

Review of the revised manuscript HESS-2019-223

“Regional ensemble forecast for early warning system over small Apennine catchments on Central Italy”

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25 November 2019

1 General comments

The manuscript has been revised following the reviewers’ comments. Some answers can be considered satisfactory and the manuscript has been generally improved. However, some scientific flaws are still present, as listed below under the specific comments, and they should be fixed before accepting the manuscript for publication.

2 Specific comments

1. The statistical analysis of the results has been slightly reinforced by introducing the analysis of ROC. However, I am worried about some results shown in Figure 7. Please, excuse me, if I am missing some details and I misunderstand the result, but I think there is some mistake in data processing. Some basic remarks follow.
 - (a) ROC curves should be monotonically non-decreasing, shouldn’t they? The probability of detection and the false alarm rate for a threshold (e.g., 10 mm) are always smaller than those for lower thresholds (e.g., 5 mm), aren’t they? This is not the case for the blue curve in Figures 7a and 7b and for the red curve in Figure 7b.
 - (b) How can be computed the area under the blue curves, which have multiple values on the y axis for a given interval on the x axis?
 - (c) Why are the data of the threshold 15 mm not shown for the red and pink curves?
2. I am sorry, but I did not put enough attention to equation (1) in the previous review. This equation is evidently wrong. The following remarks should also be considered.
 - (a) Notice that $freq = (t_{mem+1} + 1)/2$, because $\sum_{j=1}^n j = n \times (n + 1)/2$.
 - (b) Why is the sum extended to t_{mem+1} if the number of members of the ensemble is t_{mem} ? Is t_{mem+1} the control member?
3. Page 7, lines 28 to 30. The sentence “all the time series show a variability among ensemble members much smaller than the difference between ensemble mean and observations at the maximum of the rainfall” implies that the variability among the ensemble members can be used to estimate the uncertainty among the predictions, but it does not provide an accurate estimate of the spread between the observed and the predicted quantities. Unfortunately, I think that this is a very weak point of the manuscript.
4. In their answer, the Authors claim that “there are not yet operational system based on coupled regional meteorological ensemble and hydro ensemble in Italy”, but this is not enough to support the innovation content of a scientific paper in an international high-quality journal.

3 Technical comments

1. Page 5, lines 1 to 3. Acknowledge in the text the data source for SRT and rain gauges. Should not SRT be substituted with STR (Surface total rainfall)?
2. Page 5, line 13. In which sense the following configuration provides the best results?

3. Page 8, line 11. The ROC method was proposed much earlier than the book by Jolliffe and Stephenson (2012), which, therefore, could not be the best reference.
4. Page 8, line 15. I expect that radar data are spatially distributed over the area and do not need interpolation. Which interpolation method is used for the rain gauges data?