A 10 m resolution land cover map of the Tibetan Plateau with detailed vegetation types

Anonymous Referee #2

General comments:

The authors have presented revisions to justify Data description and Methods, and incorporated most suggestions in doing so. The manuscript is improved. I am pleased to see the careful revisions made by the authors. However, the manuscript still needs few minor content revisions.

Response: We thank you for providing detailed minor revision comments. We have incorporated the comments to improve the manuscript.

Specific comments:

1. **First, I do not agree with the authors' response regarding the use of median composites for mapping. Median composites are greatly influenced by the number of available images, so in many places, it is actually not possible to achieve the effect shown in Figure A4. Additionally, the multi-source information mentioned by the authors mainly emphasizes DEM information, which, although helpful for distinguishing vegetation, is still limited. For differentiating various types of vegetation, multi-temporal information is definitely the most helpful. I suggest that the authors mention this issue in the Limitations section.**

Reply 1:

We agree with you that the median composites are affected by the number of available images. Therefore, we have added an explanation in the revised manuscript (Lines 286-289), which reads:

Median composites are affected by the number of available images, we thus ensured a minimum of three high-quality observations across the entire TP while preprocessing the annual Sentinel-2 images. The composites from ≥ three Sentinel images make it possible to achieve the seamless effect shown in Figure A4 in various locations over large areas of the TP.

Additionally, information derived from DEM is limited to differentiating vegetation types in certain regions such as flat or urban areas. We have included this limitation regarding the utilization of topography dataset in the revised manuscript (Lines 295-298), which reads:

Conversely, in flat areas where vegetation distribution is minimally influenced by topography, or in urban areas where vegetation distribution is affected by

anthropogenic activity, topographic information may exhibit limitations in land cover classification (Zeng et al., 2019).

We agree that multi-temporal information is more helpful than single median composites, although median aggregation is computationally efficient for large-scale research and achieved good quality in this study. In fact, we emphasized this view in every version of our manuscript (Lines 272-275), which reads:

Although we employed the Sentinel-2 median composition method in this study, we acknowledge the potential enhancement that time-series analysis could bring to our research. In comparison to median composition, time-series analysis has the potential to more comprehensively capture phenological information of vegetation, thereby yielding more accurate land cover classification results (Xie et al., 2019; Nguyen et al., 2020).

Reference:

Nguyen, L. H., Joshi, D. R., Clay, D. E., and Henebry, G. M.: Characterizing land cover/land use from multiple years of Landsat and MODIS time series: A novel approach using land surface phenology modeling and random forest classifier, Remote Sens. Environ., 238, 111 017, https://doi.org/10.1016/j.rse.2018.12.016, 2020

Xie, S., Liu, L., Zhang, X., Yang, J., Chen, X., and Gao, Y.: Automatic land-cover mapping using landsat time-series data based on google earth engine, Remote Sens., 11, 3023, https://doi.org/10.3390/rs11243023, 2019

Zeng, T., Wang, L., Zhang, Z., Wen, Q., Wang, X., & Yu, L. (2019). An Integrated Land Cover Mapping Method Suitable for Low-Accuracy Areas in Global Land Cover Maps. Remote Sensing, 11(15), 1777. https://doi.org/10.3390/rs11151777

2. Moreover, it is also suggested that the authors include in the Limitations section the potential impact on classification results due to the direct use of coarse-resolution CHIRPS and ERA5 data.

Reply 2:

Thank you for this suggestion. The direct use of coarse-resolution data may lead to potential loss of spatial information. However, we have found that its incorporation can enhance the accuracy of the results, and we did not observe any negative impact on the fine-scaled spatial patterns of our classification results. We have included an explanation in the revised manuscript (Lines 259-261), which reads:

Our study also found incorporating resampled coarse-resolution climate data can help improve the classification accuracy of finer resolution data (Jia et al., 2014). However, it may cause potential loss of spatial information (Xu et al., 2020), which has not been observed in the TP_LC10-2022 dataset.

Reference:

Jia, K., Liang, S., Zhang, N., Wei, X., Gu, X., Zhao, X., Yao, Y., & Xie, X. (2014). Land cover

classification of finer resolution remote sensing data integrating temporal features from time series coarser resolution data. ISPRS Journal of Photogrammetry and Remote Sensing, 93, 49–55. https://doi.org/10.1016/j.isprsjprs.2014.04.004

Xu, Y., Yu, L., Peng, D., Zhao, J., Cheng, Y., Liu, X., Li, W., Meng, R., Xu, X., & Gong, P. (2020). Annual 30-m land use/land cover maps of China for 1980–2015 from the integration of AVHRR, MODIS and Landsat data using the BFAST algorithm. Science China Earth Sciences, 63(9), 1390–1407. https://doi.org/10.1007/s11430-019-9606-4