

Comment on Validating wind farm parameterizations with offshore SCADA data by Sengers et al.

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The authors validate the output of several wind farm parametrization models with SCADA measurements of five offshore wind farms. The article is well written and contains important information that can have a high impact. This is motivated from the fact that the wind industry needs accurate models for wind farm losses in order to design new wind farm layouts in areas with neighboring wind farms. Furthermore, I find the discussion and application of different validation metrics very interesting. However, I have some concerns with the validation procedure because the authors employ gap filling of the SCADA measurements, which essentially creates new data points that have not been measured; more details are added below.

1. When wake models are validated with SCADA, it is common to filter the SCADA for time intervals where turbines are curtailed, boosted, or not operating normally. When a limited (raw) SCADA set is available, as is often the case in scientific validation studies, the remaining filtered SCADA set may become too small in order to perform a statistically valid validation. It is likely, that the authors have recognized this limitation and then chose to perform an alternative approach by replacing these data points with expected power values obtained from the manufacturer's power curve and ERA5 wind speed values. As a result, the proposed SCADA now includes data points obtained from a model and one could argue that the comparison of gap-filled SCADA with wind farm parametrization is a model-to-model comparison and not a validation. Therefore, I strongly recommend the authors to avoid the gap-filling procedure and perform filters instead. The authors write that the gap-filling procedure leads to a more fair comparison with SCADA, however, the filters for curtailment, downtime and non-normal operation could also be employed as a post filter to the meso-scale simulation results. If the authors prefer to keep using the gap-filling method then they should at least write how much of the data (in percentage) is filled, which could be reported as an average over all five wind farms to avoid showing potential confidential information. Another analysis could be made by showing the impact of the gap-filling procedure on a SCADA set where the gap-filling is not required (i.e. most turbines are operating normally). One could then perform the gap-filling on a number of random turbines (so gaps are artificially made). The results with and without gap filling can then be compared.
2. The validation figures lack error bars showing the uncertainty of the mean of the processed SCADA. Adding this information would help the reader to quantify the difference between the models with respect to the SCADA uncertainty. The authors may find that some wind farm parametrization models perform similar when taking into account this uncertainty.
3. The authors do not provide a script used for processing the SCADA and this makes it difficult to replicate the validation procedure. I am aware that the employed SCADA is confidential, but the authors could use an open SCADA set for the purpose of providing a test to the script. For example, the authors could use the GLoBE dataset, which is 1.5 years data containing the Amrumbank West and Nordsee Ost wind farms.