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Does evaporation paradox exist in China?

Z. T. Cong, D. W. Yang, and G. H. Ni

State Key Laboratory of Hydrosience and Engineering, Department of Hydraulic Engineering, Tsinghua University, Beijing 100084, China

Abstract. One expected consequence of global warming is the increase in evaporation. However, lots of observations show that the rate of evaporation from open pans of water has been steadily decreasing all over the world in the past 50 years. The contrast between expectation and observation is called "evaporation paradox". Based on data from 317 weather stations in China from 1956 to 2005, the trends of pan evaporation and air temperature were obtained and evaporation paradox was analyzed. The conclusions include: (1) From 1956 to 2005, pan evaporation paradox existed in China as a whole while pan evaporation kept decreasing and air temperature became warmer and warmer, but it does not apply to Northeast and Southeast China; (2) From 1956 to 1985, pan evaporation paradox existed narrowly as a whole with unobvious climate warming trend, but it does not apply to Northeast China; (3) From 1986 to 2005, in the past 20 years, pan evaporation paradox did not exist for the whole period while pan evaporation kept increasing, although it existed in South China. Furthermore, the trend of other weather factors including sunshine duration, windspeed, humidity and vapor pressure deficit, and their relations with pan evaporation are discussed. As a result, it can be concluded that pan evaporation decreasing is caused by the decreasing in radiation and wind speed before 1985 and pan evaporation increasing is caused by the decreasing in vapor pressure deficit due to strong warming after 1986. With the Budyko curve, it can be concluded that the actual evaporation decreased in the former 30 years and increased in the latter 20 year for the whole China.

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