

Revisions for

Evaluating the use of Aeolus satellite observations in the regional NWP model Harmonie-Arome

Minor revisions to the manuscript have been performed, increasing its scientific value . A few points for further consideration remain in my view.

Thank you for the comments. In particular, the last comment contributed to the improvement of the manuscript and has hopefully taught its main author to stop confusing speed with velocity, once and for all. The manuscript has been revised to address the issues raised here.

Best regards,
the authors

1) I'd be careful with statements about analysis impact and DFS, as these are related to error covariance settings and not one to one related to the additional information content brought by Aeolus. In particular, it would be useful to more explicitly stress that a large analysis impact is not necessarily a good thing, as it may lead to overfitting and detrimental effects in the subsequent forecast. Please check.

We have modified this section further to better reflect this issue.

2) In terms of data assimilation, global NWP is followed to a large extent, while particular considerations for mesoscale wind data assimilation in terms of spatial characteristics and sampling, which are very different for the Mie and Rayleigh channel, are not highlighted. For example, a recent publication from the HARMONIE community could be useful to discuss in this respect, i.e., <https://doi.org/10.1002/qj.3979> and references therein.

We have added text, both to the main part of the paper and to the conclusions, concerning the use of super-modding.

3) In the introduction, wind speed is often highlighted, while the WMO OSCAR wind requirement is for the 2D horizontal wind component of the wind vector. This is much in line with the initialization of 3D turbulence characteristics in the atmosphere on the mesoscale, where the wind vector is relevant and its variability well expressed by its vector components, rather than wind speed and direction. It would be useful to rephrase the introduction with this requirement in mind in my view and avoid the abundant use of "wind speed". Furthermore, Aeolus measures one of the vector components and it would be useful to evaluate its impact in terms of vector components. I agree with reviewer 2 that speed and direction verification are less meaningful. If the capability is not present to track and verify vector component changes in the forecasts, it may be worthwhile to recommend this as a useful capability for the future in the manuscript.

There has been a misunderstanding from my part here. I misremembered and assumed that "wind speed" implied both the strength of the wind and its direction, rather than only the strength of the wind. I confused speed with velocity, velocity is the one that describes the vector wind and not the other way around! Wind speed used in the incorrect sense has been removed from the manuscript. Why I managed to use the correct terminology while writing the "impact on forecasts" section, but not in the rest of the manuscript is beyond my understanding.