

Nat. Hazards Earth Syst. Sci. Discuss., referee comment RC2
<https://doi.org/10.5194/nhess-2021-412-RC2>, 2022
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Comment on nhess-2021-412

Anonymous Referee #2

Referee comment on "Variations and risk of extreme precipitation events with sub-daily data: a case study in the Ganjiang river basin" by Guangxu Liu et al., Nat. Hazards Earth Syst. Sci. Discuss., <https://doi.org/10.5194/nhess-2021-412-RC2>, 2022

In this paper, extreme precipitation statistics are examined for Ganjiang river basin in China. This work contains interesting results in the field of risks of extreme events in a changing climate, though, in my opinion, there are significant problems that need to be addressed. Thus, I would recommend a major revision of the manuscript according to the following comments, which I hope the authors will find useful.

Major Comments:

- Firstly, I would like to point out that the manuscript is poorly prepared with many errors and elusive points (that are described in the specific & minor comments below).
- Moreover, the results of the statistical procedures are not discussed/explained in terms of their physical meaning, which is critical when dealing with demanding concepts.
- In addition, the intensity of the precipitation events is not examined, at least explicitly, which I think it's quite crucial when dealing with floods.
- Finally, in the manuscript, there are many grammar and syntax errors. Many sentences/phrases are incomprehensible, and this may obscure the findings.

Specific Comments

- Abstract: It should be completely revised or rewritten in terms of scope, results, and language.
- Line 10: Which parameters you refer to?
- Lines 15-16: How the results help in planning and management? This also affects the discussions and conclusions as well.
- In Introduction and the rest of the paper: A great number of the cited papers are

missing from the reference list or there are not cited properly (e.g., Asadieh & Krakauer, 2015; Westra et al., 2013; Fischer et al., 2013; O’Gorman & Schneider, 2009; Pendergrass & Hartmann, 2014; Sillmann et al., 2013; Wu et al. (2014); Brunetti, Maugeri et al. 2004; López-Moreno and Beniston 2009; Fernández-Montes, Seubert et al. 2014; Merino, Fernández-Vaquero et al. 2016; Xu, Ma et al. 2014; Chen 2015; Shan, Zhang et al. 2001 and more). This largely downgrades the quality of the paper.

- Lines 104-105: What is the meaning here?
- Line 127: According to the relief description above, the higher precipitation should be distributed to the south. Thus, why it is mentioned here that the highest precipitation is found to the NW? In addition to the above, I strongly suggest including the spatial distribution of the precipitation in the basin or at least include a table with the annual and seasonal totals.
- Line 129: Please provide more info about these weather systems/patterns. What is this quasi-stationary front? Monsoons and typhoons can affect this area, taking also under consideration the high relief of the southern areas.
- Lines 142-143: The temporal intervals of the raw observations are not mentioned. Are sub-daily observations (and with what time interval)? What “sliced with the purpose to keep data consistency” means? Sliced from daily? If yes, which is the point? If not, please clarify the followed procedure.
- Line 145: More discussion/explanation is needed regarding verification and correction.
- Line 171: Please provide info about the flood records.
- Line 174: What does this mean?
- Line 175: “only 59 years”- This is the point of statistical analysis; to estimate parameters of a population based on a sample.
- Lines 201-208: Please revise the mathematical description of the L-moments. In my opinion, there are some mistakes and omissions. Specifically, β is usually called “inversed scale”; how a_L is calculated and how it is an estimate of α ; what is a_1 ?
- Lines 227-228: Please elaborate on that. What is the purpose of this procedure?
- Lines 231-232: The term “run” firstly appears here without a previous explanation. I assumed it refers to the 12-h intervals of precipitation and under this assumption I read the rest of the paper (I hope I got it right). Moreover, the sentence is confusing: What do the phrases “on the standard of an event” and “with the purpose to keep independent for time series analysis” mean? In any case, the choice to work with 12-h values is not justified. Please elaborate more on this choice.
- Lines 247-248: Why is this important?
- Line 254/Figure 3: In line 239, it is mentioned that only one station has 28-runs, so why this value appears in every plot (every station)? The numbers on the plots, I suppose that refer to each station. Please add the name of the station on each plot instead of these arbitrary for the reader numbers.
- Line 263: What is the meaning of this phrase?
- Line 267-254: The physical meaning of β is not given. What in terms of precipitation distribution a large or small value of β provides as information? What does this mean about the events? How the conclusions about atmospheric circulation are drawn from this analysis from the values of α and β ? It seems that the authors jump to conclusions without the necessary support from the findings.
- Lines 276-289: The same comments as above stand for the discussion about trends of gamma parameters. What these changes mean in terms of observed precipitation?
- Line 294: Are the differences between percentiles and gamma distribution any meaningful/important? Why are they mentioned?
- Lines 304-305: How a change in threshold will help the risk management? How lower values of Gamma function help reduce risk?
- Lines 325-344: Please explain why you selected two different stations to compare percentiles of one station with gamma distribution results of the other. In addition, why only 5 years of data?
- Line 340: Where this selection is mentioned in the text and how it is justified?

- Lines 345-354: As above, I don't understand how these two tables compare to each other. Why didn't you use the same station with and without Gamma fitting?
- Lines 349-350: Which was the actual rain of these flood events?
- Line 353: What is "underestimated"? The number of events or the precipitation amounts? And why this happens?
- Line 360: It is quite expected to have more flood events for short-time precipitation with high intensity. Here, it is obvious that an intensity analysis should be added to shed light on these findings.
- Line 361: How the events are "predicted"? Please explain or rephrase.
- Lines 377-389: How the risk maps were created? Please provide the methodological steps and the data/layers that have been used to create the maps.
- Lines 390-395: It is not clear how the durations and amounts are connected. Which are the combinations of amount and duration leading to flood events? In other words, the intensity is needed. In addition, how robust are the conclusions with such a small number of events? Which is the uncertainty of the results?
- Discussion: In this section, the results along with a literature review should be discussed. In contrast, the results are mentioned vaguely, and the rest of the section refers to the other works. Please completely revise this part in line with the above comment.
- Lines 398-399: Here, the precipitation intensity is discussed without any previous analysis of it.
- Line 400: Correlation is not calculated in the analysis, thus, how its statistical significance is deduced?
- Line 452: Again, correlations are not calculated between any of the parameters. Please calculate correlations and then discuss on the findings.
- Conclusions: This section should be re-written after a thorough revision of the manuscript. Most importantly, the take home message for the end users is totally missing from the conclusions.

Minor comments

- Title: The name of the studied area is wrong or misspelled.
- The citations in the text do not follow the proper format.
- Figures: All have too small fonts and very low resolution/quality, and they need to be redrawn.
- Line 23-24: The citation is not valid.
- Line 50: CMIP5 is not one model. If they used one model, please mention it otherwise rephrase.
- Lines 53-54: Check syntax
- Line 123: What means "is the major inflows"?
- Line 134: Which flood is considered "big"?
- Line 165: Hurricanes are hazards not impacts.
- Line 209-210: Reference is needed.
- Lines 331-332: If the names of these rivers are mentioned on the map, then they are not readable, thus, you should increase the fonts along with the quality of the map.