

## ***Interactive comment on “Effects of terracing on soil water and canopy transpiration of Chinese pine plantation in the Loess Plateau, China” by H. Zhang et al.***

**H. Zhang et al.**

weiwei@rcees.ac.cn

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Dear referees,

Thank you for your valuable comments concerning our manuscript. These constructive comments are very helpful for revising and improving our manuscript. We have studied the comments carefully and have made extensive changes. Revised portions are marked in red in the revised manuscript. The major changes in the manuscript and the responses to the referee's comments are listed as following:

Comment 1: Line 25, “considerable implications regarding forest management and water yields” what are considerable implications? Not clear and need a rephrase.

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Response: Thank you for your comments. The sentence has been changed into “Transpiration constitutes an important part of the water budget in the soil-plant-atmosphere continuum. It can affect forest water yields and mechanism-based study on transpiration will provide theoretical guidance for forest management, ...”.

Comment 2: Line 68, “artificial plants” is this a right word?

Response: The words have been changed into “introduced plants”.

Comment 3: Line 95-96, how many soil moisture stations are employed in each stand? How close are they to the roots? It seems to me only one station is there for each stand, and if so, the soil moisture measurement would not be representative enough and could be completely biased if too close to or far away the root area.

Response: Thank you for your detailed comments. For each plot, there is only one soil profile monitored automatically with the soil moisture station (U30). It is located in the middle of the plot about 50 cm away from the trunk. Meanwhile, there are another three soil profiles uniformly distributed in the upper, middle, and bottom of each plot, which were monitored by TRIME-FM time domain reflectometry (TDR) twice a month, to calculate the soil water content. By comparing the data of each profile, it showed that the soil water content monitored by U30 can well represent the plot.

Comment 4: Line 113-114, there are grammatical errors in the sentences.

Response: Thank you for your detailed comments. We have revised the sentence into “is the maximum value of with zero transpiration assumed”.

Comment 5: Line 143, how did you do the significant test without site replicates? If you have, you may need more explanation to clarify.

Response: Thank you for your valuable advice. We have multiple monitoring locations (replicates) within each treatment. In the “2.4 Statistical analysis”, we mentioned that since the data of soil water content were auto-correlated in the time series, non-parametric tests of significance were used. The Wilcoxon rank sum test, also known

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as the Mann-Whitney U test, was used to test the differences in soil water content between two plots.

Comment 6: Line 158-159, how did you do the significant test for the canopy transpiration? Are there measurements for different trees in each stand?

Response: Thank you for your valuable advice. For each plot, six individual trees were monitored, and the canopy transpiration were calculated separately and used for statistical testing. When compared the differences between two plots, we used the average canopy transpiration.

Comment 7: Line 164, proportion of rainfall? Need more explanation.

Response: We are sorry for the unclear expression. And the sentence has been change into "The corresponding proportions of PET at the terrace site were 35.7

Comment 8: Figure 5, what do you mean "soil water variation" and "canopy transpiration variation"? The figure description in text and caption are needed to be improved for understanding.

Response: We are sorry for the unclear expression. The "soil water variation" and "canopy transpiration variation" represents  $\theta$  terrace  $-\theta$  slope and  $E_c$  terrace  $-E_c$  slope, respectively. The figure was mainly used to indicate that the differences between slope plot and terrace plot can significantly affect the canopy transpiration. The sentence in the text has been changed into "Furthermore, we examined that the increase of soil water content can make a significant increase in canopy transpiration." And the description of the figure has been changed into "Fig. 5 Correlation of  $E_c$  increment ( $E_c$  terrace  $-E_c$  slope) in response to SWC increment (SWC terrace  $-SWC$  slope) within 100 cm during two consecutive growing seasons (2014–2015)."

Comment 9: Figure 6, need a new figure. The subpanels are not clear and axis labels are vague.

Response: Thank you for your valuable advice. As suggested, we have made a new

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figure.

Comment 10: Line 214, what does the "low regression coefficient" refer to? Must be related to some correlations but without clear description.

Response: Thank you for your valuable advice and we are sorry for the confusion. The "low regression coefficient" means the  $R^2=0.20$  in Figure 5. And the corresponding revision were made in the manuscript.

Comment 11: Line 231, canopy conductance decrease with VPD? Do you mean increase of VPD? More clarification is needed throughout the whole manuscript on this problem.

Response: Thank you for your valuable advice. The canopy conductance decrease with VPD means the canopy conductance decrease with the increase of VPD. As suggested, we have revised related the sentences throughout the whole manuscript.

Comment 12: How about the weather difference between the two years in your study? Did the weather/climate difference have any impact on your study? In addition, the stands selected in the study are both located in north facing slopes, how about the south facing slopes? Qiao et al. (2015) and Zou et al. (2015) have used both experimental watershed data and modeling work to examine woody plant impacts on a broader region across climatic and physiographic settings in the southern Great Plains, USA. I think their studies could be useful references and provide some helpful hints in this study.

Response: Thank you for your valuable advice and we have searched and read these two articles carefully. There was no significant difference of climatic indicators between 2014 and 2015. Although the canopy transpiration can be affected by climate, the two plots were next to each other, the influences caused by climate can be neglected. Similarly, the slope aspect influences on canopy transpiration were the same. It did not affect the difference between slope and terrace. So we think the evaluation of

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the effects of terracing on soil water content and canopy transpiration was reasonable. Meanwhile, the articles were cited in the revision.

Thank you again for your valuable comments and suggestions.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., doi:10.5194/hess-2016-223, 2016.

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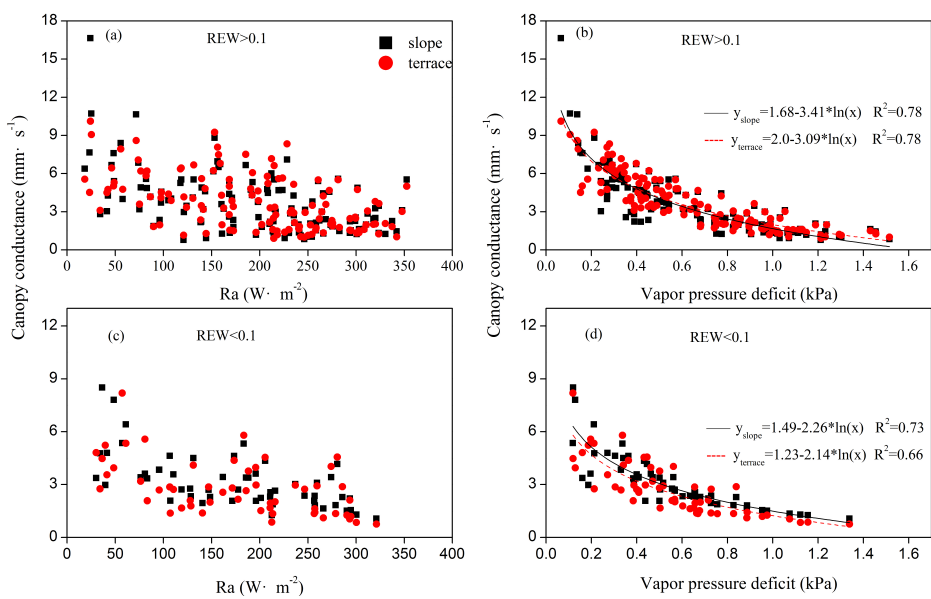


Fig. 1.

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