

Letter to Editor

Dear Editor:

Thank you very much for the opportunity to address the comments from the reviewers to our manuscript. The reviewers' comments significantly improved the quality of our document. The responses to their comments have been submitted separated to each reviewer. We also modified/add some sentences in the Results and Concluding remarks sections to improve the understanding of the paper. The implemented changes are listed below in blue and highlighted in the marked-up manuscript. Page and lines refer to the original document.

Sincerely,

The authors

Page 8. Line 6

We replaced: "composed by" with "based on".

Page 14. Line 30

After "to the previous observations" we included:

The dependency of the forecasting errors on the mean wind speed of the downstream observation for all advection models is shown in Fig. 12. From there it can be inferred that the orography correction is required, since the AHR model overestimates wind speeds in the range of 10 to 17 m/s.

We later removed the sentence in line 3 page 15: "The dependency of the forecasting errors on the mean wind speed..."

Page 16 Line 3

We replaced "This is because the roughness change correction is estimated" with "This is because both the roughness change correction and the orography corrections are estimated"

Page 16 Line 6.

The paragraph "When looking at the forecast" has been removed from this section and placed after the analysis of the results for stable periods.

Page 18 Line 1.

We included the following sentence after "conditions"

Although we include the shear in our advection models we are not considering the atmospheric stability.

Page 18 Line 2.

After this paragraph we included the paragraph from Page 16 Line 6, which has also been modified for clarification.

When looking at the forecast of wind speeds during period 7 (see Fig. 14), we can see that the advection models are able to forecast the phase of the events, but the forecast does not contain as many fluctuations as the observed wind speed at the downstream position. To analyse if this is due to the model or to the nature of the observations, the dependency of the level of fluctuations on the horizontal reconstructed

wind speeds with the distance of the measurements is investigated. In Fig. 15, the ensemble average of the standard deviation of U , computed for every hour and elevation angle during periods where all measurements are available, is displayed. The standard deviation observed by the lidar is higher the closer to the coast. We attribute this to a combination of two sources: site-specific conditions and measurement artifacts. In the first source we consider the higher roughness length close to the coast, compared to positions further offshore, and the topographic effects. In the second source we include the different height in the observations for the different ranges and the different arc length used for the reconstruction of horizontal wind speeds from the lidar. Since the arc length used for the measurement increases with the distance, the reconstruction of wind speeds acts as a low-pass filter for further distances. This filtering effect deteriorates the prediction of the magnitude of the events, and consequently influences the maximum absolute error.

Page 19 Line 5.

We modified:

“This is partly due to the presence of the coast, the wind speed reconstruction using lidar measurements and the measurement itself, acting as a low-pass filter at further distances” for “This is partly due to the presence of the coast increasing the turbulence level as the flow approaches and the low-pass filtering inherent in the wind speed reconstruction from the lidar measurements”.

Page 19 Line 8

We modified:

“This is because of the increasing height in the observations at further positions, the differences in the dual-setup and PPI observations and the assumption of neutral stability during stable conditions, due to a lack of a precise estimate of the stability offshore ” for “This is a reflection of the increasing difficulty of predicting winds as i) the observations height increase at further positions ii) the differences in the dual-setup and PPI observations and iii) the assumption of neutral stability during stable conditions, due to a lack of a precise estimate of the offshore stability”.

Page 19 Line 20

We included:

It is reasonable to expect that the forecasting performance of such a system would be better than the best results we have achieved since the many corrections might not have benefited the forecasting accuracy.