Wind Energ. Sci. Discuss.,
https://doi.org/10.5194/wes-2019-2-AC1, 2019

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Interactive comment on "Sensitivity of Uncertainty in Wind Characteristics and Wind Turbine Properties on Wind Turbine Extreme and Fatigue Loads" *by* Amy N. Robertson et al.

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Received and published: 15 April 2019

The authors thank the reviewer for his/her thorough assessment, comments, and insights. Revised text addressing these comments is shown in the new version of the manuscript as highlighted in red.

The reviewer's comments have been copied in the attached document, and are shown in blue. Authors' responses are shown in black.

Please also note the supplement to this comment:
https://www.wind-energ-sci-discuss.net/wes-2019-2/wes-2019-2-AC1-supplement.pdf

Interactive comment on Wind Energ. Sci. Discuss., https://doi.org/10.5194/wes-2019-2, 2019.

Authors' Note to the Associate Editor and Reviewers

Title: Sensitivity of Uncertainty in Wind Characteristics and Wind Turbine Properties on Wind Turbine Extreme and Fatigue Loads

Ref. No: wes-2019-2

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The date of Reference number 2 ("Assessment of extreme design loads for modern wind turbines using the probabilistic approach," DTU Wind Energy (DTU Wind Energy PhD; No. 0048(EN)) should be 2015 and not 2018.

A. This has been corrected in the reference itself and any mention of the reference throughout the paper.

Early in the paper, the authors should consider explaining their logic for choosing to use the Elementary Effects sensitivity approach instead of other approaches. As far as I am concerned EE sensitivity type of analysis is mainly used for initial assessments of input parameters, when you have large number of input parameters and it only provides information in the qualitative sense: indicates influential vs non-influential input, and hints to higher order effects caused by nonlinear or interactive relationship between parameters. You briefly explain this in section 3.1, but maybe you should consider summarizing the logic in your intro.

A. We have added some new information to the introduction based on this advice.

Page 2, Lines 4-6: I don't fully agree. Say we have a long and slender blade. You use ElastoDyn for the to define the blade dynamics via 1-2 assumed flap and 1-edge modes. This means that all your structural dynamics are effectively filtered through those three modes. A complex combination of wind speed, turbulence, shear, veer and yaw error might -in reality- result in a bend-twist coupling that will increase the loads or, unintuitively, reduce the loads (because the twist results in lower angles of attack). You will never be able to capture such a phenomena with a simpler model resulting in erroneous conclusions on your sensitivity analysis.

A. It has been shown in many studies that ElastoDyn is sufficiently accurate for loads analysis of the NREL 5 MW turbine blade. This has been shown via code-to-code comparisons to BeamDyn, MSC.ADAMS, HAWC2, Bladed, etc.

Page 2, Lines 13-14: What do you see the downfall of your sensitivity analysis if correlations and joint distributions of input parameters are not taken into account? See for instance slides 22 and 23 in http://www.gdr-mascotnum.fr/media/mascot12caniou.pdf

A. Correlations and joint distributions of the parameters were not considered since developing this relationship for so many parameters would be difficult or impossible. In addition, the correlation could be very different for different wind sites. The impact of not considering the correlation was limited by choosing parameters that were fairly independent of one another, when possible, and by binning the results by wind speed.

Fig. 1.