

Review

ForestScan: a unique multiscale dataset of tropical forest structure across 3 continents including terrestrial, UAV and airbourne LiDAR and in-situ forest census data

Dear Authors,

Thank you for the opportunity to review your manuscript for possible publication in ESSD. I have provided a number of comments throughout, both as general observations and as specific notes referring to particular lines or figures. I hope you find these suggestions constructive.

General points

Title: consider this adjustment → ForestScan: a unique multiscale dataset of tropical forest structure integrating terrestrial, UAV, and airborne LiDAR with in-situ forest **inventory** data across three continents

Use of the word “census”: Consider changing this to “inventory” in every instance (also in the title), I find inventory is more commonly used in forest research and remote sensing fields. In any case you can use census as a keyword.

There are lots of authors, and I suspect lots of contributions – sections need to be unified in style and language. Language is generally good, but often sections could be more concise. Please consider

Acronyms: please check every acronym throughout the whole manuscript, there is a lot of repetition – acronym after the first instance only (e.g., DBH, TLS, ALS, AGB, EO, VOLS,).

Please pay attention to the technological limitations (e.g. accuracy of LiDAR – refer to Morhart et al. 2024 <https://doi.org/10.1007/s10342-023-01651-z>), this is touched upon in line 311. Also consider elements of quality assessment of data processing (e.g., wood/leaf class extraction as shown in Fig. 7). I would like to see a section devoted to discussing possible methodological/processing errors within the dataset. I would also like the methodological/equipment limitations to be discussed, this is touched on in line 271. I would argue that the tilted scan is nice to have but an extra step (and all the extra workload) that might not be essential (dependent on the size of the trees scanned). Did you scan outside the plot to better capture the trees on the plot boundaries?

Plot/sub-plot numeration becomes confusing between FBRMS and their individual subplots – consider making this more transparent/unified.

Consider adding a summary table in section 2 outlining the study sites, country, coordinates, area, climate, ... this could considerably shorten the section which is a bit wordy. I would also like to know something about the stands that were scanned, tree density, mean DBH, top height,

Figures 1, 2 and 3 would be nicer if they had a unified style and similar content. For example, Figure 1 is really detailed and figure 2 is very vague. Some of the figures are missing basic mapping elements. It looks like they have been provided by separate people from the author consortium. Make sure the legends and captions are clear and correlate with the text body (e.g., lines 141 and 142 refer to treatment 1,2 and 3 – I guess this is T1, 2 and 3 in Fig 1? Also Line 230.

Mapping could also show the areas within each FBRMS that was scanned with each method. This is relevant, for example, to lines 589/590.

The methods sections (lines 281 – 332) could be condensed, call it data collection – the same or similar methods were applied for all TLS campaigns. One table for scanners used and their settings, one table for plot overviews. This part is very repetitive. E.g., Lines 318 and 328 (use of targets).

Line 766-775: Linking TLS trees to their census (inventory) counterparts. Plot marking is a valid point. Your examples are specific (e.g. Elephants). We too have tree tags that are destroyed by birds pecking at their shiny surface, we know the problem! We are also trialling QR codes on alu/foam board, plots can also be marked with a steel ground stake that can be found with a metal detector. The idea of anchor trees is good.

Specific points

Lines 44-46: define acronyms EO, AGB, cal/val, ...

Lines 78-80: Better description needed – particularly on the need for better intercalibration.

Line 86: the acronym for Spacebourne LiDAR is not LiDAR. Also be careful in this section ESA Biomass is Radar not LiDAR – it has also already been launched (line 90), update needed.

Line 93: make → undertaken.

Lines 107-108: selection based on discussions is vague (people will always discuss), stick to the criteria.

Lines 112-114: Bullet points → note the acronym after the site name in brackets. E.g., Paracou Research station, French Guiana (FBRMS-01). Also see the general comment above about plot codes/names.

Line 122: define Cirad-UMR EcoFoG.

Line 125: thousand separators, additionally please check all.

