Answers to Reviewer 1

Major comments

1. Data availability

I understand that the authors have provided several links to the data used in this paper in the main text. Can the authors provide a summary of data availability for better accessibility and reproducibility? This will help users replicate and prepare their simulations. The Zenodo link also contains the data used in the code, but I failed to identify which data is used for each case. Please clarify this and point readers to the exact documentation (e.g., README files), and update the documentation, as this is not clear.

Thank you for your advice. Indeed, the data is hard to find on the web page of Berlin, mainly because Berlin has been restructuring the page for several months. Furthermore, the files included in the palm_csd Zenodo file mirror the source code repository and, thus, the data files are mostly meant for automatic testing only. In order to make our example easier to reproduce, we collected all required data in another Zenodo archive (Schubert and State of Berlin, Germany, 2026) with a detailed README.md file. Thus, we added in section 3.1:

"All required data is available for download as a single archive (Schubert and State of Berlin, Germany, 2026)."

In the code and data availability section, we added

"The required exemplary input data for the building-resolving set-up for Berlin, Germany, is available under the Data licence Germany - Zero - Version 2.0 and archived on Zenodo under `https://doi.org/10.5281/zenodo.20342892` (Schubert and State of Berlin, Germany, 2026)."

We also explicitly refer to the documentation, which includes the technical details required for this example:

"For more technical details of this example, please refer to example.md in the palm_csd package or the corresponding section in the online documentation."

2. Workflow and folder structure

While I understand palm_csd has been publicly available for many years, the workflow and folder structure are still not clear (especially to new users) by reading the papers and documentation. Can the authors provide a flowchart showing code and folder structures and the recommended workflow? This will help users to learn and pick up the tool quickly. It is also not clear which parameters are available in the configuration file.

Thank you for pointing out this shortcoming. As all technical details are described in the documentation in the Zenodo file and online, we propose to refer the reader to this documentation instead of adding more details to the paper. Thus, we added the following paragraph at the beginning of section 2:

"This tool is extensively documented in the docs folder of the Zenodo code package (Schubert, 2026), with its markdown files referenced throughout this paper, or under https://docs.palm-model.org/25.10/Tools/palm_csd/. For the latest release, replace "25.10" by "latest" in this URL. For all technical details, please refer to this documentation. Besides its different sections, it also features a complete reference of all options in the YAML file (yaml.md)."

The basic workflow is quite straightforward. All processed input belongs in one input folder, palm_csd is run and the result is written to the output folder. We added this to section 3.1:

"Once all input data have been processed as required, the files need to be placed into the input folder that is referenced in the YAML configuration of palm_csd. After all options are set in the YAML file, palm_csd is run with this file as an argument, which creates the static driver file in the output folder. For more technical details of this example, please refer to example.md in the palm_csd package or the corresponding section in the online documentation."

We believe that a flowchart is not required for this description. The details of the actual work, the preprocessing of the data, highly depend on the availability and format of the input data, so it is hard to propose general guidelines for that. The example for Berlin can only be used as a starting point.

3. New features

I appreciate the list of new features in Lines 70-85, but could the authors please specify in the manuscript or point to the documentation on how to do these in the updated version? For example, which parameter should the users use for domain rotation? The authors may also want to highlight how the LCZ-based configuration can help set up simulations, particularly in regions without high-quality building data.

Thank you for pointing out this shortcoming. As discussed above, we would prefer to keep most of the technical details for the documentation of palm_csd. We thus added in each major section a reference to the corresponding part of the documentation, which is also included in the palm_csd Zenodo archive (Schubert, 2026).

Thank you also for your advice. We added this information to the description of LCZ-Wizard in section 2.8:

"We therefore recommend combining the LCZ-Wizard with palm_csd. Besides supporting the setup of typical urban scenario simulations, this approach is particularly suitable for systematic adaptation scenario studies. It also enables simulations of urban areas with scarce or missing input data, requiring only an LCZ classification map, which is globally available (Demuzere et al., 2022b, 2023)."

Specific comments

1. Line 120-125

for bridges configuration, can the authors please point to vector or raster examples in the

Zenodo folder for users to replicate? And from the configuration file I can see the raster and vector files are used directly. Please highlight that with the new features in Line 71 to give readers/users direct information on how to use palm_csd.

Thank you for your advice. The support for bridge structures was already present in the palm_csd version described in Heldens et al. (2020). It was based on input data generated by project partners specifically for one project. Unfortunately, these partners have not released their data processing tools. We have not reproduced their approaches, as we aim to fully support general 3D building data. Still, an example file is given in tests/99_full_application/input/Berlin_building_height_3m_DLR.nc in the Zenodo package, mostly meant for automatic tests of palm_csd in the soon to be deprecated netCDF input format. Thus, we propose to not highlight this feature further in our paper but tried to make the description clearer in the building section:

"In addition to 2D buildings, palm_csd supports bridge-like structures. These are defined by a 2D map of their upper height above the surface and a constant structural depth."

We also added the emphasis on the "direct" processing of raster and vector data in the list of new features:

"added direct processing of georeferenced raster and vector data, including the calculation of coordinates with support for arbitrary rotation angles"

We propose to keep all technical details of the input handling for the documentation. Thus, we added the following to the Domain set-up, input files and their geographic processing section 2.1:

"Please refer to domains_input.md in the palm_csd package or the corresponding section in the online documentation for all technical details."

