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Natural Hazards and Earth System Sciences
Discussions

Interactive comment on "Intra-annual variability of the Western Mediterranean Oscillation (WeMO) and occurrence of extreme torrential rainfall in Catalonia (NE Iberia)" *by* Joan Albert Lopez-Bustins et al.

Anonymous Referee #1

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Overview:

This manuscript addresses the occurrence of extreme torrential precipitation episodes in Catalonia (Northeast Spain). These episodes are considered as 24-hour periods with total precipitation amounts over 200 mm, rather than the commonly considered 100 mm threshold. The analysis is carried out from 1951 through 2016 (66 years) and using 70 weather stations covering Catalonia. A total of 50 episodes was identified and their occurrence was subsequently related to a teleconnection pattern index, the Western Mediterranean Oscillation index (WeMOi). These relationships are assessed

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Discussion paper

not only at the monthly timescale but also at two-week and 10-day timescales.

General comments:

The manuscript is clearly presented and the results are generally sounding and in line with previous studies. A satisfactory state-of-the-art is provided, giving credit to the most relevant preceding studies. Nonetheless, I found that the manuscript does not add significant new information to this topic of research. As it is currently, the manuscript is mostly a statistical description of the connections between extremes and WeMOi. From my viewpoint, the study lacks a more detailed analysis of the mechanisms underlying the occurrence of these events in Catalonia. The use of a single teleconnection index is too simplistic and does not bring any added value to both the forecast of these events and to their understanding. More focus should be given to mesoscale processes and dynamical features, also highlighting singularities.

Specific comments:

1. I recommend replacing "rainfall" with"precipitation" throughout the text, as e.g. hailfall may have occurred on some occasions.

2. Keywords are too vague. Please revise.

3. Lines 93-101: The authors state that: "The main aim of the study involves establishing a period of high potential torrentiality in Catalonia at daily resolution" and below that "Therefore, the present research attempts to go beyond the monthly timescale in order to determine the period with the highest accumulation of heavy rainfall according to fortnights 99 and 10-day periods. The intra-annual variability of the daily WeMOi values may help to establish the period with the highest propensity for torrential events in Catalonia". As previously mentioned, from my point of view this single objective of the study is not enough to justify the publication of the study. A much more detailed analysis should be provided, including an analysis of dynamical precursors, which would be very important for improving weather forecasts and the general understanding of these

events.

4. Ln 108: the authors mention several times "south of France", but the weather stations located in France only cover a very limited area of southern France. Hence, this terminology is a bit misleading and should be revised. Furthermore, the analysis for the French stations does not bring any significant new information and should be discarded from the study. Further, a different threshold is used (100 mm), as is said in Ln 471, thus not allowing a comparison.

5. Fig. 3: The use of NCEP reanalysis is not the best option. The ERA5 dataset should be used instead. Also, the quality of the panels should be considerably improved.

6. Ln 368: five consecutive days? Fig. 6 shows 5 instead of 4. Please clarify.

7. Fig. 7 and subsequent: the means of the bars and lines are not explained in the panels. Please revise.

8. The 2-order polynomial fitting is not duly explained. What is the purpose of these adjustments? What can be concluded from them?

9. Ln 584-586: The authors mention that "Further research on this theme 584 is required and SST temporal trends might provide a better understanding of these changes in extreme torrential events and WeMOi calendars". This type of analysis should not be left to a forthcoming study. This is a good suggestion to improve the manuscript.

Technical comments:

1. Please replace "furnished" by "provided" or similar throughout the text.

2. The overall quality and resolution of the figures should be improved.

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