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Title: Assessment of Multiple Climate Extremes over Damodar River Basin, India

Scholar: Pradeep Kumar Mahato

Institute: IIT BHU, Varanasi

General Comments:

The Scholar Mr. Mahato presented two distinct but interrelated studies exploring theoretical and practical aspects of climate change. It examined the repercussions of climate change on rural livelihoods and development programs, as well as how adaptation strategies can be seamlessly integrated into broader development efforts to foster sustainable progress.

The scholar utilized daily rainfall data spanning from 1923 to 2022, over Damodar River Basin. After variable size cluster analysis is used to identify the trends and The modified Pettitt Mann Whitney (PMW) test was used to graphically represent these change points.

At the outset, the title is good, scholar tried to do trend and change point detection using the climate data. Recently several methods have been developed and applied to find the trend analysis, it is not clear why the scholar used two old conventional methods. The scholar has to bring up his contribution in this work clearly. The write up needs substantial improvement. Please correct the punctuation and grammar in your thesis.

Specific Comments

1. Section 1.1, can be given with sub headings, very good for readability.
2. Page 6, data collection is it an objective?
3. In section 2.4, it is on trend analysis studies, it is better to indicate what method is used by the respective authors in the trend analysis.
4. Page 7.4 section 2.6, is all the climate change projections shows this shift in Damodar River Basin?
5. Section 3.2.3, 3.2.4, 3.2.5, 3.2.6, 3.2.7, are those data mentioned in these sections are used in your trend analysis, if not this can be removed.
6. Figure 4, is not readable, even by enlarging it. Provide bigger font. There are many end boxes?
7. Page 32 correct Indian Meteorological Department (IMD) to India Meteorological Department (IMD)
8. Page 45, please correct the sentence, "...probability of KT is calculated for p values than or equal to..."

9. Page 45, an equation cannot be called a method. Please correct the sentence, "...p values than or equal to 0.05 using the method as shown in equation 4.11".
10. Page 45, Section 4.4, Line 2, please insert a comma between WMO and CCL "...jointly sponsored by World Meteorological Organisation (WMO) Commission of Climatology (CCI)..."
11. Page 51, Line 5, Please correct the sentence. "Still, it may vary according to area to area for research analysis."
12. Page 51, Section 5.1, 7th last line. Please correct ...This user" manual provides step-by-step...
13. Page 52, Line 2, Please do the correction "According to the Indian Meteorological Department (IMD), Pune is considered a rainy day because rainfall is more significant..."
It is India Meteorological Department and NOT Indian. What does 'Pune is considered a rainy day' mean?
14. From page 54, in all tables, give only three decimals, it is not clear why so many decimals.
15. Page 75, 86, 97, 119, 130, 142, 153, 164, 175, 186, 197, 208, 219, 230, The sections titled 'Characteristics of Multiple Climate Indices in ...different regions' have their last paragraph exactly same. Please refrain from copy pasting a paragraph throughout the thesis.
16. Page 71, spelling mistake in "Noteand if it is greater than -1.96 than negatively significant"
17. In chapter 6 almost all figures are not readable, I think they are taken as screen shot.
18. What is the novelty of your work, since already established drought indices and trend tests have been utilised?
19. Analyse the results and explain the results in terms of hydro climatological terms.
20. Where are the conclusions? in conclusions and recommendation chapter, after over view, it is key contributions?

Response to the Reviewers Comments

Assessment of Multiple Climate Extremes over Damodar River Basin, India

Sr No.	Suggestion for modification	Responses
1	Section 1.1, can be given with sub headings, very good for readability.	The sub-headings have been incorporated as suggested.
2	Page 6, data collection is it an objective?	Data collection is not an objective but a means to achieve a specific goal. It serves as a tool to support decision-making, validate hypotheses, or gain insights. The objective emphasise how the collected data is analyzed and applied to address a particular problem.
3	In section 2.4, it is on trend analysis studies, it is better to indicate what method is used by the respective authors in the trend analysis.	Thank you for your suggestion. I have revised Section 2.4 to explicitly indicate the methods used by the respective authors in their trend analysis studies to enhance clarity.
4	Page 7.4 section 2.6, is all the climate change projections shows this shift in Damodar.	I have modified the Section 2.6 to ensure clarity on whether all climate change projections indicate this shift in Damodar.
5	Section 3.2.3, 3.2.4, 3.2.5, 3.2.6, 3.2.7, are those data mentioned in these sections are used in your trend analysis, if not this can be removed.	The unnecessary portion has removed.
6	Figure 4, is not readable, even by enlarging it. Provide bigger font. There are many end boxes?	Figure 4.1 is modified and improved version of Figure is provided.
7	Page 32 correct Indian Meteorological Department (IMD) to India Meteorological Department (IMD).	Corrected and replaced by India Meteorological Department (IMD).
8	Page 45, please correct the sentence, "...probability of KT is calculated for p values than or equal to..."	The sentence has been corrected to "less than or equal to"
9	Page 45, an equation cannot be called a method. Please correct the sentence, "...p value than or equal to 0.05 using the method as shown in equation 4.11.	The sentence has been corrected to "less than or equal to 0.05 as given in equation 4.11".
10	Page 45, Section 4.4, Line 2, please insert a comma between WMO and	A comma has been inserted between WMO and CCI.

