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Hydrology and Earth System Sciences Discussions

Interactive comment on "Does evaporation paradox exist in China?" *by* Z. T. Cong and D. W. Yang

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Thank Mr. Thomas for his professional advices. And we are sorry for the delay to respond the comments.

A. About the missing references

Mr. Thomas gave us some new references. Dr. Tim McVicar (CSIRO Land and Water, AUSTRALIA) also gave us some new references. This indicates that many researchers have paid attention to this topic and these new references help us understand this field more deeply. In the revision, we will consider add some references to make this analysis more dependably.

B. The major part of the paper should be devoted to analyze the effects of radia-

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tion and wind speed rather than temperature.

Evaporation paradox refers to the contrary between decreasing in pan evaporation and increasing in air temperature. So this paper pays more attention to the relation between trend of pan evaporation and trend of air temperature, even though the air temperature is not the main cause of the pan evaporation change. In this paper, our effort is to divide the past 50 years into two periods in China with full data then to discuss the evaporation paradox and the relations between pan evaporation and other climate variables. In the revision, we will give more discussion about influence on pan evaporation of other climate variables.

C. About the effect of vegetation and land use

We agree that it will alter the results if we take the effect of vegetation and land use into account. But it is a pity that we have no enough data about vegetation and land use. In the further study, we will make efforts to get the data and make this analysis.

Other comments:

1. *In addition mean temperature is masking any effects of changes in diurnal temperature range so maximum and minimum temperature should be analyzed.*

With the global warming, the diurnal temperature range became smaller all over the word and in China. The trends of Tmax and Tmin in the past 50 years have been given. In the revision, the relation between pan evaporation and the two variables will discuss.

2. *About 40% of the observed temperature change in China appears to be due to urban warming (Guoyu Ren et al.; 2008; Urbanization Effects on Observed Surface Air Temperature Trends in North China.;Journal of Climate;21;6;1333-1348). This reduces the presumed correlation between temperature and evaporation considerably. Please include this fact in your analysis and discussion.*

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Thank for the reminding. It is an interesting topic about the influence on climate observation of urbanization. In general, the urbanization caused warming and wind speed weakening because most weather stations lie near the city. It is difficult to analyze the influence quantitatively but we should consider this factor in our discussion about the climate variables trend.

3. *p2113, l11 Thomas (2000) did not analyze evaporation trends but PET trends and should be moved to l15.*

It is an obvious mistake and we will modify it in the revision.

4. *p2114, l1 conversion of pan evaporation constants in Allen et al (1988) is to pot. ET not actual ET.*

Yes, this sentence is not clear enough. What we want to say is that the potential ET can be converted from pan evaporation with pan coefficient (Kp), then the actual ET can be converted from potential ET with crop coefficient (Kc) and soil water coefficient (Ks). The relation is:

ETa = Kc Ks ETp = Kp ETpan

We will describe the relation more clearly in the revision.

5. *p2114, l12 Thomas (2002) should read Thomas (2000)*

It is a mistake, too. And we will modify it in the revision.

6. *p2114, l21 almost all papers point to other variables than temperature as responsible for evaporation trends so to stress a temperature - ET- relation and devote to it the major part of the paper is certainly misleading*

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Evaporation paradox refers to the contrary between decreasing in pan evaporation and increasing in air temperature. So this paper pays more attention to the relation between trend of pan evaporation and trend of air temperature. Therefore, we only give the result about this relation in despite of other variables than temperature as responsible for evaporation trends in these references. In the revision, we will add the discussion about influence on pan evaporation of other climate variables, and the corresponding reference will be pointed.

7. *p2117, l1, this statement is misleading: evaporation is (not 'can') be influenced by the mentioned variables.*

This comment maybe refers to p2118. 'can' is used because we are not sure whether these variables influence evaporation. Some other word may be better such as 'may'.

8. *p2117, l5-11, the PM function is well known and the paragraph that contains the equation should be deleted*

This comment maybe refers to p2118. This paragraph may be unnecessary so we will delete it in the revision.

9. *p2117, l13, change sunlight time to sunshine duration. Give the Angstroen constants that were used to estimate solar radiation from sunshine duration: did you use standard values of a=0.25, b=0.5 or individual values?*

This comment maybe refers to p2118. Thank the advice to change 'sunlight time' into sunshine duration. In this paper, only the trend of sunlight time (sunshine duration) was analyzed and the Angstroen constants are not used.

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10. *p2116, l1 Table 1 lists trends rather than means*

Both the trends and the means are listed in Table 1.

11. *reference section: Wu (2006) and Xu (2006) not cited*

It is our carelessness and the following reference information will be added.

Wu, S. Yin, Y. Zheng, D. Yang, Q. Moisture conditions and climate trends in China during the period 1971-2000. Int. J. of Climatology, 26(2):193-206, 2006

Xu, M., C.P. Chang, C. Fu, Y. Qi, A. Robock, D. Robinson, and H. Zhang. Steady decline of east Asian monsoon winds, 1969–2000: Evidence from direct ground measurements of wind speed. J. Geophys. Res., 111, D24111, 2006

12. *Figures: Fig.1 give maximum/minimum temperature instead of mean temperature; Figs 2-4: no data is given for the south China Sea islands so restrict figure to mainland China. Increase figure size considerably, figures are far too small to identify any of the symbols.*

We have redraw Fig.1 according to the reviewer. And the size of Figs 2-4 will be increased.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 5, 2111, 2008.