

Response to the reviewer's comments

Comments 1:

How was the forest height estimated for years without GEDI footprints? Please explain clearly.

Response:

Thanks for your valuable suggestions. The forest height retrieval for years before 2019 at a specific forest type and region utilized the same model as 2019 but with varied inputs corresponding to their respective years. Related descriptions were revised in the manuscript.

“To reduce the discrepancy between the retrieved forest height and the 2019 forest height products, the input factors for the tree height model were based on the study by Liu et al. (2022), incorporating DEM, slope, aspect, temperature, precipitation, and NDVI data. Additionally, this study expanded the input factors by incorporating Landsat 8 surface reflectance and the calculated NIRv vegetation index, which approximates forest productivity (Badgley et al., 2019). This resulted in a total of 13 input factors used in the tree height model. The models were constructed separately for different environmental conditions and forest types across China. Specifically, six regions (East, South, North, Northeast, Northwest, and Southwest) and five forest types (EBF, ENF, DBF, DNF, and MF) were considered. Each model was trained using 70% of the filtered GEDI footprint forest height samples, with the remaining 30% used for validation. Since no GEDI footprint forest height samples were available prior to 2019, the forest height retrieval for years before 2019 at a specific forest type and region utilized the same model as 2019 but with varied inputs corresponding to their respective years. These forests, which required height retrieval, covered only a small portion of the total forest pixels, with an average of 0.42% (see details in Section 5.2).”

Comments 2:

Fig 6 and others: what does the circle size indicate?

Response:

Thanks for your valuable comments and suggestions. The size and color of the circle represent the number of samples at that location, and the related descriptions were revised in the manuscript.

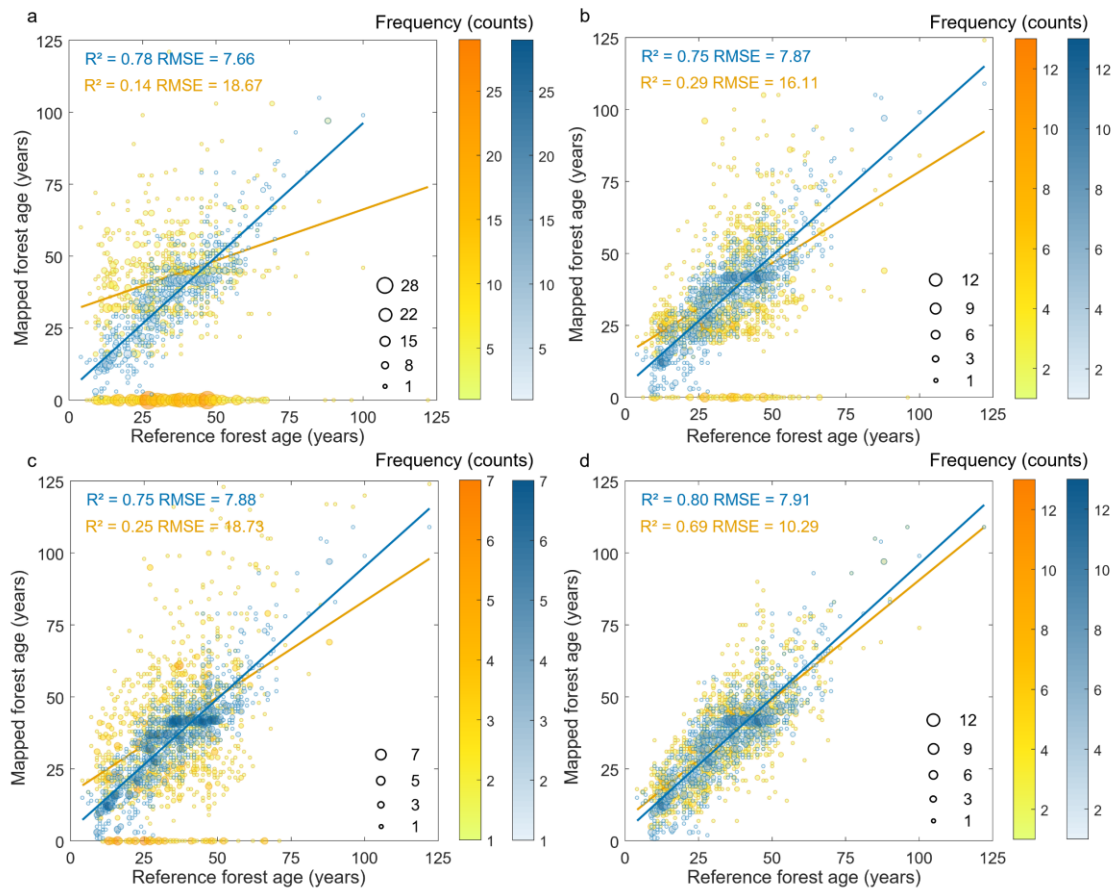
*“Figure 6: Validation of China's forest age mapping in the CAFA V2.0 dataset. **a** is for the age validation of forests disturbed at least once from 1986 to 2022, and **b** is for the age validation of undisturbed forests. The size and color of the circle represent the number of samples at that location.”*

Comments 3:

Fig 11: Add a validation figure for the result from this study as comparison.

