Referee #2

I would like to thank the author for the detailed and careful revisions. I now better understand the differences in positioning and characteristics compared to existing datasets. I think this is a helpful revision for readers as well.

Response: We sincerely appreciate the reviewer's positive feedback and recognition of our revisions. Thank you again for your valuable suggestions, which have helped improve the clarity and completeness of our work. The changes made to the manuscript are noted in the revised manuscript, and described in detail below (reviewer comments are in *italic* and cited texts are in **bold**).

There is one additional question I would like to ask.
In the comparison with Knanh2010, I could understand that in Chinese cities, Knanh2010 had less reproducibility for high-rise buildings, while in US cities this feature was not seen. Is it possible to consider possible reasons for this, whether because the data sources used in Knanh2010 and this study are different (including the year of the source), or because the estimation methods are different? For example, because Knanh2010 uses data sources from 2010, it does not capture the rapid development of Chinese cities (construction of high-rise buildings) after 2010, etc.
I don't think it's necessary to explore this in detail in this study, but I think it would be helpful for readers if you mentioned it a little in your discussion.

Response: We thank the reviewer for the constructive suggestions. As you pointed out, these differences may be due to variations in data sources (including the reference year) and estimation methods. Knanh2010 is based on 2010 data, which may not fully capture the rapid high-rise development in China after that period, whereas our dataset is derived from more recent building-scale data. Additionally, Knanh2010 uses GDP and population density-based estimations, while our dataset relies on direct building footprint and height data, which could further explain the discrepancy. We have briefly mentioned this point in the discussion section, as suggested.

"**In China, compared to the reference data, the Knanh2010 dataset performs well in capturing low- to mid-rise buildings but significantly underestimates the height of high-rise buildings (Fig. S10). However, this issue is not as prominent in U.S. cities, where the accuracy of our GloUCP dataset and Knanh2010 is relatively similar, with our dataset performing slightly better across different building height categories (Fig. S11). This discrepancy in reproducibility between Chinese and U.S. cities may be attributed to differences in data sources (including the reference year) and estimation methods used in Knanh2010 and this study. Since Knanh2010 is based on data from 2010, it may not fully capture the rapid urban expansion and the widespread construction of high-rise buildings that occurred in China after 2010. In contrast, our dataset, derived from more recent data sources, better reflects contemporary urban morphology. Additionally, differences in the estimation approaches—Knanh2010 relying on GDP and population density-based empirical models, while our dataset is constructed using building-scale vector data—could also contribute to these variations. Overall, while the Knanh2010 dataset already offers better spatial coverage than most existing datasets, our GloUCP dataset provides even more comprehensive coverage. In China, the accuracy of most datasets remains suboptimal, but our dataset slightly outperforms others, particularly in representing high-rise buildings.**"