Hydrology and Earth System Sciences Discussions

Interactive
Comment

Interactive comment on "A past discharges assimilation system for ensemble streamflow forecasts over France – Part 1: Description and validation of the assimilation system" *by* G. Thirel et al.

G. Thirel et al.

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We are grateful to the anonymous referee for his review of the manuscript. For an easier comprehension, general comments of the referee are also reported.

- Figure 6: please consider improving the visibility of the legends and labels. They are hard to read at the moment.

Response of the authors: Legend and labels have been improved

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- Regarding observation errors: streamflow observation errors are usually dependent on the magnitude of the streamflow or discharge. Is this taken into account in estimating the observation error structures?

Response of the authors: Yes, this point is detailed at the end of §4.4.1; observation variance errors increase with the discharge.

- Improvement over the dry period from June to September for the Doubs is trivial and sometimes not the case at all. The authors have provided the reasons stating that 'the model and rainfall forcing characteristics being more important for this case'. Rainfall forcing is important but not as important as temperature and ET during the dry period, especially during a relatively long period of low rainfall. I will like to know how fast the model can catch up and produce a well improved simulated streamflow after a long dry period with this assimilation method.

Response of the authors: With the low efficiency of the assimilation system during the summer period, and the limitations that we imposed to avoid non-wanted behaviours, the soil moisture stays quite realistic at the end of the summer. Thus, at the end of the summer, the assimilation system's reactivity is quite fast, and we can see that it was the case at the end of August for the river Doubs in our example for a small flood event.

- The method shows considerable improvement for floods but not low flow due to the fact the method only aims to correct soil moisture by assimilating streamflow observation based on the discharge produced over saturation. I think the method could well suit a humid or semi-humid area but not an arid or semi-arid area because the flow generation mechanism is different for arid areas. I will also like to know what happens with snowfall dominated catchments. Can authors make comments on this?

Response of the authors: As responded to Massimiliano Zappa's review, we don't have such catchments in our system. Thus, it is difficult to give comments on that. The assimilation system has to be adapted to the model and the conditions of the area by, for example, assimilating radar observations for arid areas, or modifying/assimilating

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the snow pack for the snowfall dominated areas. This has been now commented in the conclusion.

The technical correction has also been addressed.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 7, 2413, 2010.

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