

Wind Energ. Sci. Discuss., referee comment RC1
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Comment on wes-2021-158

Andrea Vignaroli (Referee)

Referee comment on "The wide range of factors contributing to wind resource assessment accuracy in complex terrain" by Sarah Barber et al., Wind Energ. Sci. Discuss.,
<https://doi.org/10.5194/wes-2021-158-RC1>, 2022

General comments

Dear Barber et al., first of all I'd like to say that I completely agree with the underlying motivation for this work. It is important to focus on how inaccuracies in wind speed predictions translate in energy and show that it's a complex matter with a lot of variables (like wind direction, wind speed distribution, shear...) impacting the final results. It is very easy to be "right for the wrong reason". This is why so many studies focus on wind speed in one direction. The aim of those studies is to improve flow models and the only thing the scientific community can do is to design and conduct experiments while minimizing the amount of variables that could make the interpretation of results impossible.

Specific comments

As I said, the motivation and scientific question behind this work is very relevant. However I notice some decisions in your implementations which confuse me a bit. I don't understand if you decided to obtain results by including some of the uncertainty components of the AEP assessment process on purpose or you tried to avoid them. For example, you decided to base your results and comparison on long term corrected wind speed data being hopefully aware of increased uncertainty that you take with you during

the AEP comparisons. How do you know that certain differences in AEP are not due to a long term correction far from perfect? Ok, but let's say that we want to include long term correction uncertainty on purpose to see how it translates in AEP, why did you decide to avoid vertical extrapolation from the measurement height to the hub height. Uncertainty of vertical extrapolation is another important source of uncertainty in the AEP assessment process. I would have avoided or included both.

I think that using wind speeds measured by nacelle anemometers for the purpose of the article is quite a stretch. It would require quite a lot of analysis (flow inclination, rotor speed, pitch settings) in order to make the statement "but the ration will still be valid". I would have not used site 4.

I am a bit puzzled how you can obtain a non zero error when you compare the wind speed at the calibration location when you consider one height only. (figure 2)

My last specific comment is that you used given power curves for different wind turbine models for different sites. I assume that each of them are different with respect to generator/rotor area ratio and they will have different rated wind speed. Would it have been better to use only one for all sites so that the results are not affected by the power curve steepness? Given power curves are also tricky because they almost always need site specific adjustment. One way to make the study power curve independent would have been to use WPD (wind power density) as a metric instead of AEP.

Technical corrections

Line 51: It would be nice to mention that flow calculations in WindPro can be based on WAsP CFD (EllipSys3D) or WAsP linearized flow model (IBZ). I assume you used the IBZ

model.

Line 56: WindSim can simulate more directions . But 12 were used for this analysis.

Line 107: I am missing some details of the MCP method used (linear least square, matrix, etc) and some metric for the reader to evaluate the accuracy of such a step (maybe a table with R^2, measured and long term corrected mean wind speed?).

Line 159 and Table 1: i don't think you explain the meaning of the abbreviation HSE or OST before using them

Line 260: Did you apply RIX correction? It's quite known that WAsP IBZ results need RIX correction for complex sites which will make a difference in terms of accuracy.