

Mesoscale nesting interface of the PALM model system 6.0 — Author response

We thank both referees for their review of our revised manuscript. While both referees accept the manuscript for publication, referee 3 recommends a few minor technical changes before publication. We address those below, noting the referee's comments in *italics* and our responses in regular type.

Finally, we want to extend our thanks once more to all referees for their thorough analysis of our manuscript and their valuable suggestions to improve it.

Best regards,

Eckhard Kadasch, on behalf of all coauthors

Response to Referee 3

1) Page 8, lines 3-4: Please state that turbulence in COSMO is fully parametrized at the current grid spacing ($\Delta x = 2.8$ km).

Since COSMO's horizontal grid spacing depends on the particular configuration, we added a mention of "horizontal grid spacings of several kilometers".

2) Page 24, line 4: The geographical coordinates provided lead to Berlin's city centre (when entering them in Google Maps), but it is stated that the domain lies east of the city. It would, however, make sense to add the exact coordinates in the manuscript to match the description of the domain (grassland land surface type).

Thanks for pointing this out. We have corrected the values in the text. In earlier versions of our setup, we have used these coordinates, but later on we decided to move the model domain towards the east where our assumed homogeneous grassland fits much better with the true vegetation. The origin of the PALM domain used in our benchmark simulation is located at 52.5°N and 13.7°E which, indeed, is located east of Berlin.

3) Page 24, lines 13-14: It should be clarified that the convective rolls stem from the convection grey-zone, and not from the grey zone of turbulence (Wyngaard 2004).

We clarified this in the text.

4) Figure 11: Please adjust the colorbar of the contourlevels to the same range of 292 K to 296 K. This makes the figures more comparable and illustrates the diurnal cycle of the ABL in a better way.

We agree with the referee that a unified colorbar would illustrate the diurnal cycle of the ABL better. However, our main goal with this particular figure was to highlight the horizontal heterogeneity of the ABL due to mesoscale forcing. With a unified colorbar for all three panels, this information would partly get lost (as we show in the attached panel plot with a unified colorbar for 10 UTC, 13 UTC and 16 UTC). For this reason, we would like to keep the plot with separate colorbars. To avoid misinterpretations, we now explicitly mention and explain the reason for the different temperature ranges in the figure caption in our revised manuscript.

5) Figures 12 and 18: The colorbars in these figures are somewhat misleading, because zero is not in the middle. Please readjust them.

While the zero mark was in the middle, the positive and negative axes in these figures did not share the same scale. That is, reds and blues of the same intensity represented different velocity magnitudes. In the revised figures, we adjusted the colorbars such that this is no longer the case and similar shadings in red and blue represent the same magnitude. Since updrafts in our plots are sharper and stronger than downdrafts, we extended the colorbar on the positive side to darker shadings.