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The relative importance of antecedent soil moisture and precipitation in flood generation in the middle and lower Yangtze River basin

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Supplementary

To validate our results, we collected the 0-200cm soil moisture from the China Land Data Assimilation System (CLDAS) provided by China Meteorological Administration (CMA) (Wang & Li 2020). 37 catchments covering a range of climate and topography were selected for comparison (Figure S3). Since this dataset only has soil moisture data from 2008, the mean percentile of antecedent soil moisture was calculated from 2008 to 2016 based on the CLDAS soil moisture. This was then compared with the mean percentile based on water balance as in the manuscript (Figure S4). As we can see from Figure S4, the scatters fall around the 1:1 line, that is, the mean percentile calculated from water balance are close to the mean percentile from re-analysis soil moisture. This is consistent with our discussion that averaging through long-term records would be less impacted by the simplification in estimation. Due to the length of CLDAS dataset, we only averaged within 9 years, for the at least 25 years records used in our study, it is likely to be less scatter. While this is just a minimal evaluation of the values, given the goal of this study, we think the averaged percentile of antecedent soil moisture based on the water balance model is acceptable for the purpose of this study at the mean annual scale.

Wang, Y. and Li, G. (2020). Evaluation of simulated soil moisture from China Land Data Assimilation System (CLDAS) land surface models, Remote Sensing Letters, 11 (12), 1060 – 1069.

Table S1: Estimated concentration time for 10 sites with largest drainage area: the ones on main stream (MS) and the ones at the outlets of major tributaries (TR).

Site Name	Concentration Time (hr)	Drainage Area (km²)
TR-Hukou	17.9	161,979
TR-Chenglingji	18.8	261,986
MS-Zhutuo	32.7	668,661
MS-Cuntan	32.8	827,799
MS-Wanxian	37.6	948,524
MS-Yichang	41.5	982,948
MS-Jianli	45.2	1,014,690
MS-Luoshan	46.3	1,276,676
MS-Hankou	51.0	1,432,008
MS-Datong	54.3	1,657,604

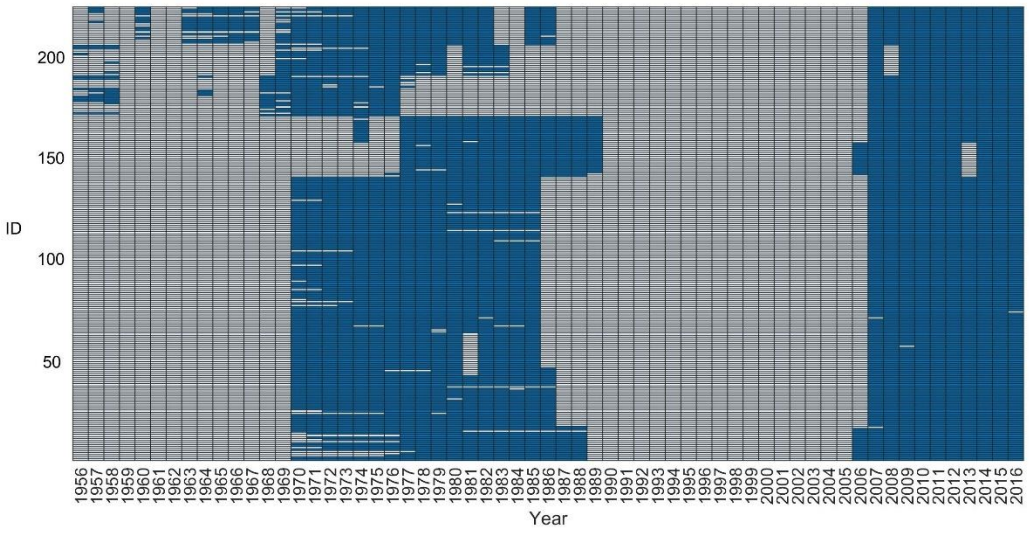

Figure S1: The data availability of each station, each column indicates each year while each row is corresponding to each station, blue grid indicates there is record of this year.

