GCD

Interactive comment

Interactive comment on "Can seasonal hydrological forecasts inform local decisions and actions? An "in-the-moment" decision-making activity" *by* Jessica L. Neumann et al.

Anonymous Referee #1

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The paper is clearly written and well-structured. I think however that it needs some major clarifications.

Overall, my main issue in the paper is that while the results (page 18, lines 4-5 summarize the results very well) are interesting, they are not novel (or surprising). It seems to me that decisions tend to reflect the level of information provided for the decision-making process: too vague information prompted less actions than sharper (even if not of better skill) information. If the focus is on providing evidence of how decisions depend on the way information is being communicated/visualized, then this should be stated already in the introduction of the paper, together with the aims of the paper. I

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[Discussion paper]

think this would add value to the findings. The stated objective of the paper ("to develop a clearer understanding...", line 5, page 3, in order to learn "weather SHF can be used to support decision-making at local level", line 23, page 5) seems to be too vague with respect to the actual findings highlighted in the results part of the paper.

Also, I have some doubts on the validity of the use of the "empathy map". My detailed comments are provided in the list of comments below.

Introduction (pages 2-3):

- I was sometimes surprised by the references that were inserted at some places. I had sometimes the impression that the references mentioned in brackets were not really related to the paper or the subject just mentioned. For instance, when the authors mention EFAS and cite Bartholmes et al., 2009 and Smith et al., 2016, they are citing papers related to medium-range flood forecasts and not seasonal hydrological forecasts (SHF), which is the main topic of the paper and of the paragraph ("SHF systems covering a range of spatial scales"; lines 20-21). Another example is in line 27, where the authors mention papers "exploring how users engage with and apply SHF to inform decisions", but cite Demeritt et al., 2011 and Ramos et al., 2013, which also deal with medium-range forecasts and not seasonal range forecasting. The same is observed in line 31, where studies not related to seasonal forecasts are cited as "others investigating the application of seasonal meteorological forecasts", or again on line 25, where skill of SHF in Europe is referenced by Doblas-Reyes et al., 2013, which is a paper dealing with meteorological forecasts and predictions and not hydrological forecasts. Overall, my impression is that the authors are not citing the papers correctly, or at least it is not clear or straightforward for the reader. I suggest them to review their citations.

- I also suggest the authors to be more explicit on the content they want to highlight from the literature they cite. For instance, lines 19-20, when they say that "recent research has demonstrated improvements", it is important to be more explicit about what improvements are these: gain in skill, accuracy, less errors? How much percent

of improvement? Also, in line 30, I think it is not clear why "uncertainty" is a "key barrier to use". For long now, operational hydrologists and water managers have used probabilistic or scenario-based predictions for seasonal forecasts (see, for instance, the use of ESP, Ensemble Streamflow Predictions, which dates back to the 1980s). Firstly, I think the barrier is not on using seasonal predictions, but GCM-based forecasts, which is quite different. Secondly, I think the barrier is not the uncertainty, but the fact that GCM-based forecasts do not always show better skill than ESP-based forecasts. At some places of the world, they do not do better than the "easier" (if we can say so) use of climatology of precipitation and temperature plus a hydrological model as in the ESP technique. I suggest the authors to clarify what they call a barrier: if no seasonal information is used at all by stakeholders in the West Thames, then the reasons may be other than just uncertainty or decreasing skill (for instance, it could be institutional barriers or lack of perception of its usefulness).

- Also in the Introduction, I miss a more explicit justification for the study. The motivation is quickly referred to in lines 21-23, but it mixes flood warning, drought risk, and water resources management. It is not clear to me why seasonal forecasting is the focus here. I do not think it is straightforward to think of the usefulness of seasonal forecasts for capturing a "flood event with 3 months lead time" (line 17). How many (and which) users rely on a 3-month information to forecast a flood event and take action? Unless we refer to very large catchments, with several months of response time, floods are rather characterized as more rapid phenomena, which are already hard to forecast with accuracy in short to medium-range forecasting systems. I think that the use of seasonal forecasts to forecast a flood event should be better justified in the paper (we note also that the authors even mentioned "flashy response to storm" in the area of the study in line 8). Is it an "expectation" of the users in the West Thames? What are the actual users' needs and expectations in the case presented in the paper?

- Finally, also in the Introduction, I think line 7 "expert flood science communication" should be clarified: what do you mean by this terminology? Also, the "in-the-moment

activity" should be clearly defined, especially as it is used in the title of the paper. I can understand "real-time", but "in-the-moment" is not fully clear to me.

