

Reply to the review reports

Dear Editor,

Thank you very much for your time and discussion on this manuscript. We also thank the referees very much for their constructive comments. We have revised the manuscript accordingly. The replies are follows:

Referees' comments:

Referee #2:

1. The manuscript is very difficult to read because of poor structure and grammar.

Reply: According to the referee's suggestion, we have checked the structure and grammar and revised it.

2. Referee can not see a proper citation of their work.

Reply: Sure, the idea that we used method is derive from the article that Mishra et al(2009) and including the reference in 319 line.

3. the figure do not have all the information required to easily follw discussion..

Reply: According to the referee's suggestion, we have change the figure 1 and identity important mountains and basins.

4. Referee is very interesting the strong correction between mean entropy and PCI and this can be conclusion.

Reply: Thanks for the referee's suggestion, We have add this to conclusion.

5. What does "point of trend" mean?

Reply: Thanks for the referee's comments, "point of trend" may be "change point of trend", it is meaning than trend turned. We have revised the "mutation of trend" so that understand it easily.

6. What is the added value of having the entropy-based variability if the mean rainfall distribution is already known?

Reply: Thanks for the referee's comments, the value is calculated using the Eq(2), and interpolated data used kriging.

7. Referee missed the explanation about how the probabilities for the entropy calculation are estimated. Referee presume that these probabilities were estimated as the relative frequency of the occurrence of rainfall events in a particular month over the complete set of years. If this correct, then these probabilities are based on binary time series(event /no event) and therefore $n=2$ in Eq(1). Am I right?

Reply: Sure, because entropy method is derive from information theory.

8. In section 3.4 it is stated that a value of $PCI < 20$ indicates significant seasonality in precipitation distrubution and extraordinary monthly variability otherwise. How do the authors come up with this vallue of 20 to define this threshold?

Reply: Thanks for the referee's comments, the threshold is given by Olive(1980).

Reference:

Oliver J.E. 1980. Monthly precipitation distribution: a comparative index. *The Professional Geographer*, 32(3): 300-309.

9. I found confuing the use of the variable n in Eq(1), Eq(2) and Eq(3). Form the text, I presume that in Eq(1), $n=2$ =number of occurrence states (event /no event). For Eq(2), n =number of years, and for Eq(3), and forEq(3), n =number of records. If I am correct, I suggest using different variables, if not, a better explanation is needed.

Reply: you are right, and we have given explanation that used in manuscript.

10. Table 1 does not inclde nuits and its caption is not nuderstandable.

Reply: Thanks for the referee's comments, the entropy is no unit.

11. It is not clear what the colour bar scale represents in Fig 1.

Reply: Thanks for the referee's comments, it represent the elevation of study area.

12. How Fig 2 was obtained? It seems to be a linear interpolation of the annual mean precipitation of the 54 station, but this is not explicitly stated, neither its units(mm).

Reply: Thanks for the referee's comments, it was obtained by using inverse distance weighted.

13. Figures 5 and 6 make sense only if the station IDs are provided in Fig 1.

Reply: Yes, only these stations data can be used to analyse.

14. Figure9 is presented to discuss the "change point text" but no description is given about what is $u(t)$ and $u'(t)$. Section 3.5 explains only what the dashed horizontal lines are.

Reply: Thanks for the referee's comments, we have given the explains in revised manuscript.

14. Tarim, Turpan and Hami are basin names that are mentioned in the text but there is no map where the reader can see where they are located..

Reply: Thanks for the referee's comments, we have identified these basins names

in Fig 1.

15. *Some authors are listed but not referenced in the text.*

Reply: Thanks for the referee's comments, we have checked the reference and revised.

16. *There are a lot of typos along the manuscript.*

Reply: Thanks for the referee's comments, we have check the manuscript and revised the typos to improve its quality.

Thank you in advance for your time and consideration.

Yours sincerely,

Chuan-cheng Zhao