Reply to Referee 2#

We sincerely appreciate your efforts to review our manuscript and give us the constructive suggestions. The following is the answer one by one:

1. Provide more discussions on scientific issues related to ET and water yield in China. For example, some climate models suggest that the global water cycle is projected to be intensified by climate change. How does this study support this argument? How does this argument vary in different regions (basins) in China with different conditions (e.g., soil water, climate, vegetation type)?

Answer: The response of water to climate change is widely concerned. There are many studies to address this issue in recent years. Our results showed that climatic and vegetation (LAI) variability have intensified the terrestrial water cycle in China which was consist with previous studies. We will compared our results with previous studies and give some discussions.

2. **The authors did a good job in reviewing literature. However, in discussion, the authors emphasized more on similarities with earlier studies. What are the differences? What is new in this study? What are new insights provided?**

Answer: This is a good suggestion. In the previous version of the manuscript, we emphasized the similarity of outputs from this and previous studies. In the revision, we will deeply discuss the differences between our study and earlier studies and the causes for these differences. We will highlight the new insight of this study into the effects of climatic variables and LAI on the water cycle of terrestrial ecosystems in China.

3. **As the input data in land cover, leaf area index, meteorological data are with biases and uncertainties, a sensitivity test on the model's response to the biases and uncertainties will be helpful.**

Answer: Thanks for this important comments. We are conducting sensitivity analysis to assess how possible uncertainties in LAI and meteorological data affect calculated ET and water yield, respectively. And we will add this part to the new version of the revised manuscript.

Specific:

Title: Suggestion for a change to: "Evapotranspiration and water yield in China's landmass from 2000 to 2010"

Answer: This change was made in the current version of the revised manuscript.

Abstract: delete last sentence "...which is..". What is new in this paper?

Answer: This change was made in the current version. We rewrote the abstract to highlight the new findings in this study in the current version of this manuscript.

P 5401, L1: change to: "ET is one of the most difficult..."

Answer: This change was made in Line 16, P 3 in the current version of this manuscript.

P 5401, L7: change "point" to "site". How large is landscape scale defined there? Give the range.

Answer: This change was made in Lines 21-22, P 3 in the current version of this manuscript.

P 5401, L9: delete "Fortunately".

Answer: This change was made in the current version of this manuscript in Line 24, P 3 in the current version of this manuscript.

P 5403, L21: add in the last sentence "in China".

Answer: This change was made in Line 1, P 5 in the current version of this manuscript.

P 5404, L3: delete "used".

Answer: This change was made in Line 2, P 5 in the current version of this manuscript.

P 5404, L4: use "2.1 The BEPS model"

Answer: This change was made in Line 3, P 5 in the current version of this manuscript.

P 5404-5: Indices *r* and *j* in Equations 1-4, and 8 are not explained. It is better to replace *r* with a subscript "plant" so that it is consistent with other subscript. Index *j* can be deleted or explained as an index for sunlit and shaded leaves.

Answer: This change was made. Variable *r* was replaced with plant. j was explained as the index for sunlit and shaded leaves. These were corrected in Line 36, P 5, Line 1, P6, Line 8, P6, and Line 9 P 6 in the current version of this manuscript.

P 5405, Equation 3: explain How ra is calculated? Is it assumed as a constant depending on land cover types? (as wind data are not mentioned for its calculation).

Answer: Similar to Liu et al. (2003), r_a is assigned according to land cover types in this study. This information was given in Line 12-14, P 6 in the current version of the manuscript.

P 5406: remove the left bracket before "Zhang" to after " Wegenhenhel" as (2006).

Answer: This change was made in Line 32, P 7 in the current version of this manuscript.

P 5408: A table summarizing all the input data would be helpful.

Answer: We added a table (Table 1) to summarize all the input data was added in P 9, which is described in P 31 in the current version of the manuscript.

P 5409, Land cover data: what is the error assessment for the data?

Answer: In this study, we used MODIS V005 land cover data to inverse LAI and drive the BEPS model. A cross-validation analysis indicated that the overall accuracy of the product is about 75% (Friedl et al., 2010). Liu et al. (2012b) indicated that the MODIS V005 data can describe the spatial distribution of land cover well in China, with a precision of 61.9%. Of course, the errors in the land cover type dataset will cause certain uncertainties in calculated

ET and water yield since different land cover types have differences in transpiration. The uncertainties can be cancelled each other at regional and national scales. We acknowledged the uncertainties related to land cover data in Lines 36-38, P 8 in the current version of this manuscript.

