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 #2

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The paper covers various surrogate methods for a quick lifetime assessment of wind turbines. For this purpose, a database with results of high-fidelity load simulations (HAWC2) for different environmental conditions is created. Using this database, the surrogate models are calibrated. Finally, the performance of the various methods is compared using several different turbine sites covering a broad range of environmental conditions.

The topic itself is very interesting and definitively relevant for the research community. Furthermore, the conducted amount work is impressive leading to a significant amount of important results. However, so far, the paper itself is too comprehensive and lacks

focusing at the most important topics. Therefore, the following advices are given to help to improve the quality of the paper:

1) Focus on the most important topics. Perhaps, some topics of minor interest can be left out (or be used in a second paper). Examples are IS, LHS, CI based on the logN distribution, several figures, sensitivity analysis, and extreme loads. Firstly, this would help to shorten the paper to make it easier to read. Secondly, you could give some more (important) details on the other topics.

2) The structure of the paper might be reconsidered. In the beginning, it is confusing that you mix up different topics (e.g.: In section 2, there are subsections concerning the database itself and concerning "reduction methods").

3) The explanations regarding the environmental conditions remain quite vague. For the database, the reader has to "search for" the distributions utilised. For the sites, they are not given and dependencies are not.

4) The implementation of importance sampling is questionable. IS should focus the sampling on important regions (those conditions where high fatigue damages occur). You sample according to the uniform (database) distributions. This might be the reason why IS is performing so badly.

5) It would be beneficial, if you should revise the theoretical sections. These sections need more detailed explanations. As you compare different methods, you cannot expect the reader to be an expert in all of them. So, don't leave out to many intermediate steps. If you don't want to give more details, then you should leave out the whole mathematical derivation and give only the final equations (and refer to the corresponding literature).

6) Some equations seem to be inconsistent or have typos. Please, revise all equations carefully.

7) The comparison of the different methods lacks overview. Please, provide a Table

or something similar summarising the number of samples used, the difference in CPU time, etc.

8) A discussion regarding the comparison would be interesting. Is it a fair comparison, if you don't take the 10000 calculations for the database into account? In my opinion it is questionable to compare 1000 MCS samples with PCE based on a database with 10000 samples. Especially since the database (probably) has to be build up for every new design, this is not really "fair". So, this approach "only" helps to analyse the same turbine at different sites. This should be clarified or it has to be explained why the comparison is "fair".

9) Please also note the supplement to this comment.

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https://www.wind-energ-sci-discuss.net/wes-2018-18/wes-2018-18-RC2-supplement.pdf