

Author's response to the reviews

We would like to thank the referee to again review our manuscript.

The comments, given by the referee, are:

I appreciate the substantial revision of the manuscript. The more elaborate comparison and giving up the double-blind strategy makes the manuscript much better in my opinion.

Concerning my comment 2 of the previous review round, the rationale of the scaling should be better explained. First of all, the Navier-Stokes equations are non-linear, and in theory the flow is not scale independent. How can you be sure that PALM of the full scale and operated on the wind tunnel scale give basically identical results. Please clarify this.

There are many language mistakes, in particular, in the new text parts. It is certainly not the task of the reviewer to make up for this, in particular when I have the impression, that the mistakes could have been eliminated if all co-authors read the new manuscript version.

As mentioned in our answer during the previous review round, PALM's main purpose is to simulate the atmospheric flow at full scale. The majority of studies and applications operate PALM at full scale rather than at wind-tunnel scale. Therefore, we think that it is of more use for future studies to evaluate PALM at full scale. Hence, we had to scale up the wind-tunnel results to be able to use them as reference for our evaluation. The scaling of wind-tunnel results is based on Townsend's hypothesis of the self similarity of fully rough turbulent flows (Townsend, A. A. (1956): "The structure of turbulent shear flow", Cambridge University Press, Cambridge, UK). According to this hypothesis, a turbulent flow is self similar, and hence, scale independent as soon as a fully rough flow regime is reached. During the wind-tunnel experiment, measurements were made to ensure that a fully rough turbulent flow regime has been developed. This allowed us to scale-up the measurements as described in the manuscript and compare them to our simulation results at full scale. This is a well-established method and a standard procedure for wind-tunnel experiments. Therefore, we did not describe this procedure in detail in our manuscript. If PALM results should be scaled down from full scale to wind-tunnel scale, similar tests need to be carried out beforehand to prove scale-independence for the simulation results. This, however, was not done in our study and we did not consider scaling the PALM simulations to a different scale.

We thoroughly checked the manuscript for language-related issues and corrected all spotted mistakes to the best of our knowledge.