

Response to Comments

Manuscript: WES-2024-123

Title: Gulf of Mexico Hurricane Hazard Assessment for Offshore Wind Energy Sites

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The authors would like to thank reviewers and the community for the comments on this manuscript submission. Please see responses to all comments below, listed by reviewer and comment number.

RC1, Comment 1: Storms in the last decade exceeding IEC reference winds have been provided to back up "significant potential to exceed design limits" statement.

RC1, Comment 2: References added.

RC1, Comment 3: Added a phrase to indicate changes in surface roughness and turbulence characteristics occur with increasing wind speed.

RC1, Comment 4: Source has been added to the figure title. A brief summary of how the profiles were derived was also added.

RC1, Comment 5: A new sentence has been added to point out the behaviour of the sea-surface drag coefficient vs wind speed.

RC1, Comment 6: X-axis values have been labeled.

RC1, Comment 7: Figures have been updated to improve readability.

RC1, Comment 8: Text has been added to address limitations of the probabilistic modeling approach.

RC1, Comment 9: Text has been added to explain why a simulation period of 500,000-years was employed.

RC2, Comment 1: The introduction has been expanded to highlight the effects of hurricanes on wind turbines. Examples of wind turbines affected by strong hurricane winds have been provided.

RC2, Comment 2: Definition of IEC acronym has been moved to section 1 and removed from section 2.

RC2, Comment 3: Added source reference to figure.

RC2, Comment 4: This section has been rewritten for clarity and to better explain the statement of "obtaining good results for wrong reasons".

RC2, Comment 5: Definition of RMW acronym has been moved here (first reference in the paper) and removed from the later section in which it was defined.

RC2, Comment 6: Agreed, title section has been removed.

RC2, Comment 7: Both the name of the island and its coordinates have been provided.

RC2, Comment 8: The column heading for the first column of Table 1 has been updated to note that the wind speed is a mean.

RC2, Comment 9: Added mean wind speed to figure title. The averaging time is likely about 5-minutes to 1-hour. We have assumed an averaging time of 10-minutes as indicated in the text since it is the average of six 60-second averages.

RC2, Comment 10: The gust duration is arbitrary. However, we have added 5-seconds since the discussion applies to C-MANs and buoys.

RC2, Comment 11: Figures have been updated to improve readability.

RC2, Comment 12: Equation functions have been corrected to non-italicized text.

RC2, Comment 13: Other figures have been updated as needed throughout.

RC2, Comment 14: Sections 3.2 and 3.3 have been combined.

RC2, Comment 15: Labels have been added to the figure color bars.

RC2, Comment 16: Both discussions are needed in the single paper to readily enable the design wind speeds presented herein to be relatable to Saffir Simpson wind speeds and to justify the variation of the mean wind speed with height.

RC2, Comment 17: This manuscript focuses solely on the hurricane hazard and does not provide analysis or guidance on the vulnerability (and thus risk) of wind turbines. The title of the submission has been updated to indicate such.

RC2, Comment 18: The focus of this paper is on the hurricane hazard and providing developers and decision makers with a common framework for communicating that hazard between the Saffir Simpson scale and IEC design criteria.

RC2, Comment 19: Updated to APA for all.

CC1, Comment 1: A map of the 500-year return period 10-minute mean wind speed has been added to the manuscript.