Reviewer 1

Iam happy to see the revisions, which make the paper more comprehensive and robust. Interesting to see the scatter plots of the precipitation data and how low (!) the spatial correlation is among different rainfall data sets. One thing I note is that WFDEI/GSWP/GPCC seems to have high spatial similarity while others differ in different ways. This can be a useful message in the discussion/conclusion.

On using ensemble of data sets, I agree with the current statement that it is useful to quantify uncertainty. Meanwhile, another piece of information emerging from this analysis is that we really need benchmarking/new constraint given the heterogeneity. My thinking is that unlike future climate projections, the precipitation has already happened (one true value at one place-time combination). So your results are strong evidence that we really don't know what had happened and need to collect/assimilate more ground data in the future. Anyway, not contradictive but instead complementary opinions on the conclusion.

I also like adding DOLCE and GLEAM ET data. Very useful! I think this study would be of interest of many readers.

- *We thank the reviewer for his/her constructive critique, feedback, and ideas that to lead to this final version of the manuscript.*

Reviewer 2

I thank the authors for addressing my concerns. I think this manuscript is looking good, and really highlights the core issues around discrepant drought estimates. I have a few minor comments (see below) and no major comments or criticisms. I hope to see it published. There are some interesting results here that I think will be cited in the years to come.

- *We thank the reviewer for expressing his/her concerns, the constructive feedback, and additional ideas throughout the review process.*

* The last sentence of the abstract is a bit awkward and doesn't say much. Perhaps it would be more impactful to highlight that spatial extent and intensity of even well known droughts is conditional upon the drought metric, and data sources used to calculate them. Or maybe highlight the potential danger of relying on just one data-source, especially if it's one that is not robust for the region.

- *We agree with the reviewer that this sentence does not say much and rephrased it according to the reviewer's suggestion.*

* Section 2.3. Just to be clear, the standard deviation of MCWD is calculated for each individual grid cell, correct? Assuming this is the case (as it should be for making a relative drought metric), I don't understand how absolute values are then derived from the CDF in Fig S1. I would have thought that the absolute values should correspond to the -0.5, -2, and -2.5 standard deviations of MCWD that are spatially explicit. Also, the CWD or MCWD is not normally distributed (it's truncated at 0), so I think the Gaussian CDF was not the right choice. The Gamma CDF might be better, but I don't think it's necessary. Why not just replace Fig S1 with a map of the standard deviation of the absolute MCWD?

- *The reviewer is correct; we indeed normalized the values for rMCWD per gridcell. It is also correct that CWD and MCWD are not normally distributed because of the truncation at 0. We, however, did not apply any fitting to the MCWD values but only to the anomalies of the MCWD values which do not have this truncation problem at 0. We fit a Gaussian CDF through the empirical distribution across all gridcells and for each drought indicator. By doing so we can compare the CDFs and derive similar classifications between aMCWD and rMCWD. Obviously, we were not clear enough and extended our explanation of this procedure in Methods S1.*

* Section 2.3 about the calculation of (M)CWD should mention that it is reset once per year. It would also be good to mention the details of how it is reset. The wettest month of the year?
- *We added a statement regarding the resetting of MCWD in line 171.*

* Section 2.3.2: A supplement figure mapping the standard deviations used to relativize the RAI would be useful.
- *The distributions of the RAI can be seen in Figure S1c.*

* Fig. 4: This is a good addition.
  - *We are happy that the reviewer likes our new analysis and the corresponding figure 4.*

* Figs. S3-5: These figures are nice, but I can't tell which product is on the x/y axis.
  - *We added the labels to the x/y axis.*

* typo on p16: " So do CRUNCEP"
  - *Fixed*