

Responses to the Comments and Suggestions of Editor

We appreciate the time and effort by the Editor in reviewing this manuscript and summarizing the comments and suggestions from the two reviewers. Your thoughtful guidance has helped us further improve the manuscript.

Editor' Comments to Author:

The referee reports recognize the potential value of the dataset and methodology but identify major issues that must be addressed in a substantial revision. The authors should provide a detailed, point-by-point response to both reports.

Response: We appreciate the Editor's assessment and summary of the referee reports. We have carefully addressed the comments and suggestions from both reviewers and incorporated the corresponding revisions into the revised manuscript. Detailed point-by-point responses to both referee reports have been prepared separately. Our response to the Editor's comments is provided below.

In particular, the revision must:

(1) implement the complete FAO forest definition or consistently reframe the product as tree or woody cover;

Response: We appreciate this important comment. In the revised manuscript, we clearly state that FAO forest definition has three sets of metrics; (1) forest biophysical (structural) metrics (tree height, tree coverage), which are measurable directly by remote sensing data, (2) the minimum mapping unit metric (0.5 ha) and (3) land use metric (excluding forests in agricultural area and urban area). Both the minimum map unit and land use metrics are related to report of forest area. We have clarified throughout the revised manuscript that OU GFC dataset is developed from remote sensing and land cover perspective and consider only the forest biophysical (structural)

metrics in the FAO forest definition (tree height and canopy cover) but does not implement the minimum mapping area metrics (0.5 ha) and land use metrics (excluding forests in agricultural area and urban area). As the results, we report all forest cover identified by satellite images at 30-m spatial resolution, which is likely larger than those forest cover data products that consider three sets of metrics in the FAO forest definition. To avoid ambiguity, we now describe it as a forest (tree) cover product based on these biophysical criteria and explicitly state this limitation in this revised version. We also revised the related terminology, expanded the descriptions of the forest definitions used by the comparison products, and added a discussion of future improvements incorporating minimum area and land use information, including tree crop plantations. Detailed revisions are provided in our response to Referee #2.

(2) validate the annual-change results or substantially restrict claims about forest gain, loss, and temporal dynamics;

Response: We appreciate this important comment. In the revised manuscript, we both strengthened the evaluation of the annual OU GFC maps and substantially restricted our claims regarding forest gain, loss, and temporal dynamics. Specifically, we extended the GEDI-based accuracy assessment from 2020 to those years with available GEDI data (from 2019 to 2023). The annual OU GFC maps showed consistently high and stable accuracy during this period, with overall accuracy of 89.8–91.0 % and Kappa coefficients of 0.66–0.70. We also explicitly state that the annual maps of forest cover for 2015–2018 remain unvalidated because no GEDI observations are available in those years.

At the same time, we agree that annual map accuracy does not constitute a direct assessment of forest-change accuracy. As this is a data paper, we therefore revised the manuscript to avoid interpreting interannual differences directly as validated forest gain or loss. Instead, we now focus on the spatial-temporal consistency of the annual forest cover maps and have substantially reduced claims regarding the magnitude, dynamics, and drivers of forest change. In addition, we further examined potential sources of interannual variability, including PALSAR-2 acquisition timing, Landsat observation

availability, $NDVI_{max}$ seasonality, and the effects of the three-year temporal consistency procedure. Detailed responses and revisions are provided in our responses to Referees #1 and #2.

(3) reconcile the inconsistent GEDI class totals and verify all confusion matrices and accuracy metrics;

Response: We appreciate this comment. We carefully rechecked all GEDI sample counts, confusion matrices, and accuracy metrics. The inconsistency resulted from two incorrect numbers in the text, rather than errors in the confusion matrices. We corrected the GEDI-Forest reference total and the OU GFC mapped-forest total, verified all row totals, column totals, UA, PA, and OA values, and revised the table headings and notes to clearly distinguish mapped classes from GEDI reference classes. Detailed corrections are provided in our response to Referee #1.

(4) quantify the effects of acquisition timing, observation availability, and the three-year temporal correction, including the number of altered pixels and accuracy before and after correction;

Response: We appreciate this comment. We further evaluated the effects of PALSAR-2 acquisition timing and Landsat observation availability on the annual OU GFC maps and added an analysis of annual $NDVI_{max}$ timing from 2015 to 2023. Although strong spatial variability of $NDVI$ seasonality exists, the continent-scale interannual distribution of $NDVI_{max}$ timing was relatively stable. We also quantified the three-year temporal consistency correction: NFN→NNN and FNF→FFF corrections affected only 1.1–1.8 % and 1.9–2.4 % of pixels in individual years, respectively. Using GEDI observations within the modified pixels in 2020, 72.4 % of NFN→NNN corrections and 68.2 % of FNF→FFF corrections were supported by the GEDI-derived reference classes, indicating an overall improvement in classification. Detailed analyses are provided in our response to Referee #1.

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88 (5) address the non-independence of the JRC comparison and the definitional mismatch
89 involving Landsat-GFW. All technical and presentation corrections raised by the
90 referees should also be completed.

91 **Response:** We appreciate this comment. We have explicitly explained the non-
92 independence of the JRC GFC comparison by acknowledging the shared use of a
93 GEDI- and Landsat-derived canopy-height dataset and by discussing the extent and
94 implications of this dependency. We also clarified the definitional mismatch of the
95 Landsat-based UMD GFC product, which primarily represents tree canopy cover and
96 does not explicitly incorporate the minimum mapping unit or land-use criteria of the FAO
97 forest definition. Accordingly, both >10 % and >30 % tree-cover thresholds are now
98 included in the main comparison, and the framing of this product has been revised
99 throughout the manuscript. In addition, all technical and presentation corrections raised
100 by both referees have been addressed. Detailed revisions are provided in our
101 responses to Referees #1 and #2.

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103 Further consideration will depend on whether these central validity and interpretation
104 issues are resolved through substantive analysis or an appropriately narrowed scope.

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