Reply on RC1
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The manuscript "High-resolution and Multitemporal Impervious Surface Mapping in the Lancang-Mekong Basin with Google Earth Engine" describes a new IS map for Mekong basin. To this aim, the authors applied visual-interpreted samples to multi-source features derived from Sentinel-1/2 images. The whole framework is routine and some key parameters should be further clarified or discussed. Current accuracy assessment showed better performance than some datasets. However, comparison with the state-of-art datasets is missing, the superiority to the existing works remains unclear. Moreover, the test samples seem to be located mostly in urban and sub-urban areas, leading to incomplete accuracy assessment over rural regions. The structural of manuscript is clear but the writing should be carefully revised. As such, I would suggest a rejection.

Line 70. Many 10-m global datasets have been released, such as the GHS-BUILT-S (Corbane et al., 2021) from EC JRC and the GISA-10m (Huang et al., 2022) from Wuhan University.


Response: Thanks for your suggestions. We noted the release of the global 10m impervious surface products, but (1) the globally shared samples and methods may not yield good results for a special region like the Lancang-Mekong Basin, and (2) these products are only available in one phase and do not meet the requirements of dynamic analysis. For this reason, we conducted the development of a 10m multi-temporal impervious surface for the Lancang-Mekong Basin.

Line 100. I would delete the "support" here.

Response: Thanks, we will take this comment.

Line 125. Did you just stack the Sentinel-1 data from both "ascending" and "descending" orbit together? This will lead to distortions over mountain areas if you do so.

Response: Our experimental results show that after combining the mask of DEM data, the direct stacking of the two does not have much effect on the misclassification of the mountains.

Line 195. I know these metrices make sense, but you may explain why they were chosen.

Response: The 7*7 size was obtained based on existing studies and experiments.

Line 199. Could you explain why temporal metrices were only derived from Sentinel-1? There are much more Sentinel-2 images (Figure 2).

Response: The original Sentinel-2 images are more than the Sentinel-1 images, but there are many clouds and rain in the Lancang-Mekong Basin, resulting in poor quality of some optical images. After we eliminate this part, the number of Sentinel-2 images is not enough to calculate the temporal features.

Table 2."Number" - >"Dimension".

Response: Thanks, we will take this comment.
Line 205. Could you show us the distribution of training samples?

Response: The samples were obtained by random sampling and manually divided into sample polygons of the same type around them.

Line 233. How this threshold \((\text{SAD} > 0.125)\) was determined?

Response: We experimentally obtained the division thresholds by selecting a number of sample points, including both changing and non-changing classes.

Line 235. Why a pixel can be regarded as water if its MNDWI is greater than 0.12? It’s not a robust method.

Response: Thanks, this is indeed not a robust approach, but we still use it in order to reduce the computational effort.

Line 240. Without seeing your training samples, I presume many pixels identified as changed may not change from NIS to IS if they are far from IS. Could you do a quick ablation experiment to better demonstrate the effectiveness of the sample migration?

Response: The ablation experiment at large-scale is rather complicated, and we can only give a comparison of the precision in some areas. Without sample migration, the overall precision of the results in 2021 will decrease from 91.45% to 89.86%.

Line 265. The methods (and figures) you described here are similar to that in Li et al., (2015). You should at least cite it.


Response: Thanks, we should cite it here.

Line 272. If your results follow the assumption that transition from IS to NIS is rare, you
may reduce the results to a single band where pixel indicates the time when IS was first detected, instead of putting annual data into separate bands.

Response: Thanks, this is a good way to reduce the dataset.

Figure 6. It seems that most of your IS test samples locate in or near cities. Could you provide the ISA density around the IS samples? Courtesy of higher spatial resolution, buildings and roads in rural regions can be better delineated in Sentinel images. Therefore, accuracy assessment over rural regions for 10-m IS mapping is important.

Response: We obtained the validation samples by stratified sampling, and although the samples are less at rural areas, as a whole, the representativeness is sufficient. We will use a detailed comparison to illustrate the effect in rural areas.

Line 302. Are there new (or interesting) findings from your results?

Response: I am sorry to say that the main purpose of this paper is to propose mapping methods for large scale impervious surfaces in the Lancang-Mekong Basin and to develop a usable product. But no effort was spent on analyzing the new (or interesting) findings.

Line 328. "0:05" ->"0.05"?

Response: Thanks, we have a spelling error here.

Table 5. It’s would be more interesting to compare your results with GHS and GISA-10m (I mentioned above). They are both 10-m thematic mappings, same as you did here. I strongly suggest you to do so.

Response: We are trying to compare with these two datasets, but that will take some time. At least for now, visually, we have a better product than GHS, which is too fragmented in the Lancang-Mekong Basin.

Line 377. In fact, according to your results (Table 5), the ESA-2020 achieved higher PA in all cities, indicating that ESA-2020 has less omissions. This is contradictory with the statement here that ESA-2020 ignores buildings in rural areas. Could you explain it?
Response: As you mentioned before, the results of the accuracy validation are strongly related to the distribution of the samples, and the stratified samples are mostly scattered in urban areas, which is the reason why the ESA accuracy is higher than ours. However, in terms of visual effects, ESA has a certain omission in rural areas.