

Interactive comment on “Ecohydrological Optimality in Northeast China Transect” by Q. Li et al.

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The authors present a paper where they apply the Optimal Canopy Cover Theory from Eagleson to the Northeast China Transect. This area is interesting because it has a strong precipitation and vegetation gradient from west to east. After a comparison of the existing and optimal canopy cover, they carry out a sensitivity analysis to assess the dominant factors controlling the optimal canopy cover. This could e.g., be used to develop strategies to improve the canopy cover. Although the analysis is carried out carefully, I don't see the novelty in the paper. What can we learn from this? No new theories are tested, no new analysis approaches, or assessment tools. Even no new data is collected. In the current stage, the article is 'just' an application of an existing model. This might be interesting and useful for local people (or for consultancies who have to give advise on land use strategies), but has limited use for the scientific

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audience in general. Therefore I recommend that the paper is submitted to a regional journal, or changed significantly in such way that there is a scientific novelty.

Nonetheless, the article is well written and clearly structured. Also the figures are OK.

SPECIFIC COMMENTS

P1L10: What is meant by 'optimal canopy cover'? Please explain.

P1L29: "...terrestrial ecosystems."

P2L19: "... reacts..."

P2L21-22: What is upper limit of vegetation density? Please explain.

P2L23: Please explain what optimal canopy cover is and why do we need it?

P2L30: Maybe I missed it, but what is the 'new method' in this paper? I only see the application of the theory of Eagleson.

P3L6: unit of rainfall is mm/year.

P3L30: Please provide somewhere how 'sunshine hours' are used to calculate Penman-Monteith, since there exist multiple ways to do this.

P4L11-12: Ev and Eps should be in italic.

P4L18-21: Please provide units.

P4L25-26: k_v^* and M should be in italic.

Eq4: Please provide units. They are partly in the appendix, but not consistent. P_{τ} seems to have an uncommon unit ($=mv/mh=[\#]/[mm]$). Normally this is e.g. mm/day. In that case dS (with unit mm?), should then be divided by dt (day). Please check all units carefully. It seems to me that currently it's a bit chaotic and inconsistent.

P5L2: if $E[]$ is the expectance, then this should not be in italic, since it's not a symbol.

P5L3: “.of the growing season..”

P5L5-7: These are all new symbols that are not explained in the main text. Furthermore, Eq 5 and 6 are a bit ‘surprising’ since I don’t know all the assumptions that Eagleson made. Maybe provide a bit more background. Also the appendix does not help to clarify.

P5L9: “.. describes the water demand. . .” Method-section: what is the new contribution? This is a summary of the work of Eagleson, right?

P6, L23-Table2: What is I, R and E. Not defined yet. I assume Interception, Runoff and Transpiration (thus neglecting soil evaporation)? And how are these numbers derived? Are these model data, or observations? Or is this output of the Eagleson model? Furthermore, the water balance components have the unit [mm], but what is then the time period? Over a year?

P9L24-Appendix: Please add units throughout appendix.

Table 1: Try to avoid terms like mn, since they can be confused with $m \cdot n$; Same for ‘ne’, better n_e . Furthermore, m is used twice and the explanation of hs/h is a bit unclear. Lastly, the unit of the psychrometric constant is kPa/K.

Figure 1: unit of precipitation is mm/year.

Figure 6: add that dM is calculated as $M^* - M$.

Figure 7: what is t_a and p_t ?

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