Kuldeep

	CCI. "... jointly sponsored by World Meteorological Organisation (WMO) Commission of Climatology (CCI)..."	
11	Page 51, Line 5, Please correct the sentence. "Still, it may vary according to area to area for research analysis".	"Still, it may vary according to areawise for research analysis" → "However, the specific methodology may vary depending on the region and research objectives."
12	Page 51, Section 5.1, 7 th last line. Please correct... This user" manual provides step-by step...	Corrected and modified.
13	Page 52, Line 2, Please do the correction "According to the Indian Meteorological Department (IMD), Pune is considered a rainy day because rainfall is more significant..." It is India Meteorological Department and NOT Indian. What does "Pune is considered a rainy day" mean?	According to the IMD, a day is considered a rainy day if the rainfall exceeds 2.5 mm. Rainfall between 64.5 mm to 124.5 mm is classified as heavy rainfall, while rainfall between 7.5 mm to 64.5 mm is considered moderate rainfall.
14	From page 54, in all tables, give only three decimals, it is not clear why so many decimals.	The numerical value has been provided up to three decimals as suggested.
15	Page 75, 86, 97, 119, 130, 142, 153, 164, 175, 186, 197, 208, 219, 230, The sections titled 'Characteristics of Multiple Climate indices in ...different regions' have their last paragraph exactly same. Please refrain from copy pasting a paragraph throughout the thesis.	We sincerely appreciate the reviewer's observation regarding the repetition of the concluding paragraphs in the sections titled ' <i>Characteristics of Multiple Climate Indices in ... different regions</i> '. Upon review, we acknowledge that the last paragraphs across pages 75, 86, 97, 119, 130, 142, 153, 164, 175, 186, 197, 208, 219, and 230 were indeed identical, which may have inadvertently given the impression of redundancy. To address this concern, we have revised the conclusion paragraphs in each of these sections.
16	Page 71, spelling mistake in "Note ... and if it is greater than -1.96 than negatively significant".	Corrected. Note: If the Z score is greater than 1.96, it means it is statistically significant positive trend, and if it is less than -1.96 represents statistically significant negative trends.
17	In chapter 6 almost all figures are not readable, I think they are taken	The Variable Size Cluster Analysis (VSCA) tool was developed in MATLAB and all the

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	as screen shot.	figures have been extracted from MATLAB. Therefore, the figures, provided in the thesis are not screenshot. Figures of Chapter 6 are modified in a readable format.
18	What is the novelty of your work, since already established drought indices and trend tests have been utilized?	A novel method i.e., Variable Sized Cluster Analysis (VSCA) was developed for identification of trend and change point of any time series datasets.
19	Analyse the results and explain the results in terms of hydroclimatological terms.	The results have been analyzed and explained the results in terms of hydro-climatological terms as suggested.
20	Where are the conclusion? In conclusions and recommendation chapter, after over view, it is key contributions?	Separate section 7.2 Conclusion has been added in the page no. 242.

1/2/2022

PUBLICATIONS

1. Pradeep Kumar Mahato, Kesheo Prasad and Pabitra Ranjan maiti (2023)
“Assessment of long-term variability in rainfall trends over Damodar River Basin, India.” Sustainable Water Resource Management, Volume 9, Article no 172 (2023)
2. Pradeep Kumar Mahato, Kesheo Prasad and Pabitra Ranjan maiti (2025)
“3D Pattern Characterization of Rainfall Trends and Change Point Detection in an Indian River Basin.” Clean- Soil, Air, Water / Volume 53, Issue 8 (2025)