

Review of the manuscript “Identifying regions of Europe which may be less prepared for extreme rainfall”

The authors present a quantification of the assumed preparedness to precipitation extremes, based on gridded precipitation observation over Europe. The metric employed is two dimensional, incorporating both the year of the current record - to quantify the memory-related preparedness - and the chance of a new record. The method is straightforward, clearly explained, efficient at highlighting regions of potential unpreparedness based solely on precipitation data, and easily applicable. The paper is overall well written. I suggest publication after addressing the following comments.

General comments

- Chances of a new record:

While I understand that for the sake of simplicity the authors chose a risk metric solely based on percentile and observed maxima, I recommend improving the robustness of the “Chance of a new record” metric, considering equivalences with extreme value theory, particularly the shape parameter.

In simpler terms, the risk metric evaluates how close P_{max} is to P_{99} , relative to the distance between $P_{99.5}$ and P_{99} , i.e., is the record P_{max} “easy” to break. This assesses whether breaking the record is “easy” or “difficult.” With EVT, quantiles beyond the observed data can be estimated, and the “easiness” of breaking a record can be interpreted through the shape parameter of the distribution. For instance, a heavy-tailed distribution implies a higher likelihood of record-breaking events, as illustrated (without the frame of EVT) in your supplementary Figure 1. The manuscript would significantly benefit from framing the analysis within the EVT context and adopting its terminology.

Additionally, it would be helpful to clarify that the occurrence of an extreme during year Y does not decrease the probability of occurrence of an extreme in year $Y+1$ (i.i.d. assumption). Some phrasing could be misleading “less risk of a record” (l.252). Please ensure the reader understands that a record is difficult to break because the observed maximum is already far into the upper tail of the distribution.

- Downstream impacts of heavy precipitation:

The impact may extend beyond the location where the precipitation occurs, potentially affecting downstream fluvial regions. Please comment on the added value a similar analysis based on catchments, with maybe some examples.

Specific comments

- Fig5: Have you considered visualizing the data with more categories for the “Chance of a New Record” and “Year of Current Record”? This could provide nuanced insights into assumed preparedness and better highlight the most unprepared regions.
- Fig7: consider changing the marker color from red to black for readability, and maybe linking the red/black markers to the corresponding white one, with a thin/dashed line.

- Is there a quantitative assessment of how societal preparedness improves when recent extremes are considered versus when memory of past events fades? Literature from behavioral and cognitive sciences may offer relevant insights into how recent experiences shape risk perception and preparedness.
- The use of the term “risk” for the chance of a new record may not be optimal, as the IPCC defines risk as a combination of hazards, vulnerability, and exposure. To avoid confusion, consider using “probability” or “likelihood” instead.