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Natural Hazards and Earth System Sciences
Discussions

Interactive comment on "Brief communication: The role of using precipitation or river discharge data when assessing global coastal compound flooding" *by* Emanuele Bevacqua et al.

Anonymous Referee #2

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General Comments:

Bevacqua et al., present a global scale analysis of compound flood (CF) potential by comparing results that estimate the probability of CF using precipitation and storm surge water levels (surge and waves) and discharge and storm surge water levels (surge and waves). This is an important topic for CF research, as a variety of results have been published that use either discharge or precipitation and to my knowledge, this is the first study that tests how the two variables compare. This paper was well written and easy to read. While this is a valuable addition to the literature, I'd like to see the authors more thoroughly address that differences between results are not due

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Discussion paper

to their analysis techniques before being accepted for publication.

Specific Comments:

The manuscript could address whether results are dependent on the chosen analysis techniques more thoroughly. I'm broadly interested in if the patterns in the return periods and the Triver/Tprec ratio are related to local characteristics of the datasets as the authors suggest in their Results and discussion section, or the analysis that was undertaken, particularly concerning 1) dependency between variables, 2) threshold selection and 3) goodness of fit.

1) Most CF assessments begin by assessing the dependence of the given parameter space. A comparison of the dependence between precipitation and surge level and discharge and surge level may help to explain patterns in the differences in the results. Are there large differences in the dependence between surge vs precip and surge vs river extremes?

2) The authors select pairs of data that are larger than the individual variable's 95 %ile threshold. If less than 20 pairs, the authors decrease the threshold to include more pairs of joint variables. How was the number of pairs, 20, chosen? This seems like a fairly low amount of joint-events to base an analysis on (less than one a year!). Furthermore, how many locations was the threshold decreased, and what's the lowest threshold that was used? Can these variables still be considered "extreme?" It would be interesting to know how variable the number of events analyzed per location was in this analysis.

3) Do patterns in statistical compatibility have anything to do with the goodness of fit of the marginal distributions and copulas? There are some big differences in statistically compatibility and ratio in the same regions (e.g., stations next door to one another). Any reason why that might be?

I think it would be helpful to bring up some more information about the catchments

studied earlier. What's the smallest catchment considered? What's the largest? Are the results dependent on how the catchment values are binned?

Finally, on Page 2, line 53-54, the authors state that the study "aims to assess whether a precipitation based CF assessment can be used as a surrogate for potential CF in estuaries." But I feel like the authors never come back to answering this question. For example, most places that are statistically incompatible are where Tprecip is much larger than Triver. Does this analysis suggest then that precipitation can't be used here, or it should be used in these cases?

Comments on Specific Lines:

Page 1, line 6: In the abstract, the authors state that CF in long river catchments is "more accurately" analyzed using river discharge data. However, there's no underlying assessment of the accuracy of either of these datasets, and/or how well these locations represent joint variables at known locations. Thus the authors may want to consider a change in word choice here.

Technical Corrections:

Page 4, line 108: "centered" is spelled "centred" Page 10, line 199: "Overall, we find that independently of catchment. . ." should be "independent" Figure 3: I don't seem to understand the difference in light versus dark lines in 3d and 3e. All maps could have lat/lon grid lines.

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