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Interactive comment on "WRF4PALM v1.0: A Mesoscale Dynamical Driver for the Microscale PALM Model System 6.0" *by* Dongqi Lin et al.

Anonymous Referee #2

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This article presents a set of Python tools for offline nesting from WRF into the PALM large-eddy simulation model (WRF4PALM). The authors describe the Python routines necessary to provide initial and lateral boundary conditions for PALM, and show two case studies for the urban environment of Christchurch in New Zealand, providing comparisons of 5-m wind speed and temperature to an automatic weather station. However, there is a number of fundamental reasons why I cannot recommend this work for publication in Geoscientific Model Development.

1) The authors make a case for not using the recently developed INFOR infrastructure by Kadasch et al. GMDD2020 (https://gmd.copernicus.org/preprints/gmd-2020-285/) based on its current applicability restricted to the COSMO, which is not open source model. Given that PALM is a community model, I question the decision of promoting a

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duplicative tool instead of enhancing INFOR to accommodate WRF model data, which should in turn be more straightforward and at the same time more beneficial to the user community of PALM. This work appears to be redundant in that regard.

2) Within the WRF4PALM tools, the authors derive geostrophic wind components from WRF output to be used as forcing for PALM. This choice is not correct, as the lateral boundary conditions already provide the large-scale pressure gradient information implicitly, so this would be somewhat double counting of the mesoscale pressure gradient forcing. In addition, what about the ageostrophic component then? The current approach assumes that component is not relevant when that is often not the case. The use of geostrophic forcing in this context is not necessary and would lead to spurious mesoscale forcing driving PALM.

3) The authors mention the use of a synthetic turbulence generator (STG) to accelerate formation of resolved turbulence features. While this is a key component in the mesoscale-to-LES downscaling, the authors do not mention the specific method being used or if particular extensions have been made to accommodate realistic atmospheric flows. I suspect the authors are using Xie & Castro (2008) method, which is part of the PALM release. However, that approach was extended by Kadasch et al. GMDD2020 to include atmospheric stability information, as well as presented a comprehensive analysis of scaling and computational cost. This is again another strong argument why it does not seem a good idea to have WRF4PALM as a separate tool, rather the authors should leverage the INFOR preprocessor as already mentioned.

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