

<b>First Referee Comment (RC1)</b>	<b>Author Comment (AC)</b>
<p>In this paper authors investigate the evolution of wet and dry events collectively in space and time over Upper Jhelum Basin for a period of 1981-2014. They use SPEI index calculated from distribution mapping based corrected ERA5 precipitation estimates and observed temperature data, and locate the hotspot regions for wet, dry and both wet-dry rapid transit events. The idea of the analysis is interesting and the potential for the results is high, however the manuscript remains mostly descriptive.</p> <p>The paper is well written, with a clear, fluent and concise language and a well-organized structure. I think that the manuscript can provide new insights into understanding the evolution of compound extreme events. Hence, my assessment of the manuscript is overall positive.</p> <p>However, some revision is needed before the work can be accepted for publication in the journal. Below detailed comments are listed:</p>	<p>We would like to thank Dr. Muhammad Zaman for his fair and thorough review. Below, we give a comment-by-comment response, indicating the changes we made in the revised manuscript.</p>
<p><b>C1:</b> Figure 1 is not well explained. I suggest that the authors should revise the figure by showing name or number of the gauging stations. I suggest presenting a detail figure of study area.</p>	<p>Figure 1 was updated accordingly.</p>
<p><b>C2:</b> The writing and English need thorough polishing. Numerous grammatical and rhetorical issues too.</p>	<p>The text of the paper was further checked to remove grammar errors and typos.</p>
<p><b>C3:</b> I have some concerns about the introduction section. I think that if the authors wish this paper is well considered by experts, more attention should be devoted to discuss the extreme events in the area. Moreover, this section is lacking clarity and sufficient motivations. I suggest to improve it or better explain with realistic examples. Kindly go through the Zaman et al (2020) for extreme events in the UIB.</p> <p><b>Zaman, M.;</b> Ahmad, I.; Usman, M.; Saifullah, M.; Anjum, M.N.; Khan, M.I.; Uzair Qamar, M. Event-Based Time Distribution Patterns, Return Levels, and Their Trends of Extreme Precipitation across Indus Basin. <i>Water</i> <b>2020</b>, <i>12</i>, 3373</p>	<p>Introduction part was revised to improve clarity and paper motivation. Moreover, the mentioned study is indeed relevant and a reference to it was added in the Introduction chapter of the revised paper.</p>
<p><b>C4:</b> As the data use to carry out a research work is the base of a research work and the most important ingredient. The authors have not provided any detail of the data they have used to carry out their work. I suggest that the authors must provide the complete detail of the data they have used in this research work. Moreover, the authors have applied any homogeneity test on the data to ensure the data quality? In data description section the authors did not mention from where they took observed data and what is the ethnicity of the data. I suggest the authors to go through the Zaman et al 2020 for the data quality and presentation.</p> <p><b>Zaman, M.;</b> Ahmad, I.; Usman, M.; Saifullah, M.; Anjum, M.N.; Khan, M.I.; Uzair Qamar, M. Event-Based Time Distribution Patterns, Return Levels, and Their Trends of Extreme Precipitation across Indus Basin. <i>Water</i> <b>2020</b>, <i>12</i>, 3373</p>	<p>Suggestions were accounted for in the text incorporated under the heading “<b>Data Description</b>”. Kindly see the updated version of the manuscript.</p>
<p><b>C5:</b> Line 138, I would strongly suggest adding 2-3 sentences why authors prefer to use distribution mapping method of bias correction of ERA5 precipitation and which frequency distribution was employed/fitted to the precipitation data.</p>	<p>Suggestions were accounted for in the text incorporated under the heading “<b>Data Description</b>”. Kindly see the updated version of the manuscript.</p>
<p><b>C6:</b> Authors used gridded ERA5 precipitation and observed temperature based potential evapotranspiration for the calculation of SPEI index. Would you please just clarify the reason why authors use gridded and observed data combination instead of use only gridded or observed datasets for both variables?</p>	<p>Reviewer concern was accounted for in the text incorporated under the heading “<b>Data Description</b>”. Kindly see the updated version of the manuscript.</p>

