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Hydrology and Earth System Sciences
Discussions

Interactive comment on "Urbanization dramatically altered the water balances of a paddy field dominated basin in Southern China" *by* L. Hao et al.

Anonymous Referee #3

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This study "Urbanization dramatically altered the water balances of a paddy field dominated basin in Southern China" discussed an important hydrological consequences of urbanization over the typical agricultural landscape of the southern China over which paddy field dominates. The conclusion that urbanization will increase the total streamflow and decrease ET is within our common sense , while this article provided more evidence and data to support this idea and highlighted the larger magnitude in the increase of runoff coefficient due to the urbanization over paddy fields than other vegetation cover. My major concern is the robustness of statistical analysis over this short time period (i.e. 2000-2013) over which natural fluctuations due to climate variations

may overcast the human influences. Although the authors provided several different statistical methods to support their conclusions, I still have doubt on their conclusions because of some missing data and assumptions (see detail comments that followed). To make it publishable, this manuscript need major edits in the language.

Figure 1: Capitalize "Overland flow" and put it in one line; Separate each item with ";" or line break in each text box; increase the width of lines. Make a brief description of this figure in the text.

Page 1945, Line 27: add "to" between "was" and "understand";

Rephrase the title of Figure 2 as "The location and land use change of the Qinhuai River Basin during 1988-2012". Replace "The insert map..." with "The land use map was classified from Landsat ETM+ images of the year 2012".

P1946, L23: The rate should be clarified. according to Fig. 3, the rate should be 0.26 Celsius degree / decade since 1961. The "1990s" represents a 10-yr period. Is it exactly what the authors want to report that the temperature increased 0.44 Celsius degree in this decade?

Figure 4: replace "P" with "PPT"; spell out the "SD".

Figure 5: Rephrase the title, such as "Changes in MODIS ET and LAI during the peak growing season (July - August) during 2000-2013. What's the unit of ET?

P1946, L25: Add "per unit basin area" after "streamflow". P1948, L10: Delete "are". P1950, L5-6: It's better to replace these two "change" with "linear trend".

Figure 6: Need to explain why using different time scales on LAI (annual mean?) and PET (in the peak growing season) when calculating their correlations with departure of ET (annual).

Figure 7 & P1950,L13-15 & L24-27: This figure and analysis are misleading since the data for the first time period is not complete, i.e. missing 2004 & 2005. From

the diagram of runoff coefficient during May-October in each year, I am arguing that there might be no significant change during 2006-2011 and the big increase in the last two years may due to climate variations. I am concerning the robustness of statistical method for this short time period.

P1951,L10-12: As authors mentioned in P1950,L22-24 that groundwater levels were on the rise in recent decade, estimating ET with "PPT - Q" might be questionable; while it may also indicates that ET might decrease in a higher rate than the current estimations.

P1951,L15-17: Fig. 10 shows the trends of annual streamflow during the period of 1986 - 2013, but here the authors are talking about the trends over the period of 2000 - 2013. Do these two time periods have the same trends in the magnitude?

P1951,L22-24: The strong correlation between MODIS ET and LAI is most likely from the equations on which MOD16 product based (Mu et al., 2007). I question the usage of this information to support author's point at here. But without doubt, the authors can make this claim that MODIS ET also have the same result as detected with other methods (in this article).

P1952,L1-2: Here the authors claim that "regional annual ET is generally controled by PET, P, and ..." which is inconsistent with their previous claim (P1951,L20), i.e. "LAI is a major controlling factor for ET". Do these control factors' role change in various spatial and temporal scales? The authors should clarify in the text.

P1952,L2-3: I believe there is a typo. Should replace "an increase in P and PET" with "a decrease in P and PET".

P1954,L22-23: The claim of "The changes in water balances were mainly through the reduction in growing season ET and not by increasing impervious surfaces alone" is confusing. One conclusion from this study should be that the decrease of ET is mainly caused by the shrinkage of rice paddy fields and expansion of impervious surface

area. Are there other reasons that could decrease ET? Are the authors mentioning decreasing LAI (is it not dominantly from urbanization)?

P1952,L6-7 & P 1950,L24-25: Why does this shift in runoff coefficient happen around 2003?

References: Mu, Q., F.A. Heinsch, M. Zhao, and S. W. Running, (2007), Development of a global evapotranspiration algorithm based on MODIS and global meteorology data, Remote Sensing of Environment, 111, 519-536, doi: 10.1016/j.rse.2007.04.015

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