Review of WES-2022-70

Title Bayesian method for estimating Weibull parameters for wind resource assessment in the Equatorial region: A comparison between two-parameter and three-parameter Weibull distributions

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Iteration Revised submission

Specific comments

- Equation 4 is now restricted to positive wind speeds, as it should. However, the integral of this will be less than one when the offshore parameter is negative, so it is not a proper probability distribution. You can repair this by adding a finite probability of calm wind speed, see below.
- I am happy about the changes to equation 21-25 and table 8. However, it would be better to substitute the term 'available power' by 'wind power density', which is standard in wind energy.
- Figures 1-3 shows the variations of repeated Bayesian estimators. This information is necessary for the reader.
- Figures 5-11 compares fitted distributions with bin statistics of wind speeds at six met masts. It seems unnecessary to include this many similar plots, especially since tables 4 and 5 summarises key statistics.
- It would be relevant to compare the times of computation by the Maximum likelihood method and the Bayesian fitting by JAGS. The results are very similar, but what about the efficiency?

Technical comments

- The manuscript should explain why some numbers in tables 4, 5 and 7 are printed with bold.

Note about Equation 4

For **positive offset parameter** ($\theta \geq 0$) we can use the standard three-parameter Weibull distribution.

$$p(u\,|k, A, \theta\,) = \begin{cases} \frac{k}{A}\left(\frac{u-\theta}{A}\right)^{k-1} \exp\left\{-\left(\frac{u-\theta}{A}\right)^{k}\right\} & \text{for } u \geq \theta \\ 0 & \text{for } u < \theta \end{cases}$$

For **negative offset parameter** ($\theta < 0$) we have a problem, since then the integral of the standard probability distribution over non-negative wind speeds becomes less than one. Instead, you could combine the truncated version the 3-parameter Weibull distribution supporting positive wind speeds only with a finite probability for calm situations $u = 0$, e.g. written like

$$p(u\,|k, A, \theta, p_{calm}\,) = \begin{cases} p_{calm} \cdot \delta(u) + (1 - p_{calm})\, \frac{k}{A}\left(\frac{u-\theta}{A}\right)^{k-1} \frac{\exp\left\{-\left(\frac{u-\theta}{A}\right)^{k}\right\}}{\exp\left\{-\left(\frac{-\theta}{A}\right)^{k}\right\}} & \text{for } u \geq 0 \\ 0 & \text{for } u < 0 \end{cases}$$

using Kronecker's delta function $\delta(u)$. You could simplify this mixed probability distribution to an expression with three parameters, if require postulate the probability of calm situations to be equal to the clipped-off part of the Weibull distribution. This would change the expression to

$$p(u\,|k, A, \theta\,) = \begin{cases} p_{calm} \cdot \delta(u) + \frac{k}{A}\left(\frac{u-\theta}{A}\right)^{k-1} \exp\left\{-\left(\frac{u-\theta}{A}\right)^{k}\right\} & \text{for } u \geq 0 \\ 0 & \text{for } u < 0 \end{cases}$$

with the somewhat arbitrary **constraint**

$$p_{calm} \stackrel{\text{def}}{=} 1 - \exp\left\{-\left(\frac{-\theta}{A}\right)^{k}\right\}$$

Without this constraint, the probability model would have four parameters – k, A, θ and p_{calm}.