

***Interactive comment on* “Robust processing of airborne laser scans to plant area density profiles” by Johan Arnqvist et al.**

Anonymous Referee #1

Received and published: 19 May 2020

The manuscript, entitled "Robust processing of airborne laser scans to plant area density profiles", presents a new approach to estimate Plant Area Density (PAD) using airborne lidar data. This type of research is highly needed and a topic of interests in Biogeosciences, as we need to improve our understanding of plant area allocation, vertical profiling, and its relationship to Leaf Area Density (LAD) that is related to many biochemical functions of trees. We also need to overcome some data and model challenges by using airborne lidar for PAD estimation. However, the current version is insufficient for publication with two major concerns as listed below:

1. No accuracy assessments/ statistical analysis to validate the improvement of the new proposed results. The new proposed approach applied scaled intensity information to Beer-Lambert law to improve the PAD estimation, and compared it to three other

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methods (IR: un-scaled intensity return method, FR: first return method, and AR: all return method). And it also has LAI2000 data as field measurements. However, there is no statistical analysis / accuracy assessment, such as r -squared and paired t-test to show the new results performs better than the other three. The only discussion on this was based on the visualizations on Fig 2 on Page 8. The results of the proposed method is very similar to the results of AR on Fig 2. So the conclusion of this study is arguable without statistical tests for comparison and statistical validation with field measurements.

2. The writing needs improve. Equations should go to the method section. And some equations are redundant e.g. Eq. 4, 5, and 6 are basically the same equation with different inputs. The description of new approach is vague and confusing. And there is no explanation why the scaled intensity is able to fix the issue of ground PAD reflections in IR. And also, lots of the statements have grammar issues and debatable context, which made the manuscript hard to read.

Interactive comment on Biogeosciences Discuss., <https://doi.org/10.5194/bg-2020-121>, 2020.

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