

Hydrol. Earth Syst. Sci. Discuss., referee comment RC2  
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## **Comment on hess-2021-543**

Anonymous Referee #2

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Referee comment on "The Mesoamerican mid-summer drought: the impact of its definition on occurrences and recent changes" by Edwin P. Maurer et al., Hydrol. Earth Syst. Sci. Discuss., <https://doi.org/10.5194/hess-2021-543-RC2>, 2021

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The authors present a manuscript that evaluates how varying the definition of the Central American mid-summer drought (MSD) impacts the magnitude of observed changes over the last 40 years. The results are of interest to the climate science community because they find that adjusting certain parameters in the MSD definition has significant impacts on changes across the observational record. The manuscript includes a new definition of the MSD in an expanded region, the use of daily data, and analyses of how the MSD parameters influence the results. It is important, as they show that the potential non-stationarity of the MSD should be accounted for in all future analyses. I recommend that this manuscript is accepted at HESS after addressing the following minor revisions.

Line 32: "Many MSD descriptions have originated with the smallholder farmers in the region and often have qualitative components." This sentence seems out of place since no examples of qualitative definitions are provided in this paragraph. I recommend the authors either provide some qualitative definitions to show how they vary or remove this sentence since it appears to be unrelated.

Line 42: Add "observational" between "recent record".

Line 73: Please clarify what you mean by “most recent warming”.

Line 89: I understand that the CHIRPS data was aggregated in the previous study referenced in this sentence (Stewart et al. 2021) for comparison against other precipitation datasets. Please provide a reason for why the data was aggregated in this study since no comparisons against other precipitation datasets are made. I also ask that the authors address how this resampling may affect the characterizations of the MSD.

Line 94: Please reword this sentence as it is confusing as written. Maybe switch to something like “We use the CHIRTS dataset for the limited temperature analysis in this paper”.

Line 119: I recommend that the authors explicitly state the values for the parameters they change in the MSD definition in the methods (i.e. durations, intensities, windows, % of years with an MSD required). For example, at line 119 list the different thresholds that are analyzed for % of years with an MSD required.

Line 120: I think it is important that the authors address how changing the two main periods of analysis could influence the results? Since you change many other factors, it might be relevant to consider moving windows (i.e. 10 years) for the time periods.

Figure 2: Please include a higher resolution version of this figure. It is really challenging to see the patterns and differences for individual grid cells.

Line 155-156: Please provide clarification since parts of this sentence seem to contradict each other. It says temperature change is highly variably month to month, but that they are also mainly positive and statistically significant.

Figure 3: Clarify by adding "Number of years out of 20 with a MSD"

Line 167: Please clarify what variable is being referenced in terms of statistically significant changes (i.e. statistically significant changes in the number of years with a MSD)

Figure 4: Please address how the individual points were selected in the methods.

Figure 6: I recommend the authors mark the day 1 of every month instead of just Jan, Apr, Jul, Oct.

Line 274: Are you meaning to compare the spatial patterns in figure 7 with figure 6? It seems like you might actually mean to reference Figure 4?

Lines 276-279: Please clarify the logic of this sentence since it is confusing as written. Maybe instead write something like "...net reduction in the overall number of cells classified as having an MSD when considering the difference between the two periods".

Figure 9: I recommend the authors make this a 3-panel figure that includes the original definition for direct comparison with the different thresholds.