

Atmos. Meas. Tech. Discuss., referee comment RC1
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Comment on amt-2022-218

Anonymous Referee #1

Referee comment on "High-resolution 3D winds derived from a modified WISSDOM synthesis scheme using multiple Doppler lidars and observations" by Chia-Lun Tsai et al., Atmos. Meas. Tech. Discuss., <https://doi.org/10.5194/amt-2022-218-RC1>, 2022

Review "High Resolution 3D Winds Derived from a Newly Developed WISSDOM Synthesis Scheme using Multiple Doppler Lidars and Observations"

Summary:

The study introduces a new version of the WISSDOM algorithm. In comparison to the previous version, multiple wind datasets can be incorporated as independent input sources. In addition, here, Doppler Lidar data is used instead of Doppler radar data. This allows the algorithm to operate in clear-sky conditions. With a case study, the WISSDOM results are compared to wind measurements and sensitivity tests are performed on key features of the algorithm.

General remarks:

The overall goal of the study could be presented more clearly. The authors present a new version of the WISSDOM algorithm; however do not compare it to the performance of the old version. There is also very little discussion about the change from Doppler radar to Doppler LIDAR data (issues, benefits, etc.). Some aspects of the algorithm could be explained more clearly – the goal should be that the algorithm can be reproduced independently with the information given.

The validation of the control run is performed with sounding data and LIDAR quasi-vertical profiles. As both sounding data and LIDAR data are used in WISSDOM, this is not an independent verification and rather reflects on the importance of these data sources in combination with the others.

The sensitivity tests do not present a clear conclusion or interpretation of the results. They are only compared to the control run and not to independent data sources; to me it is not clear how this results in a validation of the parameter choices in the control run.

The algorithm looks like an elegant solution to merging multiple data sources into one cohesive 3-D wind dataset. However, the verification and sensitivity tests are not quite convincing yet. The discussion needs a clearer interpretation of the results and it would be nice to compare the control run to the initial version of WISSDOM.

Detailed remarks:

A line-by-line review is in the attached, annotated PDF.

Please also note the supplement to this comment:

<https://amt.copernicus.org/preprints/amt-2022-218/amt-2022-218-RC1-supplement.pdf>