<p><b>C7:</b> From line 152 onward. Overall, the explanation of SPEI is very easy to understand and I think it should not be substituted by merely a reference to another publication. However, would it be possible to add basic equations to guide some type of readers?</p>	<p>More explanation of SPEI with equations was added under the heading “<b>Wet and Dry Events Identification</b>”. Kindly see the updated version of the manuscript.</p>
<p><b>C8:</b> The authors used monthly time scale to detect floods and flash droughts. What do you mean by flash drought? Please explicitly define somewhere in manuscript.</p>	<p><b>Response:</b> The flash drought is a relatively new type of drought. Currently, there is not a universally accepted definition or criteria for flash drought, though there is a general consensus on the principle of rapid onset or intensification characterized by moisture deficits and abnormally high temperatures for a period lasting at least 3 weeks (Lisonbee et al. 2021, Otkin et al. 2018, Hunt et al. 2009). We incorporated this definition in the revised manuscript.</p>
<p><b>C9:</b> Figure 8, what are the units of transition time? Kindly mention it.</p>	<p>Units were added in figure 8.</p>
<p><b>C10:</b> Geographical coordinates are provided in figure 7 only. It would be better to add geographical coordinates to all figures or remove it from figure 7.</p>	<p>Thank you for your suggestion. Figure 7 was updated.</p>
<p><b>C11:</b> Rapid transition of wet-to-dry or dry-to-wet event refers to the one extreme event is followed by the opposite event. It must not necessarily happen with similar severity level.</p>	<p>Yes, the rapid transition refers to the consecutive events/months of different types (One type of event followed by another type of event), regardless of their severity level. These consecutive opposite events could be of the same or of different severity level.</p>
<p><b>C12:</b> Line 261-263, rephrase the sentence.</p>	<p>We rephrased the sentence to make it clearer.</p>

Second Referee Comment (RC2)	Author Comment (AC)
<p>The paper of Ansari and Grossi provides an exercise where the main features of dry-wet condition transitions are analysed at the monthly time scale in the Upper Jhelum Basin located in between India and Pakistan. The authors use a mixed dataset for the period 1981-2014, including ERA5 derived precipitation and observed temperature, they first calculate the SPEI index and then derive several related indices highlighting both dry, wet and combined dry/wet transition events characteristics.</p> <p>The main contribution of the paper, besides the specific results achieved for the study area, is the effort of proposing a methodological framework, yet based on well-known approaches and methods. I suggest some improvements detailed below. I hope my comments can contribute to enhancing the quality of the paper.</p>	<p>We would like to thank Anonymous Referee #2 for the fair and thorough review.</p> <p>Below, we give a comment-by-comment response, indicating the changes we plan to make to the manuscript.</p>
<p>First, I suggest the authors carefully checking the text to avoid several grammar errors and typos widespread in the manuscript (I list some of them at the end of the review as examples).</p>	<p>The text of the paper was further checked to remove grammar errors and typos.</p>
<p>I classify this comment as ‘main’ because it concerns the title. In practice, if the authors agree, it can be easily solved. I don’t agree with the term “wet event” because the expectation of the general audience is for smaller time scales than monthly. Therefore, for the sake of clarity, I suggest different phrasing. Probably “wet-dry months” is a correct, yet simple choice (please refer also to the note at lines 226-227).</p>	<p>We agree with your point of view. However, the manuscript primarily works on wet and dry events rather than floods and droughts. In the text we mention the clear difference between flood and wet event (kindly check the LL 77-80 of the preprint) and support the results with the historical flood and drought events occurred in the region. We also clearly explain the meaning we give to these terms (flood-drought and wet-dry event) (please refer also to the note at LL 77-78 of the preprint). If the Reviewer still thinks we should change the term in the title, we will do it.</p>
<p>I see several problems with data. First, I can’t read the source of observed temperatures. Then, the reliability of ERA5 precipitation data needs to be accurately checked against available observations. In this regard, the authors provide a reference to a conference abstract (Ansari and Grossi, 2021). It’s not enough, a section about data validation is needed. Finally, I’m not that keen on using the Thornthwaite method, which is very dated. I would suggest using at least a temperature-based model, e.g. Hargreaves-Samani. However, ERA5 provides potential evaporation data, a comparison between such data and the results achieved by the authors with another method would be interesting and could provide useful insights. The authors should discuss their choice of relying partially on datasets and partially on ground observations</p>	<p>Reviewer’s concerns have been discussed and incorporated under the heading “Data Description”. Moreover, a few results of the reliability check of DM-corrected ERA5 is now provided as supplementary material. The detailed evaluation of different gridded precipitation datasets and different bias correction methods with respect to extreme precipitation indices is under review.</p> <p>Kindly see the <b>Data Description</b> heading in the revised version of the manuscript. Hopefully it clarifies any aspect of data origin and their usage.</p>
<p>Overall, I found the results and, mainly, the discussion, not particularly vivid. The authors should strive to emphasize better the added value of their study, avoiding not very fitting comments. E.g., I don’t think the sentence in LL396-398 is very appropriate, because it refers to actual ET, while the method used refers to potential ET (PET).</p>	<p>Efforts have been made to improve this section.</p> <p>Regarding the LL396-398, authors intended to highlight the link between global warming and drought conditions, along with the provided citation. Even if the mentioned sentence refers to</p>

