

## RESPONSES to Reviewer 1: M. Coenders-Gerrits

The authors present a study where they apply the Eagleson ecohydrological optimality method to a North-East transect in China. The paper is well written and structured while some language issues should be solved. Furthermore, the paper needs some clarification on the definition of some hydrological terms and the units should be checked. Since I reviewed an earlier version of this manuscript before, I don't have many comments on the scientific methodology. Nonetheless, I think, the study remains poor in its added value/novelty. Mainly it's an application of Eaglesons theory and shows a comparison between existing canopy cover versus optimal canopy cover. On the other hand, the sensitivity analysis of several climate and plant physiological parameters does provide new insights.

RESPONSE: Thank a lot for the nice work by Dr. M. Coenders-Gerrits. We recognize that the innovation of this paper is not remarkable but "the sensitivity analysis of several climate and plant physiological parameters does provide new insights." We had accepted all the advices about the writing and had revised them in the manuscript.

### SPECIFIC COMMENTS

1. P1L8: Explain why "it's interesting to understand vegetation distribution..". That something is interesting is not a 'knowledge gap'. Maybe the last sentence of the abstract is the answer.

RESPONSE: It is true that something is interesting is not a 'knowledge gap'. We changed this sentence into "It is remarkable to understand vegetation distribution and dynamics under climate change in this transect."

2. P1L17: ".. the increas of LAI, stem fraction, AND temperature...."

RESPONSE: It is accepted.

3. P1L22: "Transect studies play an important..."

RESPONSE: It is accepted.

4. P2L22: too much =>many.

RESPONSE: It is accepted.

5. P2L24: ".. Eagleson presents a theory.." (also skip terms like 'smart')

RESPONSE: It is accepted.

6. P2L29: ".. which IS partly due..."

RESPONSE: It is accepted.

7. P2L32: "Mo applied this method..."

RESPONSE: It is accepted.

8. P3L7: unit of annual rainfall is mm/year

RESPONSE: It is accepted.

9. P3L15: "... on THE NASSA website.."

RESPONSE: It is accepted.

10. P3L25: Why is it so difficult to define barren soil and forest? This has nothing to do with the period 2000-2013, does it?

RESPONSE: We are sorry the confusion by the writing. We got the yearly Land Cover Types and the corresponding NDVI. Since the land cover of a fixed grid maybe changed in different year, so it is not easy to define the real barren soil or the forest areas. Our solution is that we considered the area sensed as barren soil for every year is the barren soil area, and the  $NDVI_{min}$  is the spatial average of barren area NDVI. Similarly, the area sensed as forests every year is considered as forests area, and the spatial average of forests NDVI is  $NDVI_{max}$ . We wrote this sentence into "Since the land cover of a fixed grid maybe changed in different year, it was hard to define the real barren soil or the forest areas."

11. P3L29: Why is canopy cover set as 1 the the NDVI is above it's max value? NDVI is related to the greenness and in principle has not much to do with canopy coverage, right?

RESPONSE: According to our definition of  $NDVI_{min}$  and  $NDVI_{max}$ , the actual NDVI of a grid may larger than  $NDVI_{max}$  or smaller than  $NDVI_{min}$ . The canopy cover can be regarded as 1 when the NDVI is above  $NDVI_{max}$  and as 0 if the NDVI is below  $NDVI_{min}$ .

12. P4L4:  $R_n$  should be in italic.

RESPONSE: It is accepted.

13. P4L5: Max and min temperature are not required for Penman (-Monteith).

RESPONSE: Yes, Max and min temperature are not required for Penman (-Monteith) in general. Here we used the FAO-Penman-Monteith Equation, where Max and min temperature were used to calculate the actual water vapor pressure.

14. P4L10: ".. He considered THAT climate and vegetation.."

RESPONSE: It is accepted.

15. P10L28: Please keep your units consistent. Here  $E_{pd}$  has unit [mm/day] while  $E(E_r)$  is in mm.

RESPONSE: All the units of evaporation are mm/day, but  $E_r$  is the storm surface retention depth of each storm. So the unit of  $E_r$  is mm.

16. Table 2: how is interception, runoff and evaporation calculated and what is the relation with Equation 6?

RESPONSE: Yes, all the components of water balance are estimated based on Equation 6, which had been stated when the Table 2 was referred.

17. Fig 1: unit of annual rainfall is [mm/y]

RESPONSE: It is accepted.

18. Fig 3: Add in legend that  $\Delta M = M^* - M$ .

RESPONSE: It is accepted.

19. Fig 5 6: lower right figure is not alligned well.

RESPONSE: The aligning problem is caused by the WORD and we had improved it.