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Hydrology and Earth System Sciences
Discussions

Interactive comment on "Global change in flood and drought intensities under climate change in the 21st century" *by* Behzad Asadieh and Nir Y. Krakauer

Anonymous Referee #2

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The article by Asadieh and Krakauer investigates the very topical issue of flood and drought changes under future climate conditions. The topic has been subject to a large number of studies in the past few years, many of them based on the same set of GCM-GHM combinations from the ISI-MIP initiative, so it is difficult to find some unexplored topic of research in this area. However, this work is based on an interesting idea of comparing together increases in droughts and flood intensity and frequency under future climate, and I think it has potential for being published. The writing style is up to international standards and the article is compact, hence I don't see room for shortening.

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Discussion paper

My main concern is the misleading use of the terms “floods” and “droughts” throughout the article, for indicating high and low streamflow quantiles which are not really extremes, and certainly not linked to actual flood or drought events. Floods are normally linked to much higher quantiles, and in addition, they depend on the local vulnerability. Streamflow droughts (which by the way should be specified in the article, as meteorological and agricultural droughts are calculated differently) are also not as simple as a connection to the streamflow quantile, but they depend on the duration and intensity of the droughts. My suggestion is to clarify well through the article (e.g., p4 l18-21, p5 l22-25, p6, and in general in the results) and in the title that the aim is to “high and low streamflows” rather than floods and droughts. Interestingly, only in the caption of Fig 1 did the authors write a warning about linking those streamflow quantiles to actual floods and droughts.

Specific comments

P1 l11-12: This sentence reads more like a finding rather than an introduction. I’d move it to the introduction and support it with some references.

P2 l17-18: I suggest complementing the list with the more recent studies by Alfieri et al. (2015, 2017) and Winsemius et al. (2016).

P2 l30-31: “Climate-change-induced” could be removed here, to avoid speculation.

P5 l14-15: The sentence doesn’t read well. Please reformulate.

P5 l19: currently-frozen should be replaced with more appropriate terminology. Also, this sentence needs a supporting reference or a reason for the wider model spread.

P6 l28: also the over –> also over

P7 l4: Is it available? Otherwise you should add “not shown”

P8 l14: flux to the Arctic Ocean

P8 l26-27: “In the meantime” should be replaced with more appropriate terminology.

P11 l5-7: This sentence sounds speculative as no specific simulation was performed to support it.

Table 1: I suggest removing “rel” in the first two columns, as that is clear from the % sign.

Figure 5 is surely the most interesting one, and the main novelty of this work. I wonder if the caption could be shortened. It is currently pretty long.

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