Review of the paper "Sensitivity analysis of numerical modeling input parameters on wind turbine loads in deterministic transient load cases" by W. Wiley, J. Jonkman and A. Robertson

General comment

The paper presents the results of an extensive simulation campaign focused on evaluating the impact of variations in model parameters on the design loads of a floating wind turbine. The paper is well written, and the Authors have done an excellent job summarizing the results and presenting them in a clear and understandable manner. The paper is suitable for publication but there is one important comment that Authors should address before the final acceptance of the manuscript.

Important comment

- There are notable similarities between this work and that of Bortolotti et al., WES 20219 (Bortolotti, P., Canet, H., Bottasso, C. L., and Loganathan, J., Performance of non-intrusive uncertainty quantification in the aeroservoelastic simulation of wind turbines, *Wind Energy Science*, 4, 397–406, 2019). The paper by Bortolotti at al. focused on a bottom-fixed turbine and adopted a different approach to evaluate the propagation of the uncertainties. Although these represent two strong differences, I encourage the Authors to discuss both similarities and differences in the introduction.

Minor comments

1. Fig. 3: Consider enlarging and improving the figure, especially given the two-column layout of the journal, which may reduce its size. Mooring lines are barely visible and power cables could be drawn in a different color.
2. Line 85: The authors correctly state that the controller structure and gains are perfectly known, making it unnecessary to include control parameters in the uncertainty analyses. However, measurements (used by controllers) could be affected by systematic/deterministic errors that are not known a priori. Additionally, actuator bandwidth (and dynamics) could also be uncertain. This aspect should be mentioned, as they potentially affect the turbine response especially in faulty of gusty conditions.
3. Lines 146-152: the discussion is correct, but it is worth noting that if the range of each parameter is chosen based on its physical variability (or its standard deviation) then, the sensitivity may provide an intuitive piece of information. For example, for a single parameter the absolute value of the product between the sensitivity and the parameter standard deviation represents a good estimate of the output standard deviation. This addresses the issue of comparing sensitivities, mentioned by the authors.
4. Eq. 3: the meanings of σ and μ are missing and should be easily introduced in the sentence immediately preceding the equation.

5. Tab. 4: some parameters, such as the lift and drag coefficient at blade tip, depend on the angle of attack. Please, provide a better explanation. Line 206 provides a partial clarification.
6. Lines 222-223: the inclusion of the unsteady aerodynamics parameters in the analysis is appreciated. It should also be noted that these parameters may influence not only the transient behavior but also the steady response under very large yaw misalignment angles (e.g. following the end of the ECD gust).
7. Fig. 20 and 21: it seems that the Gulf of Maine case appears to exhibit a generally lower probability of exceedance compared to Humboldt Bay. Is there a physical reason for this difference?