

Wind Energ. Sci. Discuss., referee comment RC1
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Comment on wes-2021-37

Anonymous Referee #1

Referee comment on "FAST.Farm load validation for single wake situations at alpha ventus" by Matthias Kretschmer et al., Wind Energ. Sci. Discuss.,
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Comment nr 1:

The use of TurbSim to model the input wind field based on measurements for 1-to-1 simulations is presented in section 2.4, and discussed in section 5. While high-quality modeling and synchronization with measurements is ensured for mean wind speed and power spectral density, coherence has received less attention, with a number of caveats :

- TurbSim uses Taylor's frozen wake assumption which is not valid for this turbine configuration (the input wind field on AV5 is not simply the field on AV4 with a delay, see for instance Viguera-Rodriguez et al., 2012 for a farm-wide coherence model)
- Coherence is modeled using a statistical model, not the actual 10-min observations. The wind field is not a reconstruction around the observations that would be consistent with the 1-to-1 simulation approach.
- The way 2.4 is written lets the reader believe that u, v, w components are correlated. In reality, only the TIs are correlated, not the realization. The coupling between u and w coherence (see for instance Cheynet et al, 2018 for FINO1 data) is to my knowledge not implemented in TurbSim.

It might be argued that the impact of those caveats is low as the focus is not on time-domain nor cross-spectral comparison, and when compared to the overall scatter. Still this should be made clear.

Comment nr 2:

In section 3.2, given the scatter on Fig. 3, the only valid conclusion may be that the turbulence intensity cannot be modeled using only mean speed, direction and stability class as parameters. Suggestions would be welcome.

Comment nr 3:

In section 4.4, the relationship between a skewed wake and an increase in 2P excitation combined with a decrease in 1P is not trivial. The given reference does not appear to provide more information. A better explanation would be welcome.