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

Jiayi Fang et al.

jyfang@geo.ecnu.edu.cn

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Reviewer 3:

This study investigates the compound events from storm surge and heavy precipitation using 11 tide gauges along the coast of China and discusses some potential driving for the occurrences of compound events. This study can provide an important supplement for the analysis of compound events in China owing to the most comprehensive records of storm surge used, even though the methods and results are not very innovative and surprise. There are some concerns that should be addressed for further consideration for potential publication in HESS. Firstly, in the section of "3.1 Selecting compound events", Figure 2 shows the scatter plot for daily maximum storm surge and

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daily maximum precipitation. You have hourly sea-level data of 11 tide gauge, do you mean to extract the daily maximum one-hour sea level data from these hourly data firstly? But for precipitation data, you only have daily precipitation data, how can you have daily maximum precipitation?

Response: Thanks for the comment. We are sorry for the confusion. Firstly, we apply a harmonic tidal analysis by using hourly sea level observations to extract the surge (or non-tidal residual) part. Then, we extract the daily maximum surge from hourly surge data. For daily precipitation data, it is the amount of accumulated daily precipitation. This is clarified in the revised version.

Secondly, in the section "4.2 Effects of sea-level rise on compound event frequencies", it is not very clear how to remove the sea level rise. Do you mean the daily sea level minuses the annual sea level?

Response: We removed the mean sea level influence by applying a year-by-year harmonic tidal analysis (see Line 100). In doing so we effectively remove the tidal influence but also the annual mean sea level from the hourly (and daily maxima) storm surge data which is ultimately used in the analysis. This is the same approach used in many previous studies and we will make it clearer in the revised version of the paper.

Thirdly, in the section of "4.5 Impacts caused by compound and non-compound flood events", how can you separate the damages induced by compound events based on typhoon related damages records? For instance, heavy wind due to typhoon events can also result in damages and losses. It is hard to separate the damages from different disasters.

Response: Thanks for the comment. The reviewer raised a very good point. The damages records developed by Yap et al. (2015) is the total damages by more than one hazard. It may be caused by one hazard, or two or more hazards, such as gale, heavy rainfall and storm surge. From the perspective of disaster system theory, it is also related to vulnerability and human activities. Unfortunately, there is no straightforward

way to disentangle the fraction that each hazard contributed to the damage. In this case, we would like to show the difference caused by compound and non-compound events, assuming that flooding was the main contributor to the damages or at least had a similar relative contribution to the damages. We realize that this is big assumption to make and based on the reviewer's comment (and similar comments from another reviewer) we decided to move this part into a new discussion section where the underlying issues are discussed when attempting to link compound and non-compound events to the damage database.

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