

Interactive comment on “Characterizing drought by change in precipitation-runoff relationship: a case study of the Loess Plateau, China” by Yuan Zhang et al.

Anonymous Referee #2

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General comments: The authors analyze the drought impacts on the runoff ratio in China's Loess Plateau. The climate anomaly, relationships between precipitation-runoff, the implications for ecosystem, and the water resource management were discussed in the manuscript. The structure of the manuscript and the problems description are well organized, but there are several serious flaws in the data analysis, methods description, and interpretations of results. Thus, this version of the manuscript can not be accepted for publication in HESS.

First of all, the amount of the water consumption for the local communities (domestic and industrial usage) is vital for the runoff ratio in the study period, especially for during

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the drought. The authors should at least investigate the changes in the water supply for the local communities.

The precipitation -runoff relationships can be influenced by the land use, surface water diversion, irrigation scheme, groundwater abstraction, and the water storage in the (sub) catchment. These issues should be addressed for identifying the influence of drought on the water yield.

Section 2.2 The proposed classification method of drought events, drought periods, the interpretations of results, and the upscale processes from 13 sub catchments to regional precipitation anomaly are not clear enough to support the publication of this version of the manuscript in HESS.

The NPP estimation based on the remote sensing data (2000-2008) could not support the analysis results of the drought on the ecosystem from 1961 to 1999. The authors need to find at least the data in one of the main drought period defined in this manuscript and another normal period to illustrate the difference for determining the drought impacts.

The English should be substantially improved to a certain level that the readers can not misunderstand the correct information.

Specific comments: Affiliation: Shaanxi? should be Shanxi.

Page 1, line 1, "is" should be "are". Page 1, line 5, only the re-vegetation that makes the drought a major concern? Page 1, line 12 delete the "around" after "(precipitation" Page 1, line 13-14, "NPP" and "PRR" should not be abbreviation in first appearance. page 2, line 9-11, weird sentence. Page 2, line 30, replace the "with" with "by". Page 3, line 25, please indicate the data length or periods. Page 3, line 27, website in the bracket does not match the text. Page 4, line 2, replace "its" with "in". Page 4, line 4, conditions 2 should be page 6, clarified. Page 6, line 21, please identify the time period for "long term". Page 7, line 25-27, long sentence. Section 3.3, please re-write

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the first paragraph. Page 8, line 10, where are the basins with significant changes in precipitation in table 1? Page 9, line 5, replace the "as well as " with "and " Page 9, line 11, should be "<http://www.mwr.gov.cn>"

Figure 1, where is the Yellow river? it is indicated on the up-left small plot that the Yellow river flows through the loess plateau. Figure 2, Do you use the average of rainfall for the 13 watersheds? The description of drought events for condition 1 and 2 in section 2.2 may not be applied on the year 1974, when the 3- year moving average should be lowest in the first main drought period. But the 3-year moving average in 1970 in the figure is lowest. Figure 3, What are the historical records? Apparently, the historical records in three plots are different, why? better to use the same scale for x-axis in three plots. Figure 5, the drought periods in different sub-catchments are not identical, why? again, what are these historical records? Figure 7, what is the drought event corresponding to the return period in figure7d? Figure 8, at least show the whole legend of the figure 8a. is it the average return period of the drought events in 8b? Figure 9, add "change" after the significant in the caption.

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