This study develops a global 1km spatially continuous urban surface property dataset (U-Surf) for kilometer-scale urban-resolving Earth system modeling by leveraging the latest advances in remote sensing, machine learning, and cloud computing to provide the most relevant urban surface biophysical parameters. Compared to the default urban surface property dataset, the U-Surf dataset significantly improves the representation of urban land heterogeneity both within and across cities globally. The accuracy, uncertainties, and limitations of the U-Surf dataset are assessed and discussed. Its great value for applications is outlined as well. Overall, the manuscript is well-structured and straightforward. The developed urban surface property dataset is of great importance for urban modeling and study. I recommend the publication and just have a few comments (quite minor) for clarification.

1. How are the raw U-Surf data separated into values for the four urban density classes (e.g., TBD, HD, MD and LD, as shown in Figure 3)? Does this separation follow the locations defined by Oleson and Feddema (2020)? If it does, is the location data also provided at a 1 km resolution?
2. When the authors aggregated the 1km U-Surf data to coarser resolutions of 0.125$^{o}$ and 1$^{o}$, were the urban surface property parameters averaged with the weights of the fractional coverage of different 1km urban land types?
3. With the U-Surf data, the possible improvements to the urban climate simulations could be speculated in detail. For example, currently, the simulated UHI effects are overestimated in CESM2 (Liu et al., 2024). Can the new data improve this simulation?

Reference:

Liu, S., Han Y., ... & Wang, Y. (2024). More heavy precipitation in world urban regions captured through a two-way subgrid land-atmosphere coupling framework in the NCAR CESM2. Geophysical Research Letters, 51, e2024GL108747. https://doi.org/10.1029/2024GL108747.