

## ***Interactive comment on “Risks of seasonal extreme rainfall events in Bangladesh under 1.5 and 2.0 degrees’ warmer worlds – How anthropogenic aerosols change the story” by Ruksana H. Rimi et al.***

**Anonymous Referee #2**

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The authors investigate changes in mean and extreme precipitation in Bangladesh for five different forcing scenarios. They divide Bangladesh in four regions and analyse the magnitude of events with different return times. They find increases in pre-monsoon and monsoon precipitation due to higher global mean temperatures but also due to a decrease in aerosols.

While the paper is clear in scope and the analysis in principle straightforward, it needs more work, especially the text. As crucial information is missing from the methods section I can only recommend publication of the paper after major revisions.

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### # General & Technical Comments

#### ## Text

\* The text could profit from more work. Some sections seem rather long, while others miss some essential information (see below). Also, there are numerous small mistakes that give the impression of sloppy proofreading. The conclusion, on the other hand are very well written and concise.

\* It is very hard to really pin down, but I had the impression that some information is repeated over and over again, see e.g. my comment concerning the abbreviations below. Another example is the first two sentences in your introduction - they are different but they basically say the same. Of course, sometimes it is good to repeat things (e.g. in the conclusions), I felt it rather hindered the flow while reading.

\* When you use the word significant do you mean ‘statistically significant’ or large? Significant is a reserved word – please only use it if you conducted a statistical test!

\* Similarly, you have to be careful when using the word ‘risk’. Risk is often formalized as the combination of exposure and vulnerability to weather and climate events. Therefore please check if ‘probability’ of ‘magnitude’ would be more appropriate.

\* You introduce abbreviations for the simulations, but you often refer to the simulations by the full name; e.g. on P6: L11 (twice); L15, L16, L21; L30 (twice). There are many more examples throughout the manuscript.

\* What is the abbreviation for the simulation with current-day GHGs and pre-industrial aerosols? GHGonly? GHG? GHG only? AR? All of them are used throughout the manuscript. Be consistent! Also make sure that it can be differentiated from the abbreviation for greenhouse gas (GHG).

#### ## Methods

\* You should explicitly write why you use different time periods for your two observa-

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tional datasets.

\* You use bi-linear interpolation to regrid your data. For the future I would recommend to use a conservative remapping scheme to make sure the precipitation amount is conserved.

\* The description of the model simulations is very long and overly detailed. I recommend to shorten it.

\* On the other hand, I miss a description of your statistical analysis, which makes it difficult to assess it. In particular I need the following questions answered: - How do you calculate the return time? How do you calculate the uncertainty of the return time? - For the RR, do you assume an Extreme Value distribution? If not how is the probability calculated? - How do you calculate the uncertainty of RR?

\* Do you consider all days or only days with rainfall larger a threshold? This is particularly relevant for MAM.

\* Given that you have data from 98 \* 10 years, should your maximum return time not be at 980 years instead of 1000 as in Figure 6?

\* Similarly, when analysing the two wettest/ driest years should you not end at 196 years instead of 200?

\* You might want to mention that you look at SPI in the methods.

### ## Results

\* The two observational datasets show quite some differences. Do you have an guess if this is due to the different periods they span, or would they also be different covering the same periods? How different are they during the two overlapping years?

\* What is the point of using the two lowest and highest years? It basically says 'during a wet year the magnitude of a 1 in X years event is larger than during an average year', which is a relatively trivial result. Also, these results are barely used/ described in the

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results sections. My proposition would be to either remove this entirely, or move it to the appendix. This would help to clean up the figures and/ or reduce the amount of required subplots.

\* Evaluation is done with 5-day precipitation but return time plots and RR in the main text are with 1-day precipitation – why is that?

\* You sometimes talk about a linear rainfall response. What do you mean with linear? How can you know it's linear (as you have only 5 data points).

### ## Figures

\* I had to rasterize the Figures in order to print them. Not sure what the problem is but please make sure this does not happen for the final paper.

\* However, even in your original pdf the figures are all blurry and don't have a good quality, this makes them very difficult to analyse. Please save them as \*.pdf and ensure fonts are embedded.

\* Avoid mixing green and red in the figures.

\* The text (labels, legend) is generally too small.