	actual ET, PET is indeed the upper limit of actual ET. We rephrased the mentioned sentence to make it clear.
<b>Minor comments</b>	
L30: the authors refer to AR5, maybe they can update considering the brand new AR6	Reference to the climate change projections for South Asia in AR6 was added.
LL80-85: I think this sentence should be better placed in the Conclusions	The manuscript was modified accordingly.
L93: SSI is cited only here and not explained	SSI stands for standardized streamflow index. This piece of information was added in the revised manuscript.
L119: a paper under review is cited. I would avoid it. Anyway, it is not in the References	We removed this citation.
Fig. 1: it is not very clear. Only part of the Kunhar borders is visible. Please flip the colour palette of Elevation (high brown and low green)	Figure 1 was updated accordingly to make it clearer. See figure 1 in revised manuscript.
L136: basically, a period of 35 years is not enough for such kind of analysis. Please extend the discussion of this issue and hint at the possibility of using an extended (in the past) ERA5 dataset	Yes, authors acknowledge the reviewer's point of view. Availability of observed data is the main limitation in this regard. There are only a few climatic stations where data are available from 1971, but the number of stations would not be enough for the correction of ERA5 precipitation and interpolation of observed temperature. Discussion about the time period selection for the analysis was added under the heading "Data Description".
Table 1 and elsewhere: I guess it's "extremely wet", "severely wet", etc., not "extreme wet", "severe wet", etc.	We meant to use two cumulative (paired) adjectives (extreme wet/severe wet) rather than an adverb (Extremely/severely) + an adjective, as both forms are used in English. We prefer the shorter and more effective form.
Section 4.4: I suppose that also the number of transitions for each grid cell should be considered. Is it so? If not, why?	A figure showing the number of transitions for each grid cell was incorporated into the revised manuscript. Kindly see figure 8.
L200: alteration --> maybe "rapid transition"?	Change was made.
Fig.3: The year 1980 should not appear here, it's not within the analyzed period	Figure 3 was updated.
Fig. 4: it's like AWD and ADD, and MWD and MDD are almost complementary (my feeling)	Thank you for your valuable comments. Authors acknowledge your feelings and add few more lines considering your suggestions.
L279: TDI results are not yet introduced	The text was changed to account for your observation
Fig. 7: only here maps coordinates are made explicit. Please make all maps homogeneous.	Thank you for your suggestion. Figure 7 was updated to make it homogeneous with others of the same type. Coordinates are shown in Figure 1 only.
L328 and L339: "a greater number": please quantify	Quantification was added

Fig. 8: what are the units? Months?	Units were added in figure 8.
<b>Typos and English grammar (examples)</b>	The text of the paper was further checked to remove grammar errors and typos.