**Hydrology and
Earth System
Sciences
Discussions**

Interactive
Comment

Interactive comment on "Impact of climate change on groundwater point discharge: backflooding of karstic springs (Loiret, France)" *by* E. Joigneaux et al.

Anonymous Referee #1

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1   General Comments

This short article gives an interesting insight on a natural phenomenon that threatens the drinking water resource in a karst area in France, the backflooding. It also proposes an interesting downscaling method to directly infer climate change impact on riverflow. However, this article is perhaps too short, since they are key aspects that are not presented or not enough explained. Moreover, as noticed by the authors, the present study is not self-sufficient to estimate the impact of climate change on the backflooding. This is especially disappointing since it seems that the method used could provide a more complete answer. Therefore, I recommend some modifications to the article prior

to publication.

2 Specific comments

2.1 Section 2

The presentation of the study area is not that clear for someone who is not familiar. Fig 1 and the description at the bottom of the page 2238 should be improved.

2.2 Section 3.1

It should be made clearer that the direct observation of backflooding are only available for 4 years, and that in order to have a longer period for the climate change impact study, past events are estimated using a hydrological model, that needs as input precipitations and observed Dhuy riverflows

2.3 Section 4.1.

This section is not clear. Fig 3 can hardly be read, due to tiny legends. It would be better to present Fig 3 before Fig2, since the eq1 is derived according to the observations used in Fig 3, whereas Fig 2 presents a longer time period. The observed backflooding event should be presented with a different symbol than estimated backflooding events in fig 2.

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2.4 Sections 4.2 and 4.3

These sections present the results of the hydrological model. It would be interesting to have an idea of the sensitivity of the model errors on the number of backflooding events estimated on the period 1966-2009. How the numbers of events vary according to other different but plausible parameter sets?

2.5 Section 4.4

Here, there is a need to give more details on the assumption: why do you use a 3-day running average? Why not using 1-day or 7-day? How were assigned the coefficients associated to the weather type? How such assumptions affect the results?

Moreover, more details should be given to describe the impact of the weather types on the area under study. I suggest providing at least a table that will give for each weather type the average precipitation rate over the basin under study and over the upstream Loire basin, or other more significant information.

One key issue here is why did the analysis of the weather types was not used to characterize the Loire riverflow? The WTs analysis should provide enough information since a precise estimate of the Loire riverflow is not needed, and that only the low flow period of the Loire River needs to be estimated. As shown by Tissueil et al., 2010, a hydrologic model is not required to study such impact. It seems that by studying the Dhuy River, only half of the work was done. The extension of the proposed method on the Loire river, by providing a characterisation of the Loire behaviour would complete the work. The authors should at least explain why such work was not done: is the WTs analysis fails to give insight on the Loire behaviour? Does it represent too much work?

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2.6   sections 4.5

Interesting results, but it is disapointing not to reach a conclusion because of the lack of analysis of the Loire riverflow.

3   Generic questions

Does the paper address relevant scientific questions within the scope of HESS? yes

Does the paper present novel concepts, ideas, tools, or data? Yes

Are substantial conclusions reached? Yes

Are the scientific methods and assumptions valid and clearly outlined? Some improvement could be made on the presentation of the methods.

Are the results sufficient to support the interpretations and conclusions? The restriction of the method to one part of the problem should be justified.

Is the description of experiments and calculations sufficiently complete and precise to allow their reproduction by fellow scientists (traceability of results)?

Do the authors give proper credit to related work and clearly indicate their own new/original contribution? Yes

Does the title clearly reflect the contents of the paper? Yes

Does the abstract provide a concise and complete summary? Yes

Is the overall presentation well structured and clear? Some parts have to be improved.

Is the language fluent and precise?

Are mathematical formulae, symbols, abbreviations, and units correctly defined and used?

Should any parts of the paper (text, formulae, figures, tables) be clarified, reduced, combined, or eliminated? The legends of the figure are too small.

Are the number and quality of references appropriate?

Is the amount and quality of supplementary material appropriate?

4 Reference

Tisseuil, Vrac, Lek, J. Wade, Statistical downscaling of river flows, Journal of Hydrology, Volume 385, Issues 1-4, 7 May 2010, Pages 279-291

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 8, 2235, 2011.

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