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Hydrology and Earth System Sciences
Discussions

Interactive comment on "The challenge of forecasting impacts of flash floods: test of a simplified hydraulic approach and validation based on insurance claim data" *by* Guillaume Le Bihan et al.

Anonymous Referee #1

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General comments:

This paper deals with a very interesting and challanging issue: how to forecast the impacts of flash flood (FF)? Indeed, usually, flood forecasting related papers only deal separately with one issue: meteorology, hydrology, social sciences. This paper proposes a common framework and presents a FF forecasting impact method, based on a 2-step chain: 1/ pre-determination of flooded areas allowing to define "potential" impacts and 2/ a real-time rainfall runoff model used to choose the relevent predetermined flooded area. This two-step approach is convincing. It is simple enough

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Discussion paper

to be run in real-time. On the other hand, the needed simplifications (for instance in the hydraulic model) are carefully identified and analyzed on very well documented two case studies. Finally a “validation” is presented, based on insurance claim data.

Considering the high quality of this paper, I would recommend its publication with only a minor revision.

My main suggestions (detailed in the following remarks) are:

- Some details in the methodology need to be better explained;

- I am not sure that we could talk about “validation based on insurance claim data” as stated in the title, since as it is well explained in the paper, the ratio “nb of claim”/ “nb of flooded policy” does not reach 100% and need here to be event-based calculated using observation data (see my last remarks).

Detailed comments

1. Page 3, Line 19: reference not suitable : this authors are talking about the FFG, which is typically dedicated to ungauged catchment. Find some references dealing only with gauged systems

2. Page 3, Line 20: Figure 1 and text are not totally coherent. The text mention 3 steps and the figure has 4 illustrations. After reading, it seems that illustrations a and b are related to step one and illustration c and d are relatated to step 3. Step 2 is not illustrated (1-D longitudinal water profil computation). I would suggest to make clearly appear the 3 steps on the figure.

3. Page 3, Line 23: Too few information is provided for step 3. How exactly do you move from the 1D longitudinal model to a 2D representation of the flooded area? Furthermore, from the Fig1 legend, it is understood that a (manual?) post treatment is applied to remove some disconnected area, not clearly mentioned in the text.

4. Page 4, Line 13: maybe detail and regroup here all the manual corrections (including

the removal of disconnected area if it is manually done, (see previous rq), in order to insist on problem of using an 100% automated method, and on the consequent amount of work you have done to deal with this issue in order to obtain coherent inundation areas.

5. Page 4, Line 15: The mentioned return periods are not coherent with the Fig2: 6 return periods on a), 10 on b). Furthermore, in the text, latter you also mentioned 10 flooded areas (page 5, line 18). I imagine the 10 return periods you analyzed are those of fig2b ie : 2, 5, 10, 20, 30, 50, 100, 300 (not 200), 200, 1000)?

6. Page 4, Line 15: Do you have just a upstream flow input or also lateral flow inputs? If yes, how this lateral input is estimated and injected in the hydraulic model?

7. Page 4, Line 17: Which limit condition do you apply at the very last downstream reach ? How do you determine the length of each reach?

8. Page 4 Lines 21-24: this point maybe need to be explained more explicitely (gives some partial answer to my rq 3).

9. Page 4 section 2.2: It seems to me that this section focuses more on the limits of the method than on the “catalogue of flood maps” as indicated by the title. I would change the name of this section to clearly indicates that you focuse on the limits of the automated procedure presented in 2.1. I would also regroup in this section all the content related to manual procedures earlier mentioned in section 2.1. In this case, lines 15-19 should be put in 2.1. . . .or maybe in 2.3 which is a little too short in comparison with the other sections. (nota: this change in your plan is only a suggestion)

10. Page 5 Line 18: “10 flooded” area ? see rq 5.

11. Page 6 Line 3-4: what spatial and temporal resolution were finally adopted for the rainfall-runoff model in your case studies ? (maybe to be mentioned later, but I didn t find the info in the rest of the paper)

12. Page 6 Line 6: If I understood, the “reaches” and cross sections defined here

are not the same that in the previous section. How are they determined? Are those mentioned in table 1?

13. Page 6 Line 13: “the width of river reaches is the main parameter controlling the transfer function and is estimated based on the Strahler order of river reaches” but previously you wrote Line 6 : “The width of the cross-section varies with return period of the discharge”. Could you please clarify exactly how widths are calculated (same rq as 12)

14. Page 8 Line 17: temporal and spatial resolution?

15. Page 8 Line 20: may be change the title by:Reference flood maps obtained from previous studies” (just a suggestion)

16. Page 10, Line 7: There is a jump in the figures numbers. Maybe renumber the figure 7 in figure 4

17. Page 10, Line 32: “It was worse testing if it could provide a number of private houses affected by the floods for each river reach to be compared to the outputs of the proposed forecasting chain.” Worth instead of worse? Please reformulate. What do you exactly mean?

18. Page 11 Line 12: do you know how hydrometric services extrapolate these rating curves? Using hydraulic consideration?

19. Page 11 Line 32: replace ‘form” by “from”

20. Page 12 Line 21: “This explain why. . .” Please explain why.

21. Page 13 Line 31: How is your rainfall-runoff model initialized (in particular the initial soil moisture conditions)? Don t you think that can also be a (important) source a uncertainty?

22. Page 13 Line 31: “forecasted peak value” => Maybe replace “forecasted peak value” by “simulated peak value” in all the text since, the RR model is run in a “simula-

tion" not a "forecasting" mode (using QPE, not QPF).

23. Page 14 line 2: In figure 6 legend replace TSI by ISR

24. Page 14 line 12: maybe change "forecasted peak by "simulated peak".

25. Page 14 line 26:"Clearly, the number [. . .] has a random component". I agree, but your random binomial process take into account 'all' the errors of the damage database.

26. Page 14 line 29: Maybe indicate explicitly that you choose p=0.37 and p=0.43 from table 2, so knowing the number of "observed" claim divided by the number of policies effectively flooded (ie using the observed flooded area). Do I correctly understand? Or do you divide by the number of policy flooded according to your model (ie using the modelled flooded area)? In this last case, it is not a validation since p seems to me a kind of last adjustment parameter which unbiased the impact model. Please clarify.

27. Figure 8: But I maybe missed one point. Why can we see some "horizontal" steps into the claim/policies relation (blue). How did you exactly plot these blue curves?

28. Page 15 line 4-5: I don't understand. I thought you used the 'observed' flooded area to calculate the total number of policy (see rq 26). Please clarify.

29. Page 16: I globally agree with the conclusion. But does your paper also suggest that this insurance data are not suitable for a 'real' validation of the impacts (if you mean that "impact" = "nb of claim"), since you need to know the ratio "number of claim"/ "number of impacted policy". . . Maybe further researches are also needed in this direction? How to better estimate this ratio (by removing the other errors you mentioned from the database)? And then how to "forecast" it (is there some national coherences?)?

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