2. Line 135

"buffer zone" – please clarify how this is done; which parameter controls this in the configuration? Or point readers to the documentation as I struggle to find this information and I would imagine other users have the same problem.

Thank you for pointing out our omission. The replacement of buildings is controlled by `building_free_border_width` and `building_free_border_pavement_type`. Similar to the other YAML keywords, we propose to refer the user to the documentation. We, however, clarified the mechanism by adding:

"To this end, all buildings within that border are replaced by a user-selectable pavement type."

3. Line 166

"The input quantities can be specified as a single file or as several vector point files, with the columns representing the respective input data or as separate corresponding raster files."

Similar to my previous comments, please give examples and point to which files users can access to replicate the case discussed here.

Thank you for your advice. We propose to keep all the technical details for the documentation of palm_csd. Thus, we added references to the documentation in the sections 2.1 and 3.1 for that.

4. Line 212

"Furthermore, a gradual overlay of the terrain height is applied to avoid sharp gradients at the nest's boundaries." Can the authors clarify exactly how this is done?

Thank you for pointing out our omission. We extended our description:

"Furthermore, a gradual overlay of the terrain height is applied to avoid sharp gradients at the nest's boundaries. This is done by replacing the nest's terrain height by a weighted average of the parent's and the nest's terrain height within a 50 grid cell wide border of the nest. The parent's weight linearly decreases from 1 to 0 from the outside to the inside at the border of the nest."

5. Line 245

"In contrast to Demuzere et al. (2022a), the user can choose in (6) between the arithmetic and the geometric mean of building heights." Which parameter can the users choose? Please clarify.

Thank you for pointing out this unclear paragraph. There two different interpretations of the average building height: It could represent the arithmetic or the geometric mean of all buildings in the area. Note that in the original publication, the geometric mean is used. We thus adjusted the paragraph:

"In contrast to Demuzere et al. (2022a), the user can choose between H representing the *arithmetic* or the *geometric* mean of building heights. The calculations in (6) are adjusted accordingly. In the original tool, only the arithmetic average is used, while the LCZ definition in Stewart and Oke (2012) is based on the geometric mean."

6. Line 258-259

"The input data are freely available from ...". Please also add this to data availability.

Thank you for your advice. As described above, we added a data archive on Zenodo (Schubert and State of Berlin, Germany, 2026) and added in section 3.1:

"All required data is available for download as a single archive (Schubert and State of Berlin, Germany, 2026)."

7. Lin 265

Follow-up on the previous comment: I understand that the authors have included two data

sources, but can the authors specify which website the nDSM and DTM were obtained from? This will help users search their data.

Thank you for your advice. As described above, we added a data archive on Zenodo (Schubert and State of Berlin, Germany, 2026) and added in section 3.1:

"All required data is available for download as a single archive (Schubert and State of Berlin, Germany, 2026)."

8. Line 270-275

I appreciate the detailed pre-processing steps here, but the authors may want to add something like "Similarly, other building parameters can be assigned for the building polygon in QGIS" just so readers without a GIS background could pick up the context easily.

Thank you for the proposal. We adjusted the sentences as follows:

"Similarly, other building parameters can be assigned to the building polygons, such as the albedo type, heat conductivity, heat capacity and the surface fractions on a building polygon basis or for the whole domain. In QGIS, this is done by adding a new column in the Attribute table with a user-chosen name. In palm_csd, this column name is then mapped to the respective input data. For example, mapping the column `hcon_wa` to `building_heat_conductivity_wall` assigns the heat conductivity of all layers of all wall elements and mapping `hcap_wag_1` to `building_heat_capacity_wall_gfl_1` assigns the heat capacity of the outermost wall layer of the ground floor."

9. Line 278

"the land-use data set from ALKIS® (Amtliche Liegenschaftskatasterinformationssystem) is employed". Please clarify what is ALKIS and is it freely available? If so, please add to the data availability section.

Thank you for pointing out our omission. We added the following description:

"ALKIS is Germany's official, integrated information system for managing the national real estate cadastre. It combines both textual registers and graphical maps into a single, unified database to describe all land parcels and buildings across the country."

The data is freely available and now also included in the Zenodo data archive (Schubert and State of Berlin, Germany, 2026) mentioned in section 3.1 and the data availability section.

10. Figure 6

Please use a colour-blind-friendly palette as the current colours contain red and green in the same figure.

Thank you for your advice. We updated the default colour palette in palm_csd, which will be available with the next release, and used this to create the updated figures. Since

this paper is about version 25.10, we slightly adjusted the reference to the figure to

"The palm_csd package comes with the `static_driver_stats` tool that calculates statistics and can visualize any static driver (with results, for example, similar to Fig. 6)."

11. Figure 7a

Same as figure 6. A colour-blind-friendly colormap would be preferred, although I understand it could be hard for this particular case.

Thank you for your advice. We carefully considered an adjustment of the colour palette but were not able to produce convincing results. In addition, the current colours represent the community-wide defaults (`https://www.wudapt.org/lcz-resources/`). We thus propose to keep the colours as is.

References

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