Response:

Thanks for your valuable comments and suggestions, and it was added.



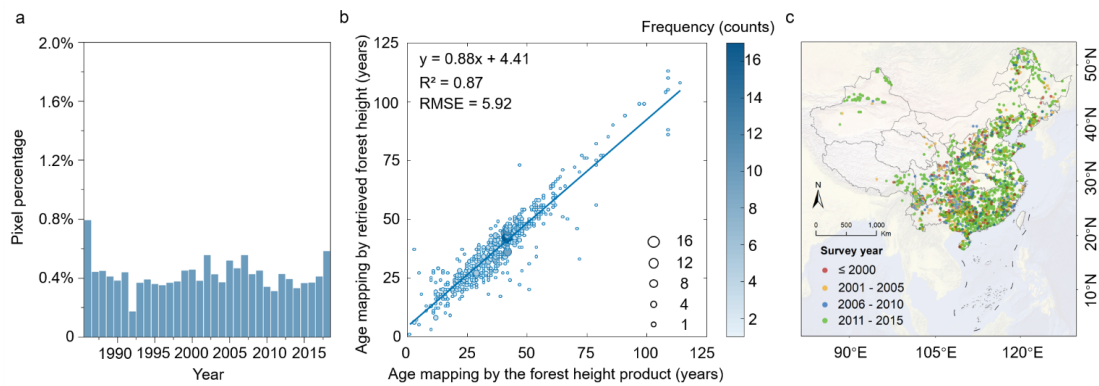
“Figure 12: Validation of the four forest age products using the same 30% reference forest age samples compared with the CAFA V2.0 product. a-d are the forest ages of Age2005, Age2010, Age2020, and Age2019 generated by Zhang et al. (2014), Besnard et al. (2021), Cheng et al. (2024), and Shang et al. (2023), respectively. Blue represents the CAFA V2.0 product, while yellow represents the four products. The age of 0 in Age2005, Age2010, and Age2020 indicate no available forest age in these products for the validated reference samples, and they are excluded from the fitting line and the calculations of R^2 and RMSE. To maintain consistency, the validation of the CAFA V2.0 product also excluded these reference samples.”

Comments 4:

Fig 13: Please also add a figure show the distribution of forest height and age samples over different years.

Response:

Thanks for your valuable suggestions. A subfigure of the spatial distribution of the survey years of samples used for comparison was added.



“Figure 14: The percentages of pixels needing forest height retrieval from 1986 to 2019 (a), comparisons of forest age mapping using the retrieved forest height *versus* forest height product in 2019 (b), and the spatial distribution of the survey years of samples used for comparison (c).”

Comments 5:

Please also add a comparison between forest age map for planted forest and natural forest.

Response:

Thanks for your valuable comments and suggestions. It was added.

“4.1 China’s annual forest age at 30m resolution from 1986 to 2022

A dynamic forest age dataset (CAFA V2.0) covering the entire China from 1986 to 2022 (Shang et al., 2023), with a spatial resolution of 30 m, was generated by integrating forest disturbance mapping and random forests methods. Figure 5 illustrates the distribution of forest ages for the year 2019, alongside comparisons with data from 1986, 2000, 2010, and 2022. This forest age dataset indicates that China’s forest age structure predominantly consists of young and middle-aged forests, with an average forest age of 58.1 ± 7.3 years in 2019. Old forests were predominantly found in the northeast, northwest, and southwest regions of China. These areas, characterized by high mountains and minimal human interference, were largely comprised of natural and secondary forests. In contrast, forests disturbed at least once during the period from 1986 to 2022 exhibited younger ages, generally below 37 years. Such forests were mainly concentrated in the southeast and central southern regions, where human disturbances were more prevalent. Furthermore, in the northeast, there were also young forests that had regenerated after extensive forest fires, such as the devastating forest fire that occurred on May 6, 1987 (Cahoon Jr. et al., 1991). This fire caused varying degrees of damage across a vast area within China, impacting more than one million hectares of forests.

According to the 2020 map of China's planted and natural forests (Cheng et al., 2023), natural forests were older than planted forests, with average ages of 69.9 ± 12.8 years and 48.4 ± 6.9 years, respectively. Regional variations were evident, with the age gap between natural and planted forests ranging from 3.5 to 20.2 years. Southwest China had the oldest natural forests (91.1 ± 21.6 years) and planted forests (74.8 ± 18.1 years), while East and South China showed lower average ages due to higher disturbance frequencies.”