

Response to reviewer' comments
On the manuscript **nhess-2020-132**
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First, we wish to thank the reviewer for their valuable insights. below our *response (in italics)* to the reviewer's raised points.

1) When describing the hydrodynamic model setting, the Author state that “For the investigated events in this study flood risk is mainly dominated by defence overflow and defence breaching”. While defence overflow can be easily computed as a function of the hydraulic head acting above the defence, defence breaching requires some model to simulate (or to account for) the breaching process and the ensuing much larger outflow (Dazzi et al., 2020; Viero et al., 2013). Any further detail on defence breaching is lacking in the paper.

We thank the reviewer for this comment. For the investigated cases there was no defence breaching, the sentence was referring to the general risk in the coastal area. We clarified the text, and removed the reference to breaching as follows

line 165- 166: For the investigated events in this study, flood risk is mainly dominated by defence overflow.

2) When describing the hydrodynamic model setting, at lines 168-169 I read “we did not represent the flow of water in the main channel. Rather boundary conditions were given as time series of water surface elevation imposed along the defence crests”. These sentences are not clear at all. How was the upstream boundary condition (inflow discharge hydrographs from the hydrological model) used in hydrodynamic modelling? What is intended for “main channel”? Does the second sentence refer to downstream boundary condition only? (at lines 220-221 I read “simulated peak flow used as an upstream boundary condition in HEC-RAS” that states that the flow of water is somewhere represented).

We thank the reviewer for this comment. We apologise for the confusion. Considering the reviewer comment, we removed the unclear sentence [previously line 168-169], and we rephrased the paragraph as follows

line 166- 169: The proposed analysis focussed upon the effects of extreme events that are so severe that all defences would, in any case, be overtopped. This allows for a simplification of the modelling problem and allows for a correct approximation of flows even without detailed bathymetric information in the main channel, as underlined in (Bates et al. 2005).

3) The “Concluding remarks” has been enlarged, rather than improved. Now conclusions are long to read, contain repetitions and, finally, are unable to convey clear messages.

Each single paragraph is a collection of very different arguments, and concluding remarks on the same topic are dissected in different paragraphs. Please revise the structure of this last section.

We thank the reviewer for this comment. We have reorganized and rewritten the “Concluding remarks” section, summarizing the main findings and trying to avoid repetitions.

Minor Points

- L. 67: Abi-Samra, not Abi-Sarma.

We fixed the reference.

- L. 108: Skamarock, not Shamarock.

We fixed the reference.

- L. 128: Meehl et al., 2007, not 2017.

We fixed the reference.

- L. 166: Please consider adding a reference to Viero et al. (2019), as a relevant example of flooding dominated by defence overflow and defence breaching.

We have rephrased this part of the text, and removed the references to defense breaching. Hence we did not add the reference

- L. 167: Bates et al. (2013) is referenced in the text but, in the Bibliography, I can only find Bates et al. (2005). This item (line 480) is missing the title and is not properly formatted.

We fixed the year in the text and modified the bibliography as well.

- L. 258: check the reference to Figure 7 (maybe Figure 9 is the correct one).

Thank you for the comment. We have fixed the figure number in the text.

- L. 275: Xian et al. (2015), not (2005).

We have fixed it.

- L. 472: in the item Ahearn (2004) the report title is missing.

We have removed the citation as we did not use this in the text.

- L. 476: Barnard et al (2017) is not referenced in the text.

We have removed the citation as we did not use this in the text.

- L. 492: Bradbrook et al. (2004) is not referenced in the text. Moreover, the link provided is not the official one, please change it to <https://doi.org/10.1080/15715124.2004.9635233>.

We have removed the reference.

- L. 510: the year at the end.

We fixed this. See line 472.

- L. 514: Surname of the Authors first.

We fixed this. See line 475.

- L. 517: Danielson and Gesch is dated 2011, not 2016.

We fixed this. See line 478.

- L. 546: reference to Gerald et al. (2007), not cited in the text, is a duplicate of Meehl et al. (2007), and should be removed.

We have fixed this and removed the duplicate reference.

- L. 553-558: the reference to Hamman et al. (2016) is duplicated.

We have removed the duplicate reference.

- L. 605: O'Donnell (2020) is not referenced in the text.

We have added the citation in the text. See line 204.

- The two references to Schumann et al., 2007 should be denoted with 2007a and 2007b.

We have fixed this as per reviewer's suggestion.

- I found several references to a U.S.S Geological Survey throughout the Bibliography. It should read USGS, isn't it? (example l. 646)

We fixed this.

- L. 648-653: the reference to Vousdoukas et al. (2018) is duplicated.

We removed the duplicate reference.

- L. 657: Wahl et al. (2018) is not referenced in the text.

We have removed it from bibliography.

- L. 671-676: the reference to Ziervogel et al. (2014) is duplicated.

We removed the duplicate reference.

- Please note that in the Copernicus template there is a Bibliography style aimed at formatting the Bibliography with proper (and reader-friendly) indentation.

Thank you for the suggestion. We have tried to follow the Bibliography style in the Copernicus template.

- Figure 3 and throughout the text: put the superscript 3 in "m³/s".

We have fixed it. Please see the next response.

- Figure 3: "Stream flow at upstream" => "Upstream boundary condition"; "Total Water Level at Downstream" => "Downstream boundary condition"

We have made changes according to reviewer's suggestions. Please see below-

