

Review of “Ecohydrological Optimality in Northeast China Transect”

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Overall Recommendation: Moderate revision

General Comments:

This manuscript applied Eagleson’s ecohydrological optimality method to derive the optimal canopy cover (M^*) and then compared M^* with the satellite derived canopy cover based on NDVI. In addition, the authors presented a comprehensive sensitivity analysis in terms of how the optimal canopy cover varies with different vegetation characteristics and climate factors. Overall, this paper is well written and organized and the main conclusions are sound. Although it is a local study focusing on the Northeast China Transect region, from a practical perspective, the implementation of Eagleson’s ecohydrological optimality theory can certainly provide some insights in terms of the understanding of climate change impacts on canopy cover dynamics and therefore, can provide useful guidelines for eco-restoration projects, especially for the selection of vegetation species and plant density. However, this paper would benefit from an additional efforts of the authors to improve their writing, as there are some grammar errors and inappropriate wording (listed in the end).

Based on the above considerations, I recommend the manuscript to be returned to the authors for moderate revisions before it can be accepted.

Specific Comments:

1. Page 2 Line 4-5: “Vegetation is considered as the indicator of climate”. This is not accurate. Please modify.
2. Page 2 Line 16-17: It is quite vague to say “Other studies ... NECT”. What kind of effects? Please be specific.
3. Page 2 Line 29: What does “due to the limitation of long term average state” mean?
4. For the introduction section, the importance of Eagleson’s ecohydrological optimality theory should be well elaborated to better and clearly state the objective and motivation of this study.
5. Page 3 Line 6: What does “global change gradient” mean?
6. Page 3 Line 17: I do not understand why the high resolution (500 m and 1 km) datasets were resampled to coarse resolution (10 km).
7. In the methodology sections, please use SI units for variables. Please also check other places.
8. Page 6 Line 1-2: Please consider moving “This method ... Table 1.” to somewhere in Section 2.
9. Page 6 Line 22: What kind of “human activity”?
10. Page 7 Line 9-10: The authors mentioned that “This can be explained ... climate changes.” But how?

11. Page 7 Line 14-15: How are water balance components calculated? There is no description.
12. Page 7 Line 22: Please consider changing “within the observed range” to “consistent with previous studies”.
13. Page 9 Line 10-16: This part could be moved to or mentioned in the introduction section to clearly state the motivation of this study.
14. Please carefully check Equations A.10 and A.12. Ve does not have the correct form.
15. For Table 1, it would be beneficial to the reader to have some statements linking it with the methods section. For example, some sentences can be added after Line 28 on Page 5.
16. Table 2, how is interception calculated?
17. In Figure 2, water supply curve should be corresponding to Eq. 7 and water demand curve should be corresponding to Eq. 5.
18. Please rephrase the caption of Figure 4.
19. Figure 5 & 6: What are the shaded areas?

Technical Corrections (Not an Exhaustive List):

1. Page 1 Line 6: Add “the” before “International”.
2. Page 1 Line 11: Change “trade-off of” to “trade-off between”.
3. Page I line 13: Change “then compare ... to discuss” to “which is compared with M to further discuss”.
4. Page 1 Line 15: Change “The result” to “Results”, change “matches” to “match”.
5. Page 1 Line 18: Change “climate change to” to “climate change on” and delete “quantitatively”.
6. Page 1 Line 22: Add “.” at the end of this sentence.
7. Page 1 Line 28: Change “the vegetation types” to “vegetation types”.
8. Page 2 Line 3: Change “effected” to “affected”.
9. Page 2 Line 7: Change “common index” to “common indexes”.
10. Page 2 Line 13: Change “researches about” to “studies on”.
11. Page 2 Line 25: Change “the vegetation” to “vegetation”.
12. Page 2 Line 26-27: Change “light ... state” to “light, energy, water and soil conditions in a long term average state.”.
13. Page 2 Line 27: Add “fact that” after “Despite the”.
14. Page 2 Line 28: Change “researches” to “studies”. Please also check other places.
15. Page 2 Line 31: Change “trade-off of” to “trade-off between”.
16. Page 2 Line 32: Change “Mo (2015)” to “Mo et al. (2015)”.
17. Page 3 Line 8: Change “200mm/year” to “200 mm”.
18. Page 5 Line 11: Change “be also” to “also be”, add “the” before “growing”.
19. Page 5 Line 12: Add “can be described as” after “soil column”.
20. Page 6 Line 21: Change “is relatively” to “are relatively”.
21. Page 7 Line 1: Change “effected” to “affected”.
22. Page 7 Line 4: The sentence “The correlation ... is 0.81” repeats previous one. Please either modify or delete this sentence.

23. Page 7 Line 5: Change “researches” to “studies”.
24. Page 7 Line 6: Change “region scales” to “regions”.
25. Page 8 Line 28: Change “shows the” to “shows a”.
26. Page 8 Line 32: Change “to” to “from”.
27. Page 9 Line 20: Change “to” to “on”, change “The main ... follows:” to “Main conclusions are summarized as follows:”.