

## ***Interactive comment on “Ensemble reconstruction of spatio-temporal extreme low-flow events in France since 1871” by Laurie Caillouet et al.***

**Anonymous Referee #3**

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General comments Overall I find this an excellent paper which makes an important contribution to understanding French low flows but also in providing a highly transferable method for reconstruction of daily river flows in other countries/locations. The authors are to be congratulated; this paper provides a benchmark study. The paper would however benefit from some additional work on grammar and tightening the communication. Some aspects are a little hard to follow and would benefit from some careful thought on how to present in a clearer way to help the reader follow what is going on. I think that a lot of the appendix information should be integrated – e.g. the work flow figure is very useful to understanding what is going on. All of my specific comments below are minor and try to be constructive. Finally I apologise from my delay!

Specific comments In section 2.2.2 SCOPE climate it would be useful if the authors could introduce the data, then outline the steps in its use and then deal systematically

C1

with the additional treatments...for example it would be helpful to the reader of the final sentences in the section appeared earlier. These steps could then be used to organise the section.

Given the objective of creating an ensemble reconstruction, why was only one hydrological model used and why is no consideration given to the uncertainty in the GR6J parameters. The model is calibrated for the period Jan 1973- sept 2006. Was there a reason for choosing this period based on variation in flow conditions? I ask as the model is expected to reconstruct conditions that are potentially very different from the calibration period. If the focus is on low flows – was consideration given to how the model performed for different duration/intensity events during the period of observations.

I note that validation across the full set of catchments is not shown but is done – what were the salient points – it would be useful to summaries these in a couple of sentences.

“It has to be noted that thorough validation experiments not shown here – out-of-sample experiments, split-sample experiments – have been performed to carefully quantify the overall hydrological modelling performance.”

I find the spatial mapping procedure difficult to follow and its communication would benefit from more clearly laying out the steps and then showing the example application.

Is it possible to make a conclusion around which aspect of drought – severity or duration – uncertainties are greatest?

When reporting seasonality you mention no visible trend – is there evidence of trend in the other parameters- severity/duration? There would seem to be for severity in the Correze catchment.

Please dont start section 4 with figures – text first.

On page 22 the text states “More generally, this figure highlights the fact that the only

C2

events having hit more than 70% of France occurred after 1940.” How confident can you be that this is a real trend or an artefact of the quality of the underlying data. While 20CR and such reanalysis data are hugely valuable confidence will reduce in time. Just a thought to consider which might be mentioned in the discussion.

I dont think there is a need to have so many sub sections in 6.2 – these would be better consolidated.

I think it would be more helpful to the reader to have the workflow image and other material in the appendices integrated into the text. This would not lengthen the paper and increase its readability.

The next generation 20CR gets back to 1850 if I am not mistaken. It would be useful to indicate this here with the potential to extend a further 20 years.

Minor points – note exhaustive - the paper needs a rigorous editing. Line 1: Consider a different phrase to ‘historical depth’ why not length? Line 7: drop the ‘a’ before continuous hydrological modelling.... Line 15: contribute to improving our knowledge of historical events.... Line 16: change to ‘Moreover, this study allows for....’ Perhaps the abstract might highlight that the methods presented are transferable to other locations where 20CR reconstructions are skilful. Page 2, line 3: drop ‘in databses’ Page 2, line 8: reword to have increased the breadth and depth of steamflow data over France. Would be useful to state why this work is insufficient. And to perhaps better clarify what you mean by breadth and depth. Page 2 Line 11 ‘have been employed’ rather than have been developed. Page 3 line 8: has prompted Page 3 Line 9 of the 20th century rather than on and no need for at – just and using.... Page 3 Line 11 an analogue method Page 3 Line 14 combined with a physically based..... Page 3 Line 17 allow rather than allows Page 3 line 27 – final sentence of paragraph needs to be reworded Page 4 line 4 – delete- beforehand the refinement steps.... Page 4 line 27 – are these daily observation since gauge commencement? Page 5 line 4 – on an 8 km resolution grid...drop the and.. Page 5 line 6 – reword and notably for some of them

C3

to some dedicated to low flows... Page 5 – line 14 – paving France? Page 6 – line 2 – double brackets needed for references Page 6 – line 3 – i dont follow how this is done – could the authors add more detail here. Page 6 line 8 – no comma after hyphen. Would reword to necessitating a biad correction step. Page 6 line 28 – from the period rather than among the period – plus overuse of period in the sentence Page 6 line 35 - summarised by the 19 diagram in Annex B – please use better grammar Page 7 line 15 – no comma after hyphen Page 10 line 12 – delete ‘The France subdivision in’... Page 10 line 17 many instead of much Page 10 line 10 matching rather than match Page 15 line 28 – the surface area of France Page 15 line 29 – This estimate Page 22 line 4 – Information not provided rather than an information not provided Page 23 line 5 – stations scattered in France? Page 26 line 3 – reword events both hit the entire France excepted the high-elevation snow-influenced alpine stations Page 27 line 24 reveal singular Page 27 line 25 – check for grammar Page 28 line 7 – reword - this can lead to identify multiple spatio-temporal events

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C4