	Comment *(line numbers refer to the original HESS-D submission)*	**Response** *(line numbers refer to the updated manuscript, non-track-changes version)*
	Reviewer 1: Dengfeng Liu	
1	General comments: The manuscript presents a range of possible process explanations of flow response to the Millennium Drought in Australia, and then evaluates these hypotheses against available evidence. The manuscript is an excellent work to understand the changes in rainfall-runoff relationships after Australia's Millennium Drought. The strength of this work is a large-scale assessment of hydrologic changes and potential drivers. The framework of Hypothesised Process Explanations is also useful to investigate the effects of the drought in other watersheds, and planning more extensive field studies to test predictions of hypotheses. Specific comments:	Thank you for the supportive comments and constructive feedback.
2	In Figure 2, the data of precipitation and runoff from 2011 to 2021 should also be presented to show the hydrological behavior after the Millennium Drought.	Agreed that post-drought data is informative. We have added data up until 2017 (Line 193), and we hope this suffices. Data up to 2021 are not easily available because the source dataset (Hydrologic Reference Stations / CAMELS AUS) is not yet updated to 2021.
3	Line 234, The manuscript focus on the changes of rainfall-runoff relationships, the annnual runoff coefficient, and those in each season may be necessary to discuss.	It is reasonable to provide the reader with information about runoff coefficients (including seasonally) as background information to assist interpretation of the HPEs. As such, we added Appendix B, which provides maps of annual and seasonal runoff coefficients (along with precipitation and streamflow) over the pre-drought, drought and post-drought periods. We added a reference to the new appendix near to where the reviewer commented (Line 168). We did not feel the runoff coefficients needed to be discussed beyond their being mentioned in Section 2 (Line 168) and as part of various HPEs (eg. HPE01, Line 216).
4	The multiple stable states of the watershed may be a potential perspective to explain the change of the behavior of the rainfall-runoff relationship, as mentioned in Line 379, such as that in Peterson et al. (2009). The Millennium Drought is an extreme disturbance that may push the system from one stable state to another. The question is how to quantify the multiple stable states of the watershed. The dry stable state may be seldom presented in the watershed. Peterson T J, Argent R M, Western A W, Chiew F H S. Multiple stable states in hydrological models: An ecohydrological investigation, Water Resources	These concepts were already present in the manuscript, but perhaps less explicitly. In response to comments from both reviewers, we have expanded the text on this topic. It now reads (line 398): *"Peterson et al. (2021) … suggest that their findings (as summarised in Section 2) are "consistent with … watersheds having multiple stable states [of behaviour] and a finite resilience". In this view, the hydrological shift towards a lower rainfall-runoff relationship corresponds to a transition from one stable state to another (see Peterson et al., 2009). It is noted*

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	Research, 2009, 45, W03406, doi:10.1029/2008WR006886.	*that the word "state" here has a different meaning to its common hydrological usage (eg. "state variable"), as it refers to the behaviour of a system being organised into discrete preferential states (eg. the "wet" and "dry" states of D'Odorico and Porporato (2004)), with intermediate conditions having low probability of occurrence. The Millennium Drought was an extreme disturbance that might have pushed several catchments from a wetter to a drier state, with the drier state otherwise seldom being apparent in a catchment's behaviour."*
5	If the water storage capacity in a watershed is large enough to control all/most of the annual runoff (associated with HPE23), the watershed will be a human-controlled system where the released runoff is regulated by the reservoirs, such as Tarim River basin in China (Liu et al., 2014; Liu et al., 2015). The total water storage capacity of all dams in a watershed may be an important index.Liu, Y., Tian, F., Hu, H., Sivapalan, M. Socio-hydrologic perspectives of the co-evolution of humans and water in the Tarim River basin, Western China: the Taiji–Tire model[J]. Hydrol. Earth Syst. Sci., 2014, 18, 1289-1303. Liu D, Tian F, Lin M, Sivapalan M. A conceptual socio-hydrological model of the co-evolution of humans and water: case study of the Tarim River basin, western China[J]. Hydrology and Earth System Sciences, 2015, 19(2): 1035-1054.	We have added the following text at line 563: *"Thus, the total water storage capacity of all dams in a watershed may be an important index, particularly when relativised by precipitation or streamflow to account for aridity; that is, a given storage size may have a higher relative impact in drier areas (eg. Liu et al., 2015)".* Note that we map this index later in the article, in Figure 8d. Also, the Liu et al. (2015) is a very interesting case study, thank you!
6	Line 570, the spatial distribution of the driving factor should be consistent with the spatial distribution of shifted versus unshifted catchments. Maybe an example will be helpful to understand it.	We have added the following text at line 614: "*For example, concerning radiation increases during the Millennium Drought, the spatial distribution of these increases (Figure C1) across the southern state of Victoria broadly matches the spatial distribution of shifted catchments, lending credence to HPE07*"
7	Line 600, Of the twenty-four HPEs, three are considered plausible, ten are considered inconsistent with evidence, and eleven are in a category in-between. The strength of this work is a large-scale assessment of hydrologic changes and potential drivers. This information should be stated in abstract.	This has been added, thank you for the suggestion. (Line 40)
8	In Figure 10, Higher AET per mm of rainfall, and it equals aridity index=AET/rainfall.	It's possible that there are numerous different definitions of aridity, but we note that most of them involve PET not AET. For example, possibly the earliest aridity index is that of Oldekop in 1911, who used the idea of long-term

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		maximum evaporation divided by long-term precipitation to define an aridity index (see http://dx.doi.org/10.1016/j.jhydrol.2016.02.002). Likewise, the PET/P ratio (or similar) underlies most versions of Budyko-type frameworks (eg. https://doi.org/10.1016/j.advwatres.2019.103435)
9	Technical corrections:	
10	L227 and L240, event rainfall->rainfall events	We have changed this as requested and also reworded it in response to the other reviewer (line 247).
11	Line 714, check the citation of Figure 4c. Maybe it is Figure 5d.	Thank you for noticing this error; it has now been corrected.