Natural Hazards
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Discussions

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Interactive comment on "Simulation of storm surge inundation under different typhoon intensity scenarios: Case study of Pingyang County, China" *by* Xianwu Shi et al.

Anonymous Referee #1

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The paper aims at quantifying the inundation range and water depth distribution due to storm surges for different typhoon scenarios for the Pingyang County in China. The typhoon scenarios are constructed in a consistent way to reflect variations in tracks and intensity. The storm surges are estimated with the hydrodynamical model. In combination with the peak river runoff values the water level scenarios are used for the estimation of the coastal flooding magnitude in case of a seawall breach. The study provides an insight into the spatial distribution of the areas potentially endangered by the typhoon related flooding. It can be helpful for further hazard and risk assessments for urban planning, emergency procedures or insurance. The paper is well structured and mostly easy to follow. Here are some points requiring clarification and some sug-

gestions:

Section 3.1: Concerning the data sources and DEM, I agree with the first reviewer. Please include the response you gave, at least partially, into the paper.

Fig. 2 in the review response: Please include this figure into the paper with (1) better quality (2) color code for the land elevation, so the orography of the potentially flooded area can be deduced.

Section 3.3 and Tables 1 and 2:

l. 139 – table content is specified as "error statistics". (1) Are these values the differences between two values: observed and modeled max high water (or max storm surge) for each typhoon and location? (2) What are the "average errors" discussed in lines 142-150 and shown in the last column and line of the Tables? These values seem not to be the average (mean) of the values in the Tables. E.g. Table 1, event 9015 – Average value 8 is not equal to the mean of (3, 2, -23), similar is true for many other lines and columns. Please either specify in the text how these "average" values were obtained or correct the average values in the Tables and discussion in the Section 3.3 accordingly.

l. 142-143: the locations of the tidal stations on the map (either Fig. 1 of figure with DEM) would be helpful. They could also help to understand the significant differences in the storm surges on Fig. 4.

l. 144: "storm surge high tide" please reformulate because by definition "surge" is a residual of water level and the tide and has no tidal component.

l. 146: "10% of the maximum storm surge" – what is the value of maximum storm surge and which maximum storm surge is meant here? Is it at any particular location or/and event or averaged maximum? Please specify in the text. Also, if the 10% is about 10cm as mentioned in the text, then the maximum storm surge should be about 1m, however at the Fig. 4 there are storm surges reaching over 3m.

Sections 3.3:

The information about the tidal signal used at the open boundaries during validation is missing. Approximate tidal range at the coast is worth mentioning in this section because the discussed errors of 15-30 cm have different weight when they occur for the tidal range of e.g. 1m or 6m. Also, how the astronomical tides were estimated for calculation of storm surges is interesting, especially in connection with Fig.3 and Fig.4.

Fig. 3 and Fig. 4: Please include the dates on the x-axis additionally to the time. The axis are different between Fig. 3 and Fig. 4 and it is difficult to recognize the corresponding water level and storm surge. For example, for Ruian on Fig.4 there is a storm surge of 3m, however on Fig.3 for the same location and same typhoon it is really hard to deduce when such high surge has taken place.

l. 189: Please provide a quantitative example of the highest water level during this typhoon for any location of your choice in the area of investigation.

l. 197-198: (1) does "constant direction of movement" mean that the modified typhoon moves in a straight line? If not, please reformulate. If yes, please explain how this constant direction correspond to original typhoon track. (2) "track... was translated to the landing site..." – meaning the track was shifted so that landing points coincide? (3) the map with the original tracks of the two typhoons and the "designed typhoon" track described in the line 202 would be very helpful here

l. 215: "36 and 36 km" please correct

l. 220: change "coupled" to "linearly added" - as far as I understood, the high tide values were linearly added to the peak surge heights at the coast

l. 229: "peak flow in an estuary has no obvious influence..." - Does it mean the peak flow does not influence water levels during the typhoon OFF the estuary or IN the estuary? If the former, please add this to the sentence. If the later, then it contradicts with the next two sentences, where it is stated that "storm surge-runoff interaction ...

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increases the tidal level...".

l. 245-246: Where the wave overtopping rate came from in the numerical simulations for this study? Was the wave model additionally used to estimate the overtopping? Or how the wave overtopping was found based on the results from the storm surge model? Please specify.

Discussion: Discuss the limitations and sources of uncertainty originating in e.g. linear combination of averaged high tides instead of dynamically simulated surge and tide with their interaction; simplified seawall collapse scenarios and how this can affect the estimates of inundated areas (for example, in this study inundation is independent on the duration of the storm surge event).