Natural Hazards
and Earth System
Sciences
Discussions

Interactive comment on "Evaluation of two hydrometeorogical ensemble strategies for flash flood forecasting over a catchment of the eastern Pyrenees" *by* Hélène Roux et al.

Anonymous Referee #2

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This article presents the creation of two meteorological NWP ensemble forecasts, 1) by perturbing the initial and lateral boundary conditions, 2) different physical parameterisations, and then forcing these through a hydrological model of a Pyreneean catchment. The forecasts are assessed for three different flood events against in-situ observations. An assessment of the systems' ability to provide reliable flood warnings against observed flood threshold exceedances is also performed. Overall both ensemble strategies provided similar performances and were able to provide more reliable flood warnings than a deterministic strategy.

This article provides an important contribution to the topic of ensemble forecasting for

flood hazards, therefore it is within the scope of this journal. I believe this manuscript is acceptable for publication after minor revisions are made. One general comment is whether it would be possible to reduce the number of figures in the manuscript as 22 is quite a lot. For example in section 5.1 there are 6 figures, but I believe that it is only necessary to retain figures 10 and 11 as these contain the most important information regarding the verification of the SREPS. I would also like the authors to be more explicit about why these two particular ensemble strategies were chosen, what differences may be expected from them and why these differences were not observed. The choice of hydrological model also needs further justification given its omission of karstic streamflow contributions which could prove important within the study catchment.

Further to the above comments, please could the authors also address the following points:

1. Page 1 line 30: replace 'large sea surface temperature' with 'high sea surface temperature' 2. Page 3 line 8: replace 'its' a real challenge' with 'it is challenging' 3. Figure 2: Could the dots and stars in 2b be made larger and also be surrounded by a white halo. It would also be useful if the black text could also have a halo 4. Page 5 line 1: Could the authors provide a little more explanation behind the runoff coefficient being greater than 1 in the Tautavel catchment for the first event. Table 3 seems to suggest that the soil moisture is similar for all three events. If there was a supply from the karstic system wouldn't this influence all three events as well as other catchments? I wonder if this could be related to the amount of snowmelt or snowfall since the event in question occurred in March, could the authors comment on this? 5. Page 7 Figure 2: I can't read the grey labels for the rain gauge names, could these be enlarged and also maybe with a white halo? 6. Page 8 Section 3.1: Given the previous discussion about the possible role of contributions from karstic streams, it concerns me that the hydrological model used in this study does not account for this process. Could the authors comment on the significance of karstic streamflow contributions in this catchment and the possible consequences of its exclusion from the hydrological model upon streamflow accuracy?

7. Page 10 Table 4: It seems like the event of 20131116 has a very low efficiency in all but one station which is located at the upper end of the catchment. In their analysis the authors suggest that this is because events with a moderate peak discharge are not well simulated by MARINE. Why is this the case, is it due to the routing scheme in MARINE? From these poor scores I think this event should be eliminated from the rest of the analysis in the manuscript, could the authors comment on this? 8. Page 12 Line 6: Has 'MPS' being defined previously in the manuscript? If not could the full definition be given? 9. Page 13 Line 6: Please give the definition for the IC and LBC acronyms 10. Page 13 Line 26: How do the different microphysical and PBL schemes add up to 20 ensemble members? 11. Page 14 Line 8: Define the CCN acronym 12. Page 14 Line 23: Add the word 'catchment' so the sentence reads '...a single medium-sized catchment is a challenging...' 13. Page 15 Figure 6: Add the following column titles: JP1, MPS, PILB. The same for figures 7 and 8. However I think these figures could all be removed from the manuscript and maybe put in supplementary material in order to cut down the number of figures in the manuscript. 14. Page 18 Figure 9: What is the CTRL referring to? In the caption replace 'the best and worst ensemble members' with 'the tails of the ensemble' 15. Page 20 Line 8: Are the 7735 grid points just within the catchment or is this over a wider area? 16. Page 21 Figure 11: Could a title and units be added to the legends 17. Page 24 Figure 14, 15, 16: I find it hard to see the grey boxes, could these be made a bit darker and maybe thicker so that they stand out more? 18. Page 26 Line 18: What is the warning threshold that is used? 19. Page 27 Line 6: Replace 'excepted' with 'except' 20. Page 27 Figure 17, 18, 19: I'm unclear what the two separate graphs in each figure show, could the authors improve the titles and/or captions? 21. Page 28 Line 5: Define QDF if not already defined 22. Page 29 Line 2: Replace 'excepted' with 'except', also occurs on page 30 line 24 23. Page 32 Line 12: Could the authors provide more discussion about why there was little difference between the two ensemble strategies? Why were these two different strategies chosen, what differences may have been expected and why do they think these differences weren't observed?