



EGUsphere, referee comment RC2  
<https://doi.org/10.5194/egusphere-2022-321-RC2>, 2022  
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## **Comment on egusphere-2022-321**

Arpita Mondal (Referee)

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Referee comment on "Countries most exposed to individual and concurrent extremes, and near-permanent extreme conditions at different global warming levels" by Fulden Batibeniz et al., EGU sphere, <https://doi.org/10.5194/egusphere-2022-321-RC2>, 2022

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This is an interesting and important study focussing on changes in four individual and two concurrent extremes at different warming levels (GWs) with reference to the pre-industrial level (1850-1900) based on multiple CMIP6 models. These findings are important to understand the changes in frequency of extremes at present and probable warming levels in the future. However, I have two major concerns: 1) the study involves statistical analysis but offers very little on physical linkages in model processes and extreme weather events, and 2) the manuscript lacks clarity in description of the adopted methods. On a broader context, there are several studies that are coming out in the recent times that are merely the outcome of the CMIP6 models represented in terms of charts and maps, offering very little on science and understanding. I hope the authors will add discussions and usability beyond that.

Further, the study starts discussing high vulnerability of tropical countries to climate extremes. Yet, it limits itself to exposure of extremes to the population, ignoring other indicators relevant to the individual extremes. While this may be beyond the scope of the study, I would suggest rewriting the introduction part for better communication.

Other points:

- 1) There has been discussion on population data from different sources and interpolating data from 2000-2100; however, later on, the population of 2015 is employed for the determining exposure. Hence, the significance of lines 116-118 is difficult to understand.
- 2) In addition to the reference provided for the methodology to select data for different warming levels, some details in addition to Line 135-137 would clarify the audience.

3) I also have some reservations on the monthly temporal scale, based on which concurrent extremes are determined here. I hope the authors have considered the timing of the events in a month, particularly for Rx1day and extreme wind, to declare the two events as concurrent. More details related to Line 163-167 are required to clarify concurrent extremes.

4) I am unclear on the method adopted for the event fraction and frequency (Line 176-177) of extremes—an explanation of how to reach the particular fraction need to be added.

5) In Figure 5b(top row), the number of concurrent extremes for the Indian region changes from 2 at present GWL to 1 at 1.5°C and then changes further. How does the number of concurrent extremes change at 2°C and 3°C for that region? Also, the possible reason behind this need to be explained in the corresponding section.

Note: My PhD student Mr. Roshan Jha has helped me with the review of this paper.