\* The caption are very long and describe results. Please make them shorter and move all results to the main text.

\* The naming of simulations is inconsistent in the legend/ labels. E.g. in Figure 1 you call it 'HadRM3P ACT' but 'HAPPI 2.0'. I recommend to remove 'HadRM3P'. In Figure 2 and 3 it is called present instead of ACT. In Figure 4 you introduce a new abbreviation!

\* In the same category: sometimes it is called MAM and sometimes pre-monsoon

### # Minor Comments

P1 L11: the future

P1 L15: risk -> probability

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P1 L16: 2°C global warming  
P1 L20: risk -> probability or magnitude  
P1 L23: in terms ... impact. -> remove, you do not look at impacts  
P1 L25: GHG abbreviation not introduced  
P2 L12: Is it really an increasing trend – do you mean a positive trend?  
P2 L14: names -> name  
P2 L15: Currently the sentence reads as if the “low-lying areas” damaged the rice.  
P2 L15: Should that be “Boro (...) and paddy crops”? Or is should it be “Boro paddy crops (...)”?  
P2 L16: Which dataset is this?  
P2 L25: remove ‘multi’. Also I would recommend to rewrite this sentence.  
P2 L25: for the northwestern part of  
P2 L27: the high resolution  
P2 L28: in the global  
P2 L31: north-eastern  
P2 L34: remove ‘of’  
P2 L35: Even if they did not calculate RRs other studies did look at the influence of anthropogenic climate change -> please reformulate  
P2 L41: runs -> simulations  
P2 L41: remove ‘the’  
P3 L4-L5: also ... warming: I don’t understand what you mean here.

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P3 L10: remove ‘here’  
P3 L11-L14: I recommend to move this sentence to the methods.  
P3 L18: 2.2 -> 3.1  
P3 L20: You did not mention Section 3.2  
P3 L27: remove the second ‘observational’  
P3 L30: remove ‘grids’  
P3 L31: in Table S1  
P3 L39: Move the reference behind ‘program’.  
P3 L41: remove ‘of’  
P4 L2: remove ‘the model’  
P4 L5: GHG was introduced before  
P4 L6-L9: This belongs in the Results Section.  
P4 L10: remove ‘the’  
P4 L27: one third  
P4 L29: remove ‘world’  
P4 L31: hereinafter?  
P4: Formula (i) and (ii): These are unnecessary.  
P4 L39: force -> forcing  
P4 L41: the other GCMs -> other GCMs  
P5 L5 and L6: I would write this as 3x30x10x98 and 4x30x10x98. In addition, make a remark that all months have 30 days in the used model.

## C6

P5 L15: presented -> present

P5 L15: This sentence does not make sense, please rewrite.

P5 L17: the probability

P5 L17: remove 'scenarios'

P5 L18: an event of the same magnitude

P5 L18-L20: Abbreviations!

P5 L26 and L34: annual -> seasonal

P5 L35: dataset it is compared with and sub-regions. -> dataset and the sub-region.

P5 L36: at -> in

P5 L36: There is no way to know if the bias is the same for the different scenarios! This is an assumption. It's ok to make the assumption, but 'note' is not the appropriate word here.

P6 L2: Significant?

P6 L6: although they suggest

P6 L28-L29: Did you show this somewhere in your paper? Do you have a reference for this?

P6 L34-L35: Is that global or local warming?

P6 41: Significant?

P7 L4: remove 'and hence efficiently masked'

P7 L6: SPI: abbreviation not introduced

P7 L15: in all -> in almost all

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P7 L36: frequencies of occurrence -> magnitude

Figure 1

\* Annual -> seasonal

Figure 2 and Figure 3

\* I recommend to change the title to '(ACT - NAT) / NAT', '(HAPPI1.5 - ACT) / ACT', etc. so it is absolutely clear what you are doing.

\* The maps in the top row look a bit distorted – do you use a projection for the map plot?

\* Why is it only 'approximately' the sub-regions? Remove approximately.

Figure 6

\* 'sub-regions of 1 and 2' -> remove of

Figure 10 and 11

\* Please use a logarithmic y-axis so that the plot is symmetric with respect to 1.

\* Remove the bars, the RR is not really something that starts a 0.

\* Reverse the order of the bars, start with the 1 in 10 year event.

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