

Geosci. Model Dev. Discuss., referee comment RC1
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Comment on gmd-2021-128

Anonymous Referee #1

Referee comment on "Verification of boundary layer wind patterns in COSMO-REA2 using clear-air radar echoes" by Sebastian Buschow and Petra Friederichs, Geosci. Model Dev. Discuss., <https://doi.org/10.5194/gmd-2021-128-RC1>, 2021

General comment

This study attempts to validate the high resolution re-analysis dataset by using clear air Radar echoes in Germany. The results show some consistencies in the diurnal-cycle between the two datasets and the usefulness of the clear air echoes. The methodologies are reasonable. However, as described in specific comments, the motivation to examine the divergence of horizontal winds is unclear. This manuscript may be acceptable after a considerable revision.

Specific comments

The atmosphere at the height of 10 m is generally in the surface layer. It sounds strange that divergence in the horizontal winds in the surface layer are used to characterize the larger scale structures that span the entire boundary layer.

Authors should reconsider a variable that physically relates to the organized structures in the boundary layer, while variables archived in the reanalysis dataset may be limited. If authors wish to use the present variable, it may be better to examine surface observations regarding the variations in the divergence in the real atmosphere. Otherwise, investigating the divergence would illuminate an unrealistic aspect of the surface layer in the simulation.

As mentioned above, the structures extracted from the reanalysis are more or less artificial. According to Table 2, validations by the clear Radar echos are possible only for the summer. The results shown in Section 5.1 should limit those that can be validated in Section 5.2.

The image of fig. 4 does not appear in the manuscript (only its caption appears). I could not evaluate the discussion associated with the figure.

In the visual appearances as Figs. 2 and 7, the horizontal scales of organized structures are different between the reanalysis and radar images. Figure 8 shows that the scale in the radar images is even larger.

It would be better to add a clear explanation for this very counter intuitive result.

-Line 133

Is the lack of insects at the top of the boundary layer only due to the temperature?

Technical corrections

Many acronyms are used without definitions. Please check throughout.

-Line 90:

It should be described as $\lambda \sim 2d$

-Figure 2

Units and explanations of shading in panel a are missing.

-Line 159:

"+10dB" may be a mistake for "-10dB".

-Figure 6:

Box plots and definitions of "rx" and "reference" are not clearly explained.

-Line 268:

I'm not sure the use of "see" is grammatically correct.