Lines 135: remove “in the early 1980’s”.

Line 138: done → carried out.

Line 148: 9 → nine.

Lines 135-149: lots of (possibly) irrelevant detail that could be cut to make the section more focused (e.g., flux tower, fertilisation experiments). Please consider revising. Compare with the description of FBRMS 02 and 03 where there is much less.

Figure 2: a, b, c and d need defining in the caption (but consider first my general comment above).

Line 190: replace “laser-scanning” with “LiDAR” approaches

Lines 190-192: Sentence “species identity....” needs a rephrase. This and the next sentence can be made more precise. I think you mean the determination of tree species is critical since wood density x TLS derived volume = biomass.

Figure 4: remove – it is secondary information – just direct the reader to the right place.

Lines 201-202: Remove the sentence about ForestPlot.net – it is not needed.

Line 218: at 1.3m – this is DBH you have defined it before.

Lines 221-228: do you mean trees were recorded by their common names and then (as written in lines 226 – 228) trained botanists returned to identify species? If so try to combine these paragraphs.

Line 228: Explain APG IV

Line 233: Remove “referenced by a DOI”

Line 231 and 236: ask the journal how to display the hyperlinks, especially since the second is linked to a reference.

Line 240: Plot numbering/labelling confusion for the reader – link to map figure

Lines 238-241: much less detail shown here than FBRMS 01, why?

Lines 241 and 245: TLS was conducted not collected (TLS point cloud data was collected).

Line 242: “most” = vague.

Line 244: Same plot numbering problems as above.

Line 251: Gabonese and Malaysian FBRMS plots

Line 260: insert - chain sampling “protocols”

Line 261: QSMs needs describing

Figure 5a and b can be combined into one grid. Consider using axis labels to define scan position, the legend to the left must be much bigger to be legible.

Line 273: figure 5c?? missing.

Line 279: Working day is arbitrary – person hours give a better idea of workload.

Line 280: Maybe give the time needed for one scan.

Line 284: 16 quarter ha plots – that’s seems like a complicated way of expressing area.

Line 319: give detail on the RTK equipment

Tables 1, 2 and 3: the Lat. Long. coordinates are very approximate.

Lines 338-339: delete bottleneck sentence. It is true but not needed here.

Lines 351: Maybe specs are needed for HPC cluster and CPUs? Time reference (ca. 4 days) is ok here as the reader knows no break is needed.

Line 362: Precision of person hours vs. days (see comments above).

Line 366: “potentially containing more than 5.42 billion points” impressive, but too accurate and irrelevant to the reader, please delete.

Line 366: Insert → one small “exemplary” section of

Line 447, 552, 586, 599 and 616: delete “data access”.

Lines 455-459: please condense.

Figure 10: a nice figure but too much content, if only representative maybe just choose one plot row for e.g., 10 trees.

Line 476: an overview table might help the reader interpret the similarities and differences between flights (across all plots and flights) – Table 5 should be used and referred to earlier, and could be expanded for the other plots.

Line 477: VLOS stipulation is a repeat.

Line 480-481: irrelevant, I would not suggest anything other than adherence to the flight rules given.

Line 487-488: delete cherry-picker (above canopy platform is sufficient as a description).

Figure 12: legend entries need defining e.g., AOI, DSM

Table 6 and 7: is something up with the UTC date and time in the tables??

Table 6: define AGL (assumed above ground level).

Line 555: please rephrase and be specific that you are referring to FBRMS02.

Line 556: DELAIR DT26X drone platform

Line 561: “different” can you be specific?

Figure 13: Please label the panels and use fitting captions, I am not sure what all photos are showing me.

Line 609: ALS

Line 611: approximately = vague.

Line 620: WD, I don’t think this is the first instance?

Lines 664 & 668: rephrase – much as/far as possible.

Line 673: EO

Line 677: “This may sound obvious” too chatty.

Line 687: replace “types” with “sources”

Line 715: clearing → cleaning?

Line 716: what is (h)?