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Hydrology and Earth System Sciences
Discussions

Interactive comment on "A global approach to defining flood seasons" *by* D. Lee et al.

Anonymous Referee #1

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General comments

This paper proposes a method to identify the main flood season(s) in all large rivers in the world, based on a distributed hydrological simulation over a few decades, forced by an atmospheric reanalysis product. The article is well written and the storyline follows a sound structure. Although the flood regime of most world rivers is already well known, the findings of this research can be useful for some hydrological applications, such as for ungauged river basins and also to provide a continuous and consistent spatial dataset with global coverage with such type of information. I assume that the validity of the findings is limited to a specific range of basin size, given the spatial resolution used in the modeling, and its use in detecting extreme discharge values. I think that this research is worth of being published, provided that the few comments below are adequately addressed.

P.4600-4602: the authors first highlight the benefits of POT approaches (e.g., p.4600, line 24-26) and then don't seem to implement this technique for peak selection. The method based on P_AMF is more like a percentile approach, while in the POT one should select only the peak within the same event, hence it is different. See the recent works by Mallakpour and Villarini (2015) and by Alfieri et al. (2015) for recent applications of POT on observed river discharge and simulated gridded streamflow, respectively. Indeed, methods based on fixed time windows are likely to be appropriate for river basins where floods occur with timing similar to that duration. In reality the flood duration vary a lot, and mostly depend on the size of the river basins. In small river basin the flood wave can be entirely contained in a single day, while for large rivers such as the Amazon or the Zambezi, there is a distinct single peak in each year, and the river discharge can be above flooding conditions for a month or more. The authors should consider this in defining the approach for peak selection and perhaps state the limitations/caveats of using the approach described. Other option would be to clarify that the focus of the article is more on detecting the season with on average higher river runoff, rather than looking at extremes causing floodplain inundation.

Sect. 3.3: As the authors write, there is a potential delay due to routing of the flood wave downstream and smoothing effect due to lakes and reservoirs. Anyway, I think that considering the start of the flood season is a more suitable parameter than the average PM, as the flood often originates upstream and then propagates downstream with a delay dependent on the travel time. Again, I bring up the example of the Amazon river (see, e.g., Rudorff et al., 2014) being the extreme case, where such approach of averaging would simply identify the peak month of a portion of the river basin located in its intermediate part (in terms of distance from the outlet location).

Figure 12: panels should refer to specific river sections rather than just river names

References Alfieri, L., Burek, P., Feyen, L. and Forzieri, G.: Global warming increases the frequency of river floods in Europe, Hydrol. Earth Syst. Sci., 19(5), 2247–2260, doi:10.5194/hess-19-2247-2015, 2015.

Mallakpour, I. and Villarini, G.: The changing nature of flooding across the central United States, Nature Clim. Change, 5(3), 250–254, doi:10.1038/nclimate2516, 2015.

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Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 12, 4595, 2015.