

## Review to EGU sphere-2023-3111 “Probabilistic short-range forecasts of high precipitation events: optimal decision thresholds and predictability limits”.

In their manuscript, the authors present a new data based ensemble post-processing method to summarize ensemble forecasts as an input to e.g. high precipitation warnings. This new approach takes into account user requirements in terms of target rain intensities and tolerance to false alarms and event non-detection. The method is based on a statistical learning of forecasts archived over a few months. The output is a set of optimal decision thresholds expressed as an ensemble probability threshold or an optimal quantile level. To examine the sensitivity of the procedure, several impact experiments have been made and furthermore 3 real case studies have been presented.

The authors found out that ensemble predictions objectively outperform the corresponding deterministic forecasts at low precipitation intensities. Precipitation forecast skill generally decreases with intensity (except for orographically enhanced events), while it increases with accumulation time, and verification scale. The post-processing method proposed in this manuscript can also be regarded as a kind of ensemble calibration since forecast biases are compensated.

The paper presents an interesting approach which could be helpful for human forecasters as a kind of supporting tool in case of severe weather but could also be included into automated forecast applications. The structure of the manuscript is clear and conclusive and it is written in excellent English supported by well-arranged figures (some of them should be enlarged) and tables.

The article is addressing topical methods in probabilistic weather forecasts/warnings and hence fits very well into the scope of the journal.

However there are some things that should be addressed before final publication.

I recommend the paper is accepted with some minor revisions.

General: There are a lot of blanks in the text (before .:) which should not be there. Also some inconsistencies (e.g. abbreviations, figure references, numbering, etc.) are present. Check the whole manuscript with respect to that.

1. Page 2, L38: significance **or** skill measures. **Typo.**
2. Page 3, L82: Reference to Wikipedia. **Can you add a more scientific reference to this statement.**
3. Page 3, L90: “prediction scales of the order of 30km, which is the resolution at which weather warnings are often issued in European countries. **Add some reference for this statement.**
4. Page 4, L121: The following **paper** will be structured as follows. **Missing word.**
5. Page 4, L122: Section 6 is described twice in this sentence.
6. Page 5, L138: What do you mean by “upper boundary conditions”? upper air? **Describe it.**
7. Page 7, L169: blank is used before : This is in the whole text, sometimes you have a blank before ;, sometimes not. **Be consistent.**
8. Page 7, L186: is there a reference why you use 4mm and 30mm as threshold? **Add reference or description.**
9. Page 8, L198: produce. **Typo.**
10. Page 9, L227: A word is missing in this sentence (e.g. of these terms).
11. Page 10, L267: “should not **be** interpreted as a ...” **Missing word.**
12. Page 10, L271: Missing bracket.
13. Page 10, L275: You mean Figure 3a – **wrong reference to figure.**

14. Page 15 Figure 5: too small figure – **should be enlarged**.
15. Page 16 Figure 6 and 7: too small figures – **should be enlarged**.
16. Page 16, L396: This is strongly depending on the region, since seasonal precipitation characteristics are completely different between the northern parts of France and the Mediterranean region. **This should be stressed more**.
17. Page 17, L 413: This sentence is confusing – **add 6h-accumulated precipitation...**
18. Page 17, L420: Why 12 to 15 local solar time? I do not understand, I thought you are using 21 UTC runs.
19. Page 18, section 6.2 As mentioned before, this seasonal dependency could be very different from region to region – **a statement about this would be fine**.
20. Page 19, L461: But this will cause a lot of false alarms.
21. Page 20 Figure 10: too small figure – **should be enlarged**.
22. Page 20, L475: and forecasters on duty do normally not have the time to look on each members separately.
23. Figures 11, 12, 13: **UTC should be written in capital letters (in the complete manuscript)**.
24. Page 20, L504: On the other hand you have an overestimation in the central parts of the domain in Figure 11 in qH quantile plot compared to the deterministic plot and the observations.
25. Page 21, L506: can strongly depend. **Remove the s in depends**.
26. Page 23, L515: It would be interesting to have a “classical” ensemble median or probability map in comparison to qL and qH quantiles plots for this case.
27. Page 23, L532: **that in instead of than**.