

Interactive comment on “A new method for the pragmatic choice of wind models for Wind Resource Assessment in complex terrain” by Sarah Barber et al.

Anonymous Referee #2

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This manuscript describes a new method to support the choice of wind models for wind resource assessment. Several parameters of model skill score and cost are taken into account. Although the method is an interesting new approach, it definitely needs further testing and evaluation. At this stage, the new method has only been tested for the Bolund Hill experiment for a single case study; as a test quantity the wind velocity is chosen. I think that the new approach needs further evaluation, especially also for the other relevant variables in wind resource assessment.

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General comments

- 1. Skill weighting.** The authors take many factors into account for the weightings assigned to the skill score. However, it is not entirely clear from the text how the weights of the individual contributions were determined. The aerodynamic solver was chosen to be the most important factor. Why? Is this general knowledge (are references of publications available)?
Were these factors chosen with a specific focus on the well-known Bolund Hill experiment? However, if this skill score framework is meant to be applied to other test sites or case studies, sparse input data (e.g., insufficient terrain data, coarse atmospheric profiles, or low-quality observations) pose a challenge to a model, even before the aerodynamic solver can have any effect on the model skill. I wonder why the input data quality is given so little weighting.
- 2. Choice of the wind velocity.** The authors mention the four key values for wind energy assesment (wind velocity, wind direction, turbulence intensity, and the shear factor), but only show the results for the wind velocity in the rest of the manuscript. Since the Bolund Hill experiment has a rich observational dataset, I am wondering why the authors omit the other three quantities? I guess that at least the wind direction, but also the turbulence intensity can be extracted from the observations. The manuscript's title includes "complex terrain", and since the turbulence structure over such a surface is known to be complex, an assesment of the turbulence and the shear factor with the new skill score framework would definitely enrich the manuscript.
- 3. Generalization.** The authors prove a new and interesting cost versus skill estimation model. However, after reading the manuscript, the question would be how easy it is applicable for other test sites or situations. The authors mention that testing for other wind directions and other atmospheric stabilities has to be carried out and will be underway. However, the applicability besides the Bolund

Hill test site is still somewhat limited and definitely needs further testing. For this manuscript, it might be sufficient to add the other three relevant quantities (wind direction, turbulence intensity, and the shear factor) to gain more insight on the new method, but the authors need to stress in their conclusions more precisely that this is novel, preliminary work which still needs (skill parameter) adjustment.

Specific comments

Section 3: The authors describe every chosen model, but it would be useful to summarize the model's chosen settings (such as grid spacing, aerodynamic solver, turbulence treatment,...) in a accompanying table. Furthermore, references to the model code and descriptions are missing for some models (see technical corrections below).

Technical corrections

- page 5, line 7 (and follow-up occasions): Put the two references in a shared bracket
- page 7, line 10: What does the abbreviation COM stand for? Conservation of Mass?
- page 7-8: Can you provide a published reference to the *ZephyCFD* modelling chain?
- page 8: Can you provide a published reference to the *ANSYS Fluent* tool?
- page 8: Can you provide a published reference to the *Palabos* code?

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- page 13, line 7: Repetition: “[...] however the four key values for wind energy wind modelling applications have been identified as [...]”
- General remark to the references: for some journals, the authors use the abbreviations, for some they don't, and at some references the dois are missing. Make sure that the references follow WES' guidelines.
- page 23, line 29: Typo in the link. It should say <https://wemep.readthedocs.io/en/latest/mep/mep.html>
- page 23, line 30: You might add the doi to this reference.

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