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Hydrology and Earth System Sciences
Discussions

Interactive comment on "Compound flood potential from storm surge and heavy precipitation in coastal China" *by* Jiayi Fang et al.

Anonymous Referee #1

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Thank you for the opportunity to review this manuscript. This study investigates the compound effects of storm surge and rainfall on coastal floods in China using gauged data from 11 tide gauges. It found that typhoon and sea level rise can potentially increases the frequency of compound coastal floods. In addition, the study attempted to explain the causes of compound events by investigating meteorological forcing. Finally the study concluded that there is a need to incorporate effect of compound floods in risk analysis and infrastructure design. This topic, the method used and the findings are not new. However, it does provide some insights into compound flood risk in China. I have a few comments and suggestions below for the authors to consider.

1. The authors stated that "To compare impacts caused by compound and non-compound events, we employ a typhoon database developed by Yap et al. (2015),

which includes historical typhoon records from 1951 to 2012, ... The database contains information of 853 typhoons in total, with records of direct 115 normalized economic loss (in US$), death toll, and number of people affected". This implies that the authors defined compound coastal flood events as a subset of flood events occurred during typhoon events for impact analysis. Is this categorization correct? Did the authors imply that in China Typhoon is the only cause for compound coastal flood events? Are there any compound flood events occurred outside typhoon events? How the impact of the compound events outside the typhoon events are evaluated or are they included? 2. The damages of compound flood events were assessed using the damages from the typhoon events. However, the damages of typhoon events are not only results of compound flood events embedded in these typhoon events, but also included damages from other effects of these typhoon events. How the impacts of other factors that are not related to compound flood events are isolated or are they included as part of the analysis? 3. It is well known that the threshold selection will have an impact on the dependence analysis, as the authors showed with their results from the sensitivity analysis. Are there any insights derived from this sensitivity analysis that can be used for future analysis, apart from the fact that the results are sensitive to the threshold values used? 4. For seasonal analysis "four periods are considered: typhoon season (July-October), summer (July-August), autumn (September-November), and whole year". Again, this is more related to typhoon events than the defined compound events. 5. Overall, there seems to be a varying definition of "compound flood events" used in the different analysis throughout the paper (e.g. sometimes mixed with typhoon events). This is not only confusing and can be sometimes mis-leading, e.g. for damage analysis commented above. In addition, although various types of analysis were conducted (all of which have been used in previous studies), the manuscript lacks a central theme tying everything together– in other words, why the different types of analysis were selected (apart from the fact that they have been used in similar studies previously) and how they collectively contribute to the understanding of the specific problem under investigation? 6. Finally a minor point: The authors pointed out that

there is a need to assess “the relationship to climate indices”. This has been done to some extent. The authors may be interested in the following paper on this topic: Wenyan Wu and Michael Leonard 2019 Impact of ENSO on dependence between extreme rainfall and storm surge Environ. Res. Lett. 14 124043

I hope my comments are helpful for the authors to improve their manuscript.

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