P 5410, L8: "Shangguan" looks like a first name, not the last name. The same applies in the reference list.

Answer: Shangguan is the last name in China and the first name is Wei.

P 5412, Equation 13: this equation may not be necessary as it is very basic. A reference for the equation may be adequate enough. If the equation for calculating *a* is given, equation for *b* should also given.

Answer: Following the suggestion, we deleted Equation 13 and added a reference (Liu et al., 2012c) in Line 24, P 10 in the current version of this manuscript.

P 5426, L12: delete "very".

Answer: This change was made in Line 23, P19 in the current version of this manuscript.

Table 1: What do CBS, QYZ... mean? Explain them in the caption. It is better to give a name to each site, such as using their location as their name.

Answer: In 2.3.1 ET measured using the EC technique, the full names for different sites are listed. The abbreviations for these sites used in this paper are same as conventionally used China's Fluxnet. Following the comment, the full names of different sites were added in Table 2 in P 10, which was described in P 31 in the current version of this manuscript.

Table 2: Explain APE, RPE, R, and RMSE.

Answer: A notation was added under Table 3 for explaining APE, RPE, R, and RMSE in P 32.

Figure 2: Delete "typical" in the caption.

Answer: This change was made in the current version of this manuscript in P34.

Figure 3: Add "(see Table 1 for site information)" in the caption. Explain site abbreviations (CBS...). Add month on the label for x-axis.

Answer: The changes were made in P 35 in the current version of this manuscript.

Figure 4: The size and fonts are not comparable with other figures (too large, or other figures being with too small fonts and sizes).

Answer: Following the comment, the size and fonts of Figure 4 were made smaller in P 35 in the current version of this manuscript.

Figure 7: Unit for ET should be mm/year. Explain the symbols for the label on the x-axis.

Answer: The unit for ET was changed. The symbols for the label on the x-axis were explained

in the current version of the manuscript in P 37.

Figure 8: Unit for ET should be mm/year. Explain the symbols for the label on the x-axis.

Answer: The unit for mean ET was changed into mm yr^{-1}. The symbols for the label on the x-axis were explained in the current version of the manuscript in P 37.

Figure 9: Explain symbols for each basin.

Answer: The symbol for each basin was explained in the current version of the manuscript in P 38.

Figure 11: What is *p*? level of significant? This 11-year trend seems not to be significant. I suggest to remote the line. What is *r*? correlation coefficient? Change caption to: "Interannual variation of TE rate averaged over China's landmass from 2000 to 2010".

Answer: Variables *p* and *r* denote significance level and correlation coefficient, respectively. Following the comments, we changed the caption of this figure into "Interannual variation of ET rate averaged over China's landmass from 2000 to 2010" in P 39.

Figure 12: Write the unit of the 11-year trend in the caption.

Answer: This change was made in the current version of the manuscript in P 39.

Figure 14: Explain symbols for each basin.

Answer: The symbol for each basin was explained in the current version of the manuscript in P 41.

This is a personal preference: please spell out the abbreviations for land cover types, validation sites, and basins throughout the text, figures, and table captions, to increase readability. Only use them in Tables and Figures. This is up to the editor and the journal's discretion.

Answer: Following this comment, corresponding changes were made.

If *p<0.01* in statistics, just write *p<0.01*. There is no need to write several decimal points for *p*.

Answer: Following this comment, corresponding changes were made.

Reference：

Friedl, M. A., Sulla-Menashe, D., Tan, B., Schneider, A., Ramankutty, N., Sibley, A., and Huang, X.: MODIS Collection 5 global land cover: Algorithm refinements and characterization of new datasets, Remote Sens. Environ., 114, 168-182, 10.1016/j.rse.2009.08.016, 2010.

Liu, J., Chen, J. M., and Cihlar, J.: Mapping evapotranspiration based on remote sensing: An application to Canada's landmass, Water Resour. Res., 39, 10.1029/2002WR001680, 2003.

Liu, X., Wang, H., He, M., and Shi, X.: Precision analysis of three land-cover types in China region,

Transactions of the Chinese Society of Agricultural Engineering, 28, 252-259, 1002-6819(2012)28:24<252:sztdfg>2.0.tx;2-k, 2012a.

Liu, Y., Ju, W., Chen, J., Zhu, G., Xing, B., Zhu, J., and He, M.: Spatial and temporal variations of forest LAI in China during 2000-2010, Chinese Sci Bull, 57, 2846-2856, 10.1007/s11434-012-5064-8, 2012b.