We thank the reviewers again for their helpful comments for improving our manuscript. The referee comments are shown with *blue font color and italics* , and our point-to-point responses with standard font.

1 Referee 1. comments

Fig. 1: Can you describe what the vertical dashed lines mean in panels b and c? Response to line 86 comment: "We do not further isolate the changes in SD and skewness. Figure 9 only shows how the SD and skewness change relative to each other." I was referring to how the PDFs indicating standard deviation and skewness changes were calculated in Fig. 1c. Line 95-96 describes how the PDF associated with mean change is calculated but there is no explanation for how the SD change and skewness change is calculated in Fig. 1c. If the rest of the analysis does not isolate changes in standard deviation and skewness, why show PDFs that isolate their contribution here? I think this is an unnecessary source of confusion for readers. It seems that reviewer 2 also had a similar confusion about whether standard deviation is isolated. On a related note, what is different about the analysis in Fig. D1 that allows standard deviation, skewness, and kurtosis to be solated whereas they cannot be elsewhere? This needs to be clarified in the manuscript.

Figure 1 is now change so that it includes only change in mean and variability. In figure text there is mention of model,and region used in panel b and also indicated what dashed lines mean. Figure D1 just shows calculated kurtosis,skewness and SD which are calcuatled from the underlayin PDF, not the effect of if only i.e kurtosis or skewness changees.

Line 122 - 123: "greenhouse gas emissions remain relatively constant in these SSPs [SSP1-2.6 and SSP3-7.0]" I'm confused by the statement that greenhouse gas emissions remain relatively constant in SSP1-2.6 and more generally that the greenhouse gas emissions in these two scenarios are similar. Doesn't SSP1 involve a cut in greenhouse gas emissions? In terms of concentrations, this means the carbon dioxide concentration increases slowly and methane decreases by the middle of the 21st century whereas CO2 and CH4 continue to increase in the SSP3 scenario (see Figure 11 from Meinshausen et al. 2020, copied for convenience on the right). Are there studies that show that the difference between SSP3 and SSP1 is dominated by the aerosol effect compared to the greenhouse gas effect? If so, can you state this explicitly and provide references?

To add more clarity we change the lines 122-123 to

"The comparison of climate responses under SSP1-2.6 and SSP3-7.0, thus, allows us to investigate the influence of anthropogenic aerosols on the PDF changes as greenhouse gas emissions remain relatively constant in these SSPs and only aerosol emissions are decreasing in SSP1-2.6. We can estimate the effects of aerosols by comparing SSP1-2.6 with SSP3-7.0, as the most significant aerosol reductions occur in Southeast and South Asia under SSP1-2.6"

We are not qunativying the excat impact of aerols, more like does they have effect at all on region variabilty on summer time precipiation

Line 160: "The spatial correlation between the SD and the number of extreme days." Do you mean the spatial correlation between changes in SD and changes in the number of extreme day

Yes, this is what we mean, this line (L160) is now corrected to "The spatial correlation between the change in SD and in the change of number of extreme days for SULx5"

Line 161 - 162: "These SD differences are significant at a p-level ¡ 0.05 using the Kolmogorov-Smirnov test." Are you testing the null hypothesis that the change in SD is significantly different from 0? The current phrasing suggests this is what is being tested but this seems out of context from the previous sentence. Are you instead testing the null hypothesis that the change in SD and

the change in the number of extreme days are correlated?

No, we are interested on regions where the underlying PDF is statistical different. To make this more cleared we added line L160. "Figure A5 shows spatial distribution of change in the PDF SD These SD differences are significant at a p-level ¡ 0.05 using the Kolmogorov–Smirnov test. The spatial correlation between the change in SD and in the change of number of extreme days for SUL×5 varies from 0.42 to 0.61 (Figure A5)"

Kolmogorov-Smirnov test is used because we are intrested are the samples drawn from same distribution or not.

Response to line 175 and Fig 6b comment: "We find it a bit inconvenient to plot the variability and mean side by side for 3 models and 4 warming levels, which is why we split them up." Putting aside the decision to put these plots side by side, can you reconcile my original comment that the brown shades in Fig. 4 generally look darker compared to Fig. 5, yet Fig. 6 shows that changes in the mean dominate the change in extreme precipitation over parts of Eastern Brazil, Southern Africa, and Northern Australia? Is the result in Fig. 6 not intended to be consistent with a comparison of the colors in Fig. 4 and 5

The figure 6 was generated using absolute values, which is now change to values actual change, and figures is drwan using change respect to 0 degree warming. We also removed line "In particular, changes in the mean state are the dominant driver of changes in extreme precipitation events over South America, Southern Africa, and Australia. Conversely, changes in variability play a more pronounced influence on extreme precipitation changes over Eurasia." from L194-195

Response to line 231 comment: "We have performed a KS test for the distribution and found that the distributions are different." I suggest you specify that you use the Kolmogorov-Smirnov test and the p-value of the test in the manuscript

We added line "To test if underlying PDF's are ly different we use Kolmogorov-Smirnov test and the p-value " to line 101

2 Referee 2. comments

I am curious about the authors' choice to use the 90th percentile as the threshold for defining an extreme event, specifically in the PDRMIP experiments, rather than applying the same criterion to the CMIP models. Could this decision be related to the relatively smaller number of extreme events in the PDRMIP experiments compared to the CMIP models

Yes,where with cmip6 runs we have multiple ensemble member, and with PDRMIP only 1 for 50 years, to get proper statistics of change in the extrems under different climate drivers we needed to use different criteria for extremes