

## ***Interactive comment on “From wind to loads: wind turbine site-specific load estimation using databases with high-fidelity load simulations” by Nikolay Dimitrov et al.***

### **Anonymous Referee #1**

Received and published: 14 March 2018

This is a very interesting paper on a relevant research topic. Relevant and viable procedures are presented, explained and verified. However, at this stage, the paper seems too comprehensive/lacks focus and needs to be more precise and better organized. The following general comments are a summary of the comments provided in the attached pdf and aim to support the authors with input/inspiration to provide high quality documentation of their impressive work.

Many things are presented: 6 different surrogate models are introduced, compared both theoretically and finally evaluated at multiple locations; sensitivity and uncertainty analysis are also introduced and performed. Monte Carlo simulation is performed as

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reference. The theory is quite complex and it seems to be valid to be introduced, as the specific characteristics are often picked up later in the paper. However, often the background is given in a very high level view, leaving many questions unanswered and sometimes theory is introduced that could be left out (e.g. multiple options are for determination of confidence limits)

The paper for this reviewer is too comprehensive and it is suggested that the focus/scope of the paper is revised. The paper is too lengthy and can and should be shortened in order to allow a clear delivery of the key messages. Generally, due to the large amount of theory explained, it could be an idea to assume the baseline theory known to the reader (e.g. PCE, Kriging, in particular Bootstrapping, and sensitivity indices). then it is possible to focus more on the differences between different modeling approaches

The introduction should include a broader overview of what has been done in the field, especially wind energy. The motivation of the chosen procedures in this paper could be more clear, i.e. how they add to and are distinct from previous research. More publications in this direction are (e.g.):

- [https://link.springer.com/content/pdf/10.1007/978-81-322-0757-3\\_46.pdf](https://link.springer.com/content/pdf/10.1007/978-81-322-0757-3_46.pdf)
- <https://www.sciencedirect.com/science/article/pii/S2452321617302445>
- <https://www.sciencedirect.com/science/article/pii/S1876610217353018>
- <https://www.wind-energ-sci-discuss.net/wes-2017-41/>
- <https://www.sciencedirect.com/science/article/pii/S0960148117310650>
- <https://www.sciencedirect.com/science/article/pii/S0960148117303981>
- [https://scholarworks.umass.edu/dissertations\\_2/601/](https://scholarworks.umass.edu/dissertations_2/601/)
- <http://onlinelibrary.wiley.com/doi/10.1002/we.1870/abstract>

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- <http://onlinelibrary.wiley.com/doi/10.1002/we.1831/abstract>

Little information is given on the direct comparison of the models and their baseline data. A comprehensive overview in form of a table is strongly recommended. Clear overviews of the procedures are necessary. written form is not enough. Also, not sufficient information is given on the number of used samples for the different models. The baseline data must be clear to proof that a fair comparison between models is performed.

The section and description of importance sampling may need revision.

A clear focus should be given to the shortcomings of some of the applied methods. E.g. the use of rosenblatt transformation implies discretized jpdf's which may lead to nonconverged results if the grid is too coarse. Then, the mentioned shortcomings need to be addressed (i.e. no information is given on the applied resolution!). Similar for Kriging / PCE: it is mentioned that Kriging is computationally more expensive, but not how much more time (CPU hrs) was required in this study. Again, this is one of the key performance indicators and should be implied in overall comparison.

It seems that all approaches provide valuable estimates from this overview study. The conclusion, that one performed "better" than another lacks the presentation of more detailed investigation, which is understood to be beyond the scope of this work.

Please also note the supplement to this comment:

<https://www.wind-energ-sci-discuss.net/wes-2018-18/wes-2018-18-RC1-supplement.pdf>

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Interactive comment on Wind Energ. Sci. Discuss., <https://doi.org/10.5194/wes-2018-18>, 2018.