

Earth Syst. Sci. Data Discuss., referee comment RC1
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Comment on essd-2022-92

Anonymous Referee #1

Referee comment on "A global map of local climate zones to support earth system modelling and urban-scale environmental science" by Matthias Demuzere et al., Earth Syst. Sci. Data Discuss., <https://doi.org/10.5194/essd-2022-92-RC1>, 2022

General comments

The paper entitled "A global map of Local Climate Zones to support earth system modelling and urban scale environmental science" depicts the major advancements realised by the community effort led by the WUDAPT community that permitted the obtention of the first global Local Climate Zones map. The paper is already in a very mature state and no major points of concern are to be clarified. The paper should therefore be published once the comments given below are treated. Some specifications are required in the methods. But most importantly, I would like to have the authors commenting more on the quality of the training polygons and the sampling bias per ecoregion. This could help focus future efforts by the community to improve the current map in future releases.

Major comments

Line 120: Please define what a well-trained student is.

Line 127 to 129: How is the best submission defined? If solely on overall accuracy (OA), then this can be biased. Why not using all submissions instead, as suggested by the HUMINEX project. Explain why 50% is retained and not 60% as suggested by Bechtel et al. (2019). Please explain the rationale in a short sentence. Also, why are archived TAs given a higher priority over the ones produced in the Generator? Were they checked or published before being archived? Some places are mostly sampled via the Generator (e.g., India or China), would you say that the resulting mapping in these ecoregions are of lower quality?

Line 169 to 174: You say it in the following paragraph but it is unclear at this stage why you do the feature importance for the 16 sets of TAs. Also, why is the performance measured at that stage and not in GEE? Could you also be a bit more specific on the reasons that explain you going from GEE to a python environment? Could be interesting for some geospatial scientists.

Line 184 to 185: I like that step and fully support it. Nonetheless, there may be a bias induced by the quality of the TA per ecoregion (e.g., TAs coming only from the Generator). This should be discussed at a certain point.

Line 192 and 193: I had a hard time understanding why you calculate the accuracy again for each subset after going through Pathway 1.

Line 249: Do you know how the GHS-S2net data performs in places where informal settlements are common and where roads are made of bare soil rather than asphalt? This could impact your evaluation.

Line 288 to 290: Looking at the TAs on the LCZ Generator, one can see that in the Indian cities, for example, close to no LCZ 7 has been sampled. Coming back to the question of the TA quality in certain places, how do you think this could influence your global map? Also, could it be that some users do not take sufficient time to get acquainted with the LCZ scheme? Would your TA filtering capture this?

Figures 5, 6 and 7 and related text: I would like the authors to comment more about the probability of a certain LCZ to occur in different FUAs. In Lagos, for example, the probability of having the same LCZ classified is higher in the city and lower in the rural area. This is the opposite for a city like Delhi or Lima. Could you try to explain and discuss how the quality of the TA sampling done in the different ecoregions may lead to such outcome?

Line 331: Does the LCZ 8 class really belong in this cluster? Shouldn't it be added to the group with LCZ 7 and 10? After all, the building materials of LCZ 8 are very different to the compact built-up LCZs.

Line 339: Although I do believe that LCZ 3 and LCZ 8 are indeed the most common LCZ globally, the proportion of LCZ 8 over LCZ 3 may be biased because some confusion is happening during the classification. Could you try to explain why such confusion is happening between these two classes? You later speak about their radiative resemblance (on line 511). Do you have any data to support this?

Figure 8: I really like this figure but could you add an estimation of the uncertainty of the proportion per LCZ?

Line 521: When you talk about "their purpose", could you add that users are invited to continue helping the development of future maps releases by contributing to the WUDAPT project through the LCZ Generator?

Minor comments

Line 2: Change "as" to "since" and "acknowledged" to "recognized"

Line 6: Add "and mitigative role" at the end of the sentence

Line 19: Change "warming" to "climate warming"

Line 19 to 20: Rephrase this complex sentence and potentially divide it in two to make it clearer

Line 34: Change to "and alters the local climate creating specific urban climates" or similar.

Line 44: Chose between "distinct urban canopies and boundary layers" or "a distinct urban canopy and related boundary layer".

Line 46 to 47: I would remove this statement that is not defended by any evidence. Otherwise, put it subjectively (e.g., "could" soon allow; "are expected"...)

Line 48 to 49: Rephrase as "Hence, a comprehensive [...] is needed."

Line 53: Change "needed to support" to "required by" and change the final dot to a double point "[...] functions: measures of [...]".

Line 55: "Influences" to "Influence"

Line 60: Change "assess" to "test"

Line 64: Add a space between "heat" and "(Demuzere"

Line 77: Add "[...] parameters (UCPs) required by urban climate models and by policy-makers to run [...]"

Line 96: Check the citation command for Ching et al. (2018). If LaTeX used, check that for all the manuscript.

Line 108: Change "random forest model" to "random forest classifier".

Line 138: Rephrase "one needs" to a less familiar tone

Line 164: "2+ million labels", are these TAs or pixels within TA polygons?

Line 171: Delete the comma after "a)"

Line 195 to 196: Is the "splitting the polygon pool" approach done for the first time in the LCZ mapping or has it been used in previous mapping (e.g., Europe or the US)?

Line 291 to 292: Please detail what the "average number of ROIs" is.

Line 322 to 325: This sentence could be moved to the discussion if needed. Otherwise, please suppress it.

Figure 9: Could you provide boxplots per ER too?

Line 388: Why is the slope chosen as a metric for evaluating the classification performance? This is quite uncommon.

Line 401 to 403: How is this statement explanatory of the difference between the LCZ-derived AHF and the observation?

Line 407: Chose another word than "zonal"

Line 422: Please change "Global South" and later "Global North" to other denominations. This concept dates from the 1980s.

Line 441 to 442: Do you have a reference to defend that city population is a proxy to urban form?

Line 453: The works by Potgieter et al. (2021) and Brousse et al. (2022) are suggested as additional references concerning crowdsourced data.

Line 471: When citing Demuzere et al. (2021a), please refer specifically to the W2W python tool as done for WUDAPT-TO-COSMO.

Line 510: I suggest changing "surface fractions" to "impervious and built-up surface fractions".

Line 512: Rephrase this sentence for clarity.

Please consider checking for American and English spelling discrepancies.