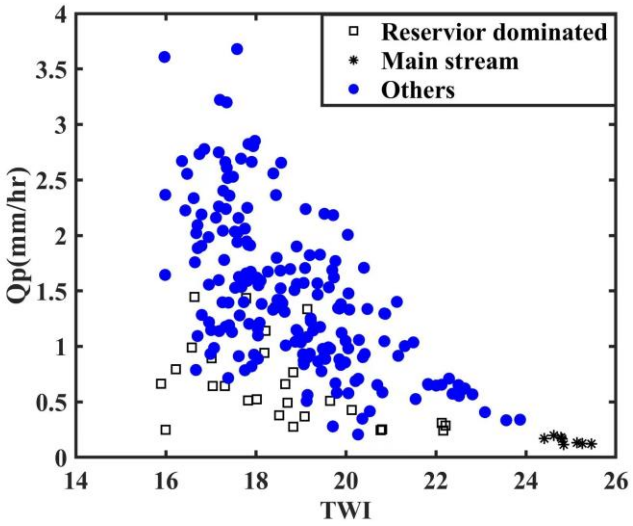

Figure S2: Scatterplot between the topographic wetness index (TWI) and area weighted annual maximum discharge (Q_P).

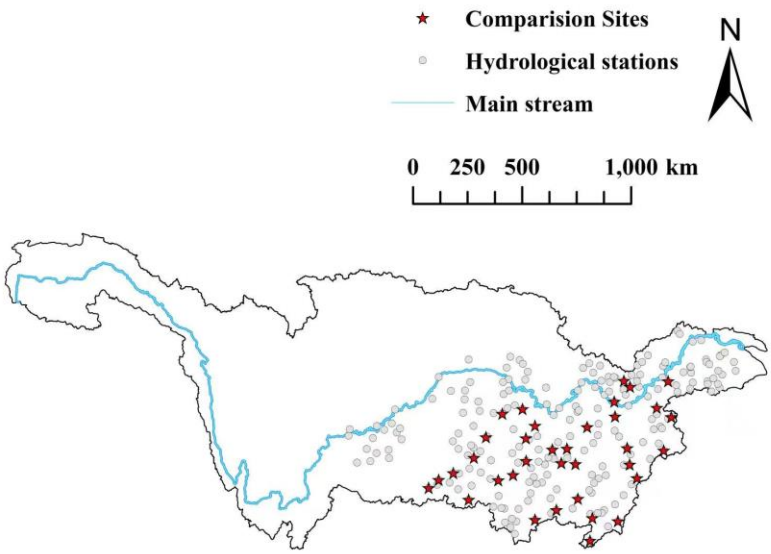

Figure S3: Map of the 37 selected stations used for comparison. Fuhe station and its two tributaries' stations almost coincide in the figure.

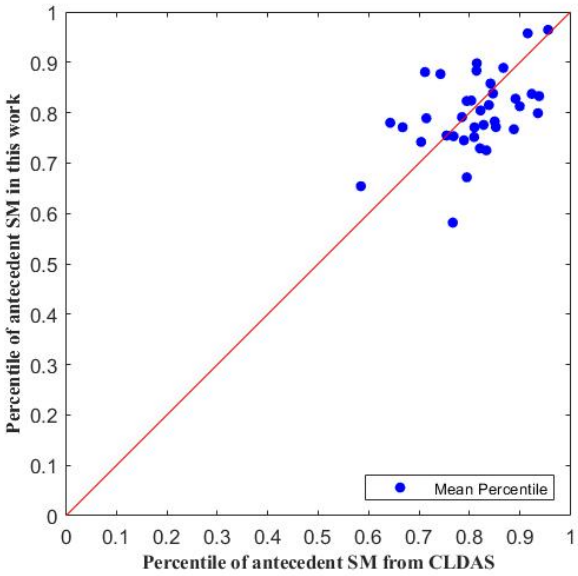

Figure S4: Comparison between the mean percentile of antecedent soil moisture in our work and the percentile of antecedent soil moisture from re-analysis dataset CLDAS (China Land Data Assimilation System). The red line is the 1:1 line.