

Interactive comment on “Predictability of soil moisture and river flows over France for the spring season” by S. Singla et al.

Anonymous Referee #1

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General comments

The article presents a sensitivity analysis of seasonal flow forecasts for the spring season (March–April–May) to soil moisture and future meteorological scenarios. The authors apply the Isba-Modcou model over a large set of 881 catchments spread over France. The skill of the probabilistic forecasts is evaluated using as reference the simulation obtained by the Isba-Modcou model fed with the observed meteorological inputs (Safran reanalysis).

The article is generally clear and easy to follow. It provides interesting insights on the variables that mostly influence seasonal flow predictability on this data set.

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One concern I have is that no evaluation against observed data is made in the article since the references being used are synthetic flow series simulated by the model. Although this is clearly acknowledged by the authors, I wonder to which extent this may influence the reliability of the results presented here. It is likely that in catchments or zones where the model is poor, the sensitivity shown in the article should be taken with more caution than in others where it is successful. I think it would be most useful that the authors introduce a discussion on this point, to better characterize the reliability of the results they propose on their catchment set considering model efficiency. For example, what is the behaviour of the Isba-Modcou model in mountainous areas which are often known to be difficult to model (partly due to the difficulty to estimate actual precipitations) and which are largely discussed in the article? A map showing efficiencies in simulation on the target period (MAM) could be introduced and discussed. Such a discussion would make the proposed modelling exercise a bit less "academic" and a bit more useful for the model's users.

I also give a few other minor comments below, which could be considered by the authors when revising their manuscript. Minor revision is requested.

Detailed comments

1. Page 7948, Line 7: "881" instead of "800"
2. Page 7948, Lines 24–26: "irrigation purposes. Predicting low flows and droughts"
3. Page 7948, Lines 25–26: Although this general objective is true, the targeted period in this article is March to May, which is not really the low-flow season in France. To avoid introducing some confusion about the objectives of the study, a clearer link to the context of the work proposed here could be made.
4. Page 7949, Line 5: The term "skill" is not so clear at this stage of the article. Should not it be defined here?
5. Page 7949, Lines 12–13: "The size of the river basin"

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6. Page 7949, Lines 12-13: Is that a general result? Could a few words be added on the results of the cited studies? Do the results presented in the article corroborate these previous findings? This could be discussed in the Discussion section at the end of the article.
7. Page 7949, Line 23: "monsoon"
8. Page 7952, Line 7: For those not familiar with the French context, the total area of France could be mentioned here.
9. Page 7954, Lines 2-5: Maybe add a few words on what this method consists in.
10. Page 7954, Line 12: "threshold temperature" (?)
11. Page 7954, Line 16: "at the daily time step for total"
12. Page 7955, Lines 4-6: I found this sentence unclear. Can the authors clarify it?
13. Page 7955: Maybe a section could be added to give a short and synthetic description of the catchment set used here (range in size, mean flow, mean catchment areal rainfall, mean altitude, regime types, etc.). This information is probably published elsewhere, but this would make this article more self-contained. This section could also include a short description of the example catchments used later in Section 4.3.2. This would help situating these catchments within the whole catchment set.
14. Page 7955, Sections 3.1 – 3.2: I found a bit unclear how the model was actually tested. The authors mention that a one-month lead time is considered. So does it mean that on 1st February, a forecast is made for the day one month later, on 2nd February a forecast is made for the day one month later, etc., and then that the series of one-month ahead forecast are considered for evaluation? In that case, a new initial condition should be considered for each day when a forecast is issued (not only 31st January). Is that what was done? Please clarify this point.
15. Page 7955, Lines 22 and 24: What "parameters" means here?

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16. Page 7956, Line 19: "(See Sect. 2.2)"
17. Page 7958, Line 10: "Figure 3 (left)" or "Figure 3a" (see comment #30)
18. Page 7958, Line 17: "the Lauragais region close to the Mediterranean sea" (?)
19. Page 7958, Line 20: "evapotranspiration"
20. Page 7958, Lines 23-25: What do you mean by "saturation of the signal"?
21. Page 7959, Line 1: "(Fig 3 (right))" or "Figure 3b" (see comment #30)
22. Page 7959, Line 4-7: Is this result not surprising? Soil moisture often plays a key role in generating flows.
23. Page 7959, Line 16: Maybe these gauging stations should be located on the map (Fig. 1)
24. Page 7962, line 14: "and RAF are shown"
25. Page 7962, lines 15-20: It would be useful to present these example catchments before (see comment #13).
26. Pages 7963-7966, Section 5: This section is a bit long and could be split in two sections could (maybe "Discussion and conclusions" and "Perspectives", the latter starting from Page 7964, line 22). As mentioned in my general comments, I think it would be useful to discuss in details the influence of model performance on the reliability of the results presented here.
27. Pages 7966-7967, Appendix A: A reference to a paper discussing the BS could be introduced. Which threshold is considered here? (line 17) Which categories are considered (line 5)
28. Page 7977, Fig.1: The colour scale could be chosen so that it appears from white to dark when the article is printed in black and white. The same comment applies to the other maps (when possible)

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29. Page 7978, Fig.2: I found this figure not so clear. Safran appears in two boxes. Maybe make clearer what is used to compute initial conditions and what is used for scenarios. What means "120 day range" in the figure? Is not it a one-month ahead forecast?

30. Page 7979, Fig.3: Maybe put "a" and "b" on the two graphs, which would ease reference in the text. The same comment applies for the other figures.

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