Earth System Dynamics Discussions

Earth Syst. Dynam. Discuss., referee comment RC2
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Comment on esd-2022-10

Anonymous Referee #2

Referee comment on "A 20-year satellite-reanalysis-based climatology of extreme precipitation characteristics over the Sinai Peninsula" by Mohsen Soltani et al., Earth Syst. Dynam. Discuss., https://doi.org/10.5194/esd-2022-10-RC2, 2022

Review of "A 20-year satellite-reanalysis-based climatology of extreme precipitation characteristics over the Sinai Peninsula" by Soltani et al. (Submitted to ESD)

Summary and Recommendation: This study invoked IMERG precipitaiton and NCEP/NCAR reanalysis dataset for atmospheric variables to first identify extreme rainfall characteristics followed by understanding synoptic properties responsible for wet and dry periods observed over Sinai Peninsula. The authors use a range of tools in CDO toolbox to perform statistical analysis over the region. The study has merit in terms of identifying mechanisms responsible for extreme rainfall events but it needs more statistical basis so as to establish "meaningful" relationship between atmospheric state and precipitation events. I highly recommend not using strong sentences such as "remarkable correlation" and "meaningful results" without performing some kind of statistical significance tests on their results. I also found out many spelling and grammatical mistakes with incoherency in their sentences throughout the manuscript and it was impossible for me to pin point each of the error and thus I highly recommend going through the manuscript carefully to fix those errors before submitting the revised version of this manuscript. Therefore, I recommend "Major Revision" before I can recommend accepting this manuscript.

My primary suggestions are as follows:

1) I suggest adding the lat-lon bounds of the entire study region Sinai Peninsula corresponding to their Figure 1 Description.

2) Multiple spelling and grammatical errors are present throughout the manuscript and thus I cannot pin point each of them, so please correct those throughout the manuscript.

3) Lines 137-139: I am not sure if I agree with this statement. I have observed cyclonic and anticyclonic patterns in coarser and finer resolution with almost similar accuracy and it was even better captured in finer resolution. I do not mind authors using coarser resolution product for their analysis but this statement is not necessarily true and I suggest removing this from their manuscript.

4) Line 170: How did authors come up with the threshold of 10 mm/day for this region? Are there previous studies available backing this claim or did authors perform any statistical analysis to come up with this threshold. Currently this looks like an arbitrary threshold and I dont think I can accept this as it is.

5) Lines 198-204: Are these numbers in trends and slopes statistically significant at a certain level of significance (say 95% or 99%)? Did authors perform any test to identify some kind of statistical significance like bootstrapping? If not, I suggest performing such tests to better aid the readers about the significance of these numbers.

6) Figure 3 and its analysis: What is the standard deviation of each month? While performing analysis of extreme events, knowledge of standard deviation is very important for each bar shown in these plots. Right now, I am not sure if I see any major differences between different months shown here.

7) Lines 225-226: When you say that "chosen sites do vary in terms of magnitude and trends", I recommend mentioning that how much do they vary actually quantitatively? Its very important to quantify these differences rather than just performing a qualitative analysis.

8) Figure 4: Are these points statistically significant throughout the map? I am not sure if I can totally rely on these numbers without knowing the spatial statistical significance. Therefore, I recommend performing a significance test to identify which points on the map are statistically significant.

9) Section 3.2.2: I suggest not using strong words such as "a strong association is realized" as correlation is not causation. So be careful in using such sentences in your manuscript.

10) Section 4, Discussion: I do agree with authors' interpretation and schematic in Figure 12 depicting the primary mechanisms responsible for extreme rainfall events. However, as the authors mentioned that they observed low correlation values with atmospheric state variables which could be due to a number of factors of course. I am reiterating that correlation is not always causation and thus if the authors really wish to establish causality between atmospheric state and rainfall, I suggest using causual discovery methods such as PC and LINGAM methods. I suggest following this book if they are interested in causal

discovery methods: https://matheusfacure.github.io/python-causality-handbook/landing-page.html

11) Line 574: I am not sure if I understand what the authors mean by "spatially dependency". I suggest explaining it in a bit more detail.