Theuer et al., 2020 – Review

General comments

The paper represents a sound scientific manuscript. The methodology is explained with a great deal of details and state-of-the-art LiDAR processing techniques are used. The specific use of relevant bibliographic sources is also commendable. Probably some discussions about the data availability could have been shortened for the sake of brevity. The only major issue that needs to be addressed before the publication in my opinion is the presence of wake affecting the turbines under investigation for wind direction close to 350° and 130°.

Specific comments

Lines 27-28: the statement "ARIMA models additionally consider past forecasting errors" is questionable. The AM part of the ARMA model already considers the error. The ARIMA is a generalization of an ARMA which has on the right-hand side of the model a derivative of the variable. Also, in the reference (Kavasseri and Seetharaman, 2009) I could not find such claim.

Line 68: it would be useful a summary of the content of each section at the end of the introduction.

Line 121: the original VAD technique (Browning and Wexler 1968) was conceived for full 360 PPI scans. Is there any reference for the estimation of the loss of accuracy due to the utilization of partial sector of 150°?

Line 148: could the author add a comment or a reference clarifying why the backward propagation needs to be avoided?

Line 151: it is correctly stated that the difference between the synchronization time and the forecast time $(t_{n+1} - T_r + k)$ has to be minimized in order to have the observation as close as possible to the prediction. This "optimization" is however done with the constraint that no backward propagation is used in the reconstruction of the synchronized velocity field. Is this constraint applied to the whole domain? Because from Figure 3d it seems like just a small portion of the actual field is then used. It would be useful to further clarify the choice of the synchronization time.

Eq 8: this expression is not present in Dyer 1974. Please find another refence and also address the applicability of such relationship in the offshore context.

Lines 240-241: the considered wind sector (130°-350°) include wind direction where wake affect the turbines which would invalidate the use of the far wind field for power prediction. Actually, the *mae* is higher for wind directions close to the boundaries of the interval (Fig. 9b), i.e. where wake effects are expected, and for stable ABL, when wake diffusion is hampered.

Technical comments

Figure 4: k is not defined before the introduction of this figure. Add explanation in caption.

Figure 9: *mae* is not defined before the introduction of this figure. Add explanation in caption.

Based on my experience with WindCube 200S, your LiDAR seems to have a quite long rest time (it should be negligible). You may want to check your set up or contact Leosphere.