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Hydrology and Earth System Sciences
Discussions

Interactive comment on "Catchment-scale drought: capturing the whole drought cycle using multiple indicator" *by* A. J. Gibson et al.

Anonymous Referee #1

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In this study, the authors quantify drought within a single catchment in eastern Australia using a variety of indicators to look at how drought is expressed across the landscape. They also analyze the dominant causes of both drought onset (attributable primarily to various important climate modes) and termination (via low pressure troughs). They further note that drought recovery is rapid, with little evidence for prolonged effects (e.g., on vegetation or runoff) during the post drought periods. This is a detailed and interesting study of drought within a highly localized area. I am happy to recommend acceptance, assuming the authors can address my relatively minor criticisms centered around some of the analysis choices.

(*) The description and application of the NDVI analysis is really quite thin. What is the dominant land cover type in this catchment (forest, shrub, agriculture, etc)? How

extensive is human land use (agriculture or pasture)? What is the seasonality of the vegetation, and when in the year is peak productivity and vegetation growth? This is all important information that is required to contextual how drought, and other stress factors, affect vegetation in this catchment. Additionally, the reverb link on line 155 does not work. As I also mention later, I think the NDVI analysis would further benefit from explicit separation of the warm (growing?) vs cold (dormant?) season droughts.

(*) Line 193: what are the units on these drought onset/termination rates? Are these changes in the index value (e.g., SPI6) per month?

(*) I found the climate index discussion to be a bit confusing, primarily because the analysis of drought conflates events during both the warm and cold season. The problem, as the authors even admit, is that the influence of climate modes in this region is highly seasonal. Seasonality is mentioned, but it is hand waved away (line 215) for a simplistic statement that Indian ocean and SAM cause drought and El Nino sustains it. Further, the lack of a strong pre-drought signal in indices (especially ENSO) could just be a function of the long-term drought index being used (integrating over 6 months) or the fact that this catchment responds quickly to these modes with little time lag. It would be useful, I think, for the authors to a priori separate cold and warm season drought events and THEN conduct the comparisons with the climate modes. As currently written, I just find this section to be a bit disorganized.

(*) For readers who are not familiar, it would be good for the authors to explicitly define "rainfall-runoff relationship" and why changes in it might matter (or what they would mean).

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