Page 5: - Lines 20-24: I suggest rewriting this part as it is a bit confusing: why is it important to learn what the authors assumed about previous knowledge of participants? Finally, isn't it only important what they finally got at the end in the focus group? - Line 24: what are the differences between raw forecasts and the Hydrological Outlook UK? - Line 29: I would be curious to know how/why the users think SHF has potential to forecast floods. I can understand that it may indicate if the season will be drier or wetter than normal, but this is not necessarily an indication that a flood event will happen and action should be taken now, for instance. This is, at least, not a common way of using SHF information. - Line 31: what is a "coarse" spatio-temporal resolution to them?

Page 6: - Line 29: I think it is a bit disturbing not to show units. I guess the hydrologists have a feeling that increasing from 1 m3/s to 2 m3/s, for instance, may not be as impacting as increasing from 1 m3/s to 30 m3/s. Graphs without units may be tricky and convey "distorted" information: we have the impression of seeing an important increase in flows when, in fact, it does not represent much, or vice-versa. Have you had reactions in that sense from the participants? How could them place their forecasts with respect to climatology, current hydrological situation, background info, etc. without the "units"? Were these pieces of information also given without units? (see also page 9, lines 4-5) - Line 30: if no information on forecast quality was provided, how could the users know that Stage 3 sharper forecast were more skilful (how could they evaluate if the forecasts from all stages were, first of all, reliable?) - Line 31: why the information was not given for 3 month lead time in all situations? Do you think that the fact of having two systems providing longer lead time information may have influenced the appreciation users might have of the quality of the systems?

Pages 8-9: - A traditional empathy map is usually used to describe what a type of user think & feel, hear, see, say & do, and also gather their typical "fears" and "gains" in order to create a shared understanding of user's needs. I did not understand well how

it was employed here: what were the objectives and how did you build it based on the concepts of the traditional approach? How did you move from the "individual" to the "collective"? From Fig. 4, I have the impression that there are two aspects being "surveyed" in the map: the SHF and the decision. How have you separated these in the analysis? Finally, was the concept behind empathy map really needed? I have the impression that the map used here differs significantly (in its target) from the traditional one, which is mostly employed to establish a common ground among team members and to understand and prioritize user's needs. If I understood correctly, basically, a traditional empathy map is built by a group of individuals to reflect a certain type of user, while here it is built by individuals to reflect their own individual preferences, which are them put together to represent a group (although it is not said how this analysis is done in the paper). I also could not understand how "discussions were captured on the empathy maps" (as stated in line 4, page 20). Could you comment on these issues? - While the situation of high flow or low flow was not informed in the beginning (as mentioned by the authors on page 6, line 28), info on flood risk only was provided (page 9, line 13). Isn't there a chance that this has influenced the participants to consider the forecasts as that of an upcoming flood event? Also, maps were provided showing exceedances of given Q thresholds, which is more common in floods than drought visualization maps. Finally, was it really necessary to hide that he forecasts were for a potential flood situation? Wouldn't they guess it anyway? - Page 9, line 17: do you mean "past (or previous) month"? - Page 18, line 13: I think "low skill" and "more dispersive" forecasts are interchangeably used here. The fact that stage 3 forecasts were sharper does not mean they were more skilful, although the perception of the participants seems to be that they were. I think this needs a more clear explanation. Users may think that the sharper, the better, which is not always the case in SHF. From my experience, water managers tend to understand this aspect much better than flood forecasters.

Discussion: - Some parts seem to present results and not a discussion. For instance, page 20 presents, for the first time, the results of the empathy maps analysis. I think

this should go to the section on results. By mixing these sections (results and discussion) it is unclear what pertains to the stakeholders' points of view and what comes from the authors' views/perceptions. For instance, when mentioning a series of projects, IMPREX, EUPORIAS, Edge, SWICCA, etc., it is not clear if these projects were discussed with the stakeholders and participants of the activity reported in the paper (and how it influenced, or not, the discussions and responses to the activity). - Page 21, lines 15-16: it is not indicated anywhere in the methodology of the activity where knowledge on "ongoing scientific developments in SHF" was conveyed to participants. This "conclusion" seems to be disconnected with the methodology presented in the paper. - Page 21, lines 19-21: I am a bit annoyed here because of the original concept behind "empathy maps", as mentioned earlier in my remarks. The definition of "empathy", itself, is related to the action of understanding, being aware of, being sensitive to, etc. the "other" (not oneself), while here it is used by the participants to express their own feelings. They use it as a mirror and not as a way to "put yourself in someone else's shoes". My question is: is it really the appropriate tool to address the issues you want to address? Why did the authors choose this specific tool? I believe the authors got the answers to their questionings, but I have the feeling that this was done with a tool that was fully adapted by them to that purpose, and not as a result of applying the well-known technique of the "empathy map". I think this needs to be clarified.

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