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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. Crago, Mr. Thomas and Mr. Hashmi for their nice encourage and good advises. This time, we will reply the questions of Mr. Crago and Mr. Hashmi firstly.

A. About the stations selecting

We had got pan evaporation rates recorded at 709 stations from 1956 to 2005 obtained from Climatic Data Center, National Meteorological Information Center, China Meteorological Administration, and other weather data from 751 stations released by China Meteorological Data Sharing Service System. Only 317 stations have the full data from 1956 to 2005 with all the weather factors. So we used only 317 stations.

B. About the statistics method

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In the following Table 3, the statistics have been provided separately for 1956 to 1985 and 1986 to 2005. In the following Table 4, stepwise regression method is used to analyze the significance to pan evaporation of the independent variables. With these results, we can get some new interesting conclusions. For example, from 1956 to 1985, pan evaporation decreased with the decreasing in daily max air temperature and the decreasing in wind speed; from 1986 to 2005, pan evaporation increased with the increasing in daily max air temperature and the decreasing in precipitation. More analysis will be made in the revision.

C. About the actual evaporation and hydrological implications

It is significative but difficult to discuss the relation of precipitation, pan evaporation and actual evaporation. When the precipitation is used as the abscissa, the pan evaporation will decrease with the increasing in precipitation at any weather station, and the Bouchet complementary evaporation relationship exists. But it becomes uncertain when the time or the year is used as the abscissa. So the complementary evaporation relationship can not used to discuss the change trend of evaporation because the energy condition maybe changes.

Other questions:

1. *The language needs to be edited by a fluent English speaker.*

   Yes.

2. *On page 2114, line 15, I think the word "complementary" should be changed to "proportional".*

   Yes.

3. *On page 2116, line 11 needs to be re-written. Do the authors mean that daily values were averaged for each year for each of the 317 stations?*

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"daily mean air temperature" should be "annual average of daily mean air temperature"

4. *On page 2115, line 20, air temperature should specify degrees Celsius.*

   Yes. It may be lost from word to PDF.

5. *On page 2115, lines 7-9, how were the 317 stations chosen? What was the basis for this choice? Was it entirely random?*

   See A above

6. *On page 2116, line 16, it is not clear what the word "they" is referring to. Pan evaporation rates?*

   It maybe refer to line 6. "they" is referring to pan evaporation rates. We will modify it.

7. *Table 2 needs to be explained either in the text or in the table heading. Currently, there is no explanation, and the table is not self-explanatory.*

   One note will add following the table.

8. *Section 2.1 should contain a brief description of the measurement methods used to collect the pan evaporation, wind speed, air temperature, and precipitation data.*

   It will be done.

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

Table 3. Correlation coefficients between pan evaporation and other weather factors a) from 1956 to 2005

heightWeather factors	Coefficient of average	Average coefficient	Number of stations with coefficient more than 0.3	Number of stations with coefficient less than -0.3
Mean air temperature	-0.02	0.24	139	14
Max air temperature	0.25	0.36	207	4
Min air temperature	-0.23	0.05	67	40
Sunlight time	0.75	0.37	189	1
Wind speed	0.53	0.27	152	8
Humidity	-0.36	-0.49	0	261
Precipitation	-0.33	-0.36	0	212
Vapor pressure deficit	0.19	0.47	247	2

Table 3. b) from 1956 to 1985

heightWeather factors	Coefficient of average	Average coefficient	Number of stations with coefficient more than 0.3	Number of stations with coefficient less than -0.3
Mean air temperature	0.35	0.38	220	1
Max air temperature	0.68	0.49	260	0
Min air temperature	-0.08	0.09	63	17
Sunlight time	0.79	0.41	224	6
Wind speed	0.51	0.30	175	8
Humidity	-0.48	-0.58	0	291
Precipitation	-0.42	-0.40	1	229
Vapor pressure deficit	0.61	0.60	295	0

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Table 3. c) from 1986 to 2005

heightWeather factors	Coefficient of average	Average coefficient	Number of stations with coefficient more than 0.3	Number of stations with coefficient less than -0.3
Mean air temperature	0.56	0.37	206	7
Max air temperature	0.61	0.42	230	7
Min air temperature	0.52	0.21	137	22
Sunlight time	0.37	0.34	193	14
Wind speed	-0.19	0.16	109	25
Humidity	-0.60	-0.50	3	254
Precipitation	-0.32	-0.35	1	205
Vapor pressure deficit	0.76	0.54	264	5

Table 4. Result of stepwise regression

Period	Variables entered	Unstandardized Coefficients
1956-2005	(Constant)	-451.634
	Suntime	0.183
	Tmax	80.308
	Windspeed	205.245
	Rain	-0.307
1956-1985	(Constant)	-676.51
	Tmax	156.56
	Tmin	-105.46
	Windspeed	128.75
1986-2005	(Constant)	477.02
	Tmax	90.35
	Rain	-0.64

Note: Stepwise (Criteria: Probability-of-F-to-enter <= .100, Probability-of-F-to-remove >= .101).

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