

***Interactive comment on* “Evaluation of leaf-level optical properties employed in land surface models – example with CLM 5.0” by Titta Majasalmi and Ryan M. Bright**

Anonymous Referee #1

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The paper targets an important issue of possible systematic errors in surface albedo values used in LSM-s that has a direct influence to the estimates of energy fluxes. In general the manuscript is well written and the applied methods are explained.

1.20 "...we found the optical properties of the visible band (VIS; 400-700 nm) to be appropriate." : How do you estimate this? Is it based on the relative error in re-lected/absorbed solar energy or some other criteria?

1.20 "...CLM default and measured estimates were observed," : What is a "measured estimate"?

1.25 "We also found that while the CLM5 PFT-dependent leaf angle definitions were

sufficient..." : Leaf inclination angle is defined as the angle between leaf surface normal and zenith. Do you mean LIA values ?

1.25 "... introduce the concept and application of 'photon recollision probability' (p)." : The p-theory is already introduced in earlier publications. Here the p-theory is applied and proposed also in discussion to be integrated into LCM-s.

Introduction 2.5 "... canopy foliage density (e.g. Leaf Area Index (LAI, m^2/m^2),..." : canopy foliage density (m^2/m^3) is not leaf area index :: Right bracket is missing.

2.15 "LSMs (e.g. ... (JULES) (Clark et al., 2011)..." : closing bracket is missing. Check also in other places.

3.10 "While measuring LIA of grasses and crops is relatively straightforward and has been conducted since 1960 using inclined point quadrats (Warren Wilson, 1960)..." : With inclined point quadrats the number of contacts is measured (counted). LIA is estimated from that data.

3.20 "...from a leaf or needle in the canopy will interact within..." : "and" seems to be missing.

3.25 "...shoot spectra based on shoot geometry (= p)..." : what is "(= p)"?

M&M 6.5 "For example, dataset by Hovi et al. (2017) contain..." : contains

7.10 "... if spectra were available >2400 nm, it was removed ..." : what was removed?

8.15 "... (and may vary e.g. from 0.12 to 0.28)..." : When STAR is greater than 0.25, then $SSA_{shoot} > SSA_{needle}$ according to Eq. (1)!

9.5 "The SSA (shoot) spectra were multiplied with normalized SI spectra for VIS and NIR..."

: Here and in other places: check that lambda is in the subscript where spectrum is pointed to.

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10.10 "...and the mean measured estimate ..." : What is measured estimate?

13. Table 3. Please present 95% confidence intervals (or at least standard error) for the mean values.

References

23.10 "Rautiainen, M., Möttönen, M., Yáñez-rausell, L., Homolová, L. and Schaepman, M. E.: Remote Sensing of Environment A note on upscaling coniferous needle spectra to shoot spectral albedo, "

:Yáñez-rausell :: albedo, ,

:Please check carefully all records in the list of references, there are many formatting errors (journal names, special characters (si× conifers), latin names) and also typos.

Interactive comment on Geosci. Model Dev. Discuss., <https://doi.org/10.5194/gmd-2019-59>, 2019.

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