to test whether it is beneficial to apply RAFT to individual, post-processed ensemble members. A comprehensive comparison with the alternative strategy (applying RAFT only to the predictive mean and generate calibrated ECC ensembles as the final step of the calibration procedure) is performed using MOGREPS-UK ensemble wind speed forecasts and wind speed observations at 152 SYNOP observation sites across the British Isles.

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The manuscript is well written and the RAFT extension proposed here is interesting. Conclusions are well supported by the verification results presented in various figures and tables. Some minor clarifications are required as discussed below.

Specific comments:

161: For RAFT\_ens, were separate correlation matrices calculated for each member or were data pooled across all members and a single correlation matrix estimated and used for all members?

191: The explanation here is somewhat confusing. What exactly is averaged here? Please add some more detailed explanation. Also, while I don't fully understand in which sequence the different lead times are being processed, I am surprised that both the preceding and subsequent lead times are assumed to have been processed at this point. Please add some explanation for this as well.

242: I am not happy with the formulation 'A flat histogram denotes perfect calibration'. A flat histogram is a necessary but not sufficient for calibration, and examples can be constructed where uncalibrated forecasts yield near flat histograms (e.g. Hamill, 2001, or Thorarinsdottir et al., 2016, their Fig. 7).

368 'From this we can conclude ...': I don't disagree with the conclusion in general but I find this pair of sentences logically confusing. If EMOS + RAFT\_m + ECC results in a better score, how does this imply that RAFT\_ens preserves the multivariate correlation structure? Please clarify.

371: I would be careful with the use of the term 'underdispersed' in connection with the average rank histogram. What we see is a U-shape, but the discussion in Thorarinsdottir et al., 2016 suggests that this can be caused by miscalibration other than underdispersion of the ensemble. I'd refer to the univariate histograms first as their interpretation is less ambiguous.

383: Can the author provide a reference for the claim that 'the CRPS is usually more

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sensitive to the error in the forecast mean'? This is not obvious to me since the CRPS - unlike RMSE or Euclidean error - assesses the calibration of the full distribution.

Fig. 8b: While I agree that at this point it is not required to always show results for both gEMOS and logEMOS given that it has been found previously that their performance is comparable, I wonder why the author chose to alternate between the two. This could create the impression that figures were hand picked to support a particular conclusion. I'd either consistently use gEMOS or logEMOS, or provide the underlying rationale if there is indeed a good reason to consider gEMOS in one and logEMOS in another context.

Language and typos:

346-347: it has be to applied -> it has to be applied

351: is is -> it is

References:

Hamill, T. M., 2001: Interpretation of rank histograms for verifying ensemble forecasts. *Mon. Wea. Rev.*, 129, 550-560.

Thorarinsdottir, T. L., Scheuerer, M., and Heinz, C., 2016: Assessing the calibration of high-dimensional ensemble forecasts using rank histograms. *J. Comput. Graph. Stat.*, 25, 105–122.

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