Wind Energ. Sci. Discuss., referee comment RC2
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Encouraging initial steps towards the generalization of the U50 spectral correction method for its use in cyclonic offshore wind climates.

Javier Sanz Rodrigo (Referee)

Referee comment on "Adjusted spectral correction method for calculating extreme winds in tropical-cyclone-affected water areas" by Xiaoli Guo Larsén and Søren Ott, Wind Energ. Sci. Discuss., https://doi.org/10.5194/wes-2022-64-RC2, 2022

Interesting method extending to tropical cyclone areas the use of the spectral correction method for mesoscale or reanalysis data. The study is limited to data from a rather old study from Ott (2005) which highlights the lack of benchmark data in these conditions. This motivates the authors to stay on the conservative side and adopt a simple correction factor (n) on the previous method for good reasons. The approach is robust and practical. The only thing I'm missing is **some quantification of uncertainty**, at least with regards to the spatial variability which is something that Ott data can provide. This would give more confidence when you extrapolate to the other large areas without validation data.

Indeed, when deriving the relationships between r, n and u (eqs. 5 and 6), you mention that this could be site dependent but you end up using the location with the stronger winds to be on the conservative side. However, when you extrapolate to other cyclone areas you end up applying the same relationship at every grid point over very large areas so we may anticipate large errors normally biased to overprediction of the extreme winds. It would be interesting to apply the regression technique locally to each of the Ott (2005) grid points to compare with your results using eqs 5 and 6. This way you can provide some quantification of the potential bias/uncertainty introduced by your conservative approach at least for the validation area.

Given the high uncertainty of the **vertical extrapolation** methods why not sticking to the more conservative and simpler Charnock method, which has confluence with Andreas equation up to 40 m/s? In fact, seeing the parabolic dependency of n with wind speed in Figure 4, one could argue that the n coefficient may be a **generalization of the Charnock constant for cyclone wind events**. Maybe you can try to relate the two?

The paper has value as it is so it could be published after some editing but it would be more solid if these suggestions are addressed.

The **new recipe** is described in the paragraph of p5.128. I think it would be easier to follow if you use a numbered list with all the steps from input to output.

Some editorial corrections/suggestions:

P1.21: particularly for over water > particularly over water

P2.36: for the assessing > for assessing

P2.37: are forecast > are forecasts

P2.38: improvement > improvements

P2.44: are of spatial > come with a spatial

P2.45: has used > have used; extreme wind > extreme winds; data validation > validation

P2.48: suffers from the smoothing effect…> suffer from the smoothing effect, introduced by a coarse grid that facilitates the convergence of the model.

P2.53: wind variability to… > wind variability from modeled time series through a spectral model. Thus, the corrected time series will follow the power spectrum down to the temporal resolution of the measurements.

P2.56: create extreme wind > predict extreme winds

P3.59: same way as for the mid-latitude > same way for mid-latitude

P3.62: the strenth of the methods from Ott (2005) and Larsen et al (2012).

P3.75: which were from the best > which is derived from best track data, and Holland model, for an area over…

P3.76: in contour lines > as contour lines

P3.80: and, accordingly, translates into low spectral energy at high frequencies when compared to measurements.

P3.85: zeroth- and second-order

P4.110: from Gage and Nastrom (1986) for the same area? (please specify)

P4.118: WRF-SWAN > have you coupled the SWAN model? This is not described in the Annex

P4.119: the higher resolution of the WRF model simulation, at 2 km, produced a spatial wind variability that is 3 to 5 times larger than that of the CFSv2 data at 25 km resolution.

P5.128: To define n in Eq.4, firstly, annual wind maxima u_max are extracted for a period of 32 years from 1979 to 2010 from CFSR-1 data. Then, the 50-year…

P6.Fig2: calculated, in the S-N and W-E directions, from the WRF

P6.131: to train the CFSR-1 data > to derive a regression model for the CFSR-1 data. (avoid machine learning jargon)

P6.133: in grey dots, covering a range from 1 to 2.6.

P7.Eq(6): replace u by u_max.

P7.149: merges > coincides

P7.154: a couple of hundreds of meters. We > 200 m. Therefore, we

P7.157: to Sonde … conditions, as shown in e.g. Powell et al. (2003) and Giammanco et al. (2013)

P8.Fig4: (a) Distribution… with respect to U_50ott; (b) Derived…

P9.167: algorithm

P9.181: the difference > a difference

P10:190: move the link to the references section

P10.193: move the zenodo link to the references section using doi citation (thanks for sharing!)

P10.203: Imberger and Larsén (2022) show

P10.206: This suggest an important source of uncertainty associated to the input reanalysis data.

P10.214: on only one parameter, the wind speed, allows to use the the SC-TC method in areas of strong winds that are not necessarily affected by tropical cyclones. (Is this what you mean?)

P12.234: two purposes for using

P12.240: from the surface to a pressure level

P12.243: as initial and boundary conditions for WRF.

P12.244: OISST data were used to define the sea surface temperature conditions.

P12.244: started… and ended at

P12.245: The model outputs are recorded every 10 min.