Hydrol. Earth Syst. Sci. Discuss.,
https://doi.org/10.5194/hess-2018-274-AC1, 2018

Hydrology and Earth System Sciences
Discussions

Interactive comment on "Future hot-spots for hydro-hazards in Great Britain: a probabilistic assessment" *by* Lila Collet et al.

Lila Collet et al.

lila.collet@irstea.fr

Received and published: 10 August 2018

First of all, we would like to thank you for your interest in our work and your positive and constructive feedbacks. We summarized your comments in the following points and answered them below:

Comment 1: "[. . .] it important to observe that a location might experience a high probability of hydrologic risk without that risk significantly increasing."

Answer to comment 1: We agree with this nuance, there is indeed a difference between a location that presents a high probability of hydrological hazard (and risk), and a location presenting an increasing probability of hydrological hazard. We chose to use the second definition to refer to "hydro-hazard hot-spots", the question behind being:

Printer-friendly version

Discussion paper

where should we change our water management practices to better anticipate climate change impacts in terms of hydro-hazards? By doing so, we assume locations where there is a high probability of hydro-hazards are already managed (or at least decision-makers and managers are already aware of these). Our aim is to focus on locations where these risks would intensify or emerge as a result of climate change.

To clarify this, we added a sentence in the introduction: "This is particularly important for regions expected to become even more at risk of both floods and droughts, as these would be 'hot-spots' where resilience to hydro-hazards must be strengthened and water management plans adapted to anticipate climatic changes."

And in section 2.3: "The hot-spot definition aims to clarify the question: 'Where should we anticipate an increase in hydro-hazards as a result of climate change and adapt our water resources management?' By doing so, we assume locations with a high probability of hydro-hazards under the current climate are already managed, known as at risk by decision-makers, and hence do not require highlighting. Instead, our methodology aims to focus on locations where these risks would intensify or emerge in a changing climate."

Comment 2: "[. . .] locations that experienced some subset of the three criteria described on page 6 and shown in Figure 3. [. . .] some note about sites that were missed and how strong the correlation between criteria is."

Answer to comment 2: The results we got are so dense that we chose to summarize them in the hot-spot representation for this paper. However, there is much more to say, particularly on sites showing a strong increase in one particular criterion. Hence we decided to add a paragraph in the discussion (section 4.1 page 15) on this topic and add in supplementary information the first maps we produced during this work (Figures S1 and S2), showing changes in each criterion for each hazard and for all the catchments. We agree it would be nice to add points on Figure 3, but tricky to plot all 3 percentiles and we would miss the locations of these points, which is the

additional information we get on the new S1 and S2 maps. They show that correlation between magnitude and duration can be very strong, particularly for droughts, possibly because of how these criteria are calculated (the longer the drought event, the higher the magnitude).

“When analysing changes in each criteria (frequency, magnitude, and duration) separately (Figures S1for floods and S2 for droughts), we can see that for floods the increase in frequency is stronger on the west coast and the southwest of England, while the increase in magnitude is more prominent in the south and southwest of England and duration shows very little changes compared to the other criteria, with the highest increases in the south of England and Wales and the north of Scotland (for the 90th percentile only). For droughts, changes in frequency show a similar spatial distribution (mainly along the west coast), and there is a strong gradient of changes in magnitude (that shows the highest increases compared to the other criteria) and duration, which are strongly correlated, with the highest increases in the diagonal going from the southwest of England up to northeast of Scotland along the west coast of Wales and England.”

Comment 3: “[. . .] how floods and droughts are changing individually and collectively.”

Answer to comment 3: This is also an interesting point. We have also mapped separated hot-spots for each hazard, keeping the same criteria and increase thresholds (Figure S3), that shows which sites are more “hot-spotty” for one hazard or for the other. This is now described in the discussion (section 4.1).

“Interestingly, when applying the hot-spot analysis separately to each hazard (see Fig. S3), we can see that severe hot-spots (i.e. catchments selected for the 3 percentiles) are shown in southwest of England and Wales and eastern Scotland for floods, and for droughts on the west coast of Wales, England, and Scotland, with 2 catchments on the east coast of Scotland. While there is roughly the same number of hot-spots for both hazards separately, catchments do not necessarily match when floods and droughts

are analyzed together."

Comment 4: "[. . .] the unintentional implication that sites not classified as hot-spots will require little changes to water resources management."

Answer to comment 4: This is a very good point. Since this work focuses on sites where hydro-hazards would worsen, we didn't discuss implications of those where hydro-hazards would decrease, which would of course imply an adjustment in terms of water management planning. A few sentences on this point (locations showing a decreasing in hydro-hazards and possible effects on water resources management) were added in the discussion to nuance our conclusions (section 4.2).

"While this study focused mainly on identifying locations of increasing hydro-hazard hot-spots, Fig. S2 also shows that climatic projections could induce a decreasing drought hazard, particularly in terms of magnitude and duration in the southeast of England and northern Scotland. Such 'positive' changes, i.e. where water deficit would decrease under climate change, would also imply a readjustment of water policies. For example in southeast of England where drought is historically the most frequent observed and managed hydro-hazard, the FFH shows there would be a need to shift hazard management to flood protection, since this region would see an increase in flood frequency, magnitude, and duration, and at the same time a decrease in drought hazard."

Comment 5: Less general comments Answer to comment 5: P4l11: Agreed, that was added in the text. P6l10: Agreed, a more detailed guidance was added on threshold selection in section 2.3 (page 6). Figure 3: We did not investigate significance of changes as such (we did not perform statistical analysis), but severity of changes was implicitly investigated through the 3 percentiles: there is a high severity of change for sites where the 3 percentiles converge (meaning 90% of the ensemble-members agree on the change). Figure 3: Indeed, title of (a) was corrected. Section 3.5: To clarify this point, a description of the mean day of year and seasonality calculation was added in

Printer-friendly version

Discussion paper

SI and that was pointed out in section 2.2 (page 4).

Again, thank you for these feedbacks that helped improving this paper.

Please also note the supplement to this comment:
https://www.hydrol-earth-syst-sci-discuss.net/hess-2018-274/hess-2018-274-AC1-supplement.pdf

---

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., https://doi.org/10.5194/hess-2018-274, 2018.