Wind Energ. Sci. Discuss.,
https://doi.org/10.5194/wes-2020-2-RC1, 2020


eawe european academy of wind energy
Open Access WIND ENERGY SCIENCE DISCUSSIONS

# *Interactive comment on* "The importance of round-robin validation when assessing machine-learning-based vertical extrapolation of wind speeds" *by* Nicola Bodini and Mike Optis

**Dariush Faghani (Referee)**

dfaghani@pfdrive.com

Received and published: 3 February 2020

The paper presents a robust measurement campaign and analysis results. The thoroughness of the various analyses is commendable. The sensitivity analysis at the end of the paper is particularly insightful as it helps shed light on the reasons for the performance of the machine-learning (ML) approach used by the authors. Indeed, the risk when using ML is to blindly depend on a black box which may, or may not, provide reliable output. especially for new situations for which no data was included in the training set.

The following questions and comments are provided in the hope of enhancing the



readability and overall reach of the paper:

0. One could argue that power law and log law are also machine learning approaches - even though they are simple regressions!

1. In the intro, low-level jets (LLJ) are mentioned. Provide some more background as they are not ubiquitously present, nor relevant. Or specify that " in some regions ...".

2. Provide a better presentation of the measurement campaign - notably, do not forget to add the missing paragraph which was posted: - Site description - Typical wind regime description - Lidar precision/accuracy/validation/testing discussion as the wind industry is still considering scanning lidars with a lot of caution. Or, provide discussion that high lidar accuracy is irrelevant in this context because ... - Provide an idea of the total number of data samples used. - Any data quality applied?

3. The wind industry also uses by-sector and/or by-hour-of-day vertical extrapolation. These are targeting a couple of shortcomings the authors note, namely: stability and terrain complexity. It would be useful to add this in the discussion - or even better, in the analysis.

4. My understanding is that the authors optimized the hyper-parameters by making use of available target-height measurements. So what is the authors' suggestion to fine-tune these parameters in the absence of target-height measurements? Could we contemplate a database of parameters for specific site conditions? Other? More generally, how their round-robin results could be leveraged, used on site?

5. Lines 192 and following: any particular reason comparison results for the specific use case under discussion were not more thoroughly reported?

6. Personally, I find the last sections of the paper to be the most valuable ones! Without suggesting to re-write the whole paper, I submit the following ideas for author's consideration: - Put the emphasis on the fact that more physical parameters where included in a data-driven model, and their impact on model performance was investigated and

fully understood (cf. sensitivities). - The model seems to out-perform standard models, even under round-robin conditions (which is indeed a better way of assessing the model). - The model could be used for a given site as follows (might need more thought to be put here ...)

Thank you for having submitted a paper which makes a balanced and useful use of ML!

---

Interactive comment on Wind Energ. Sci. Discuss., https://doi.org/10.5194/wes-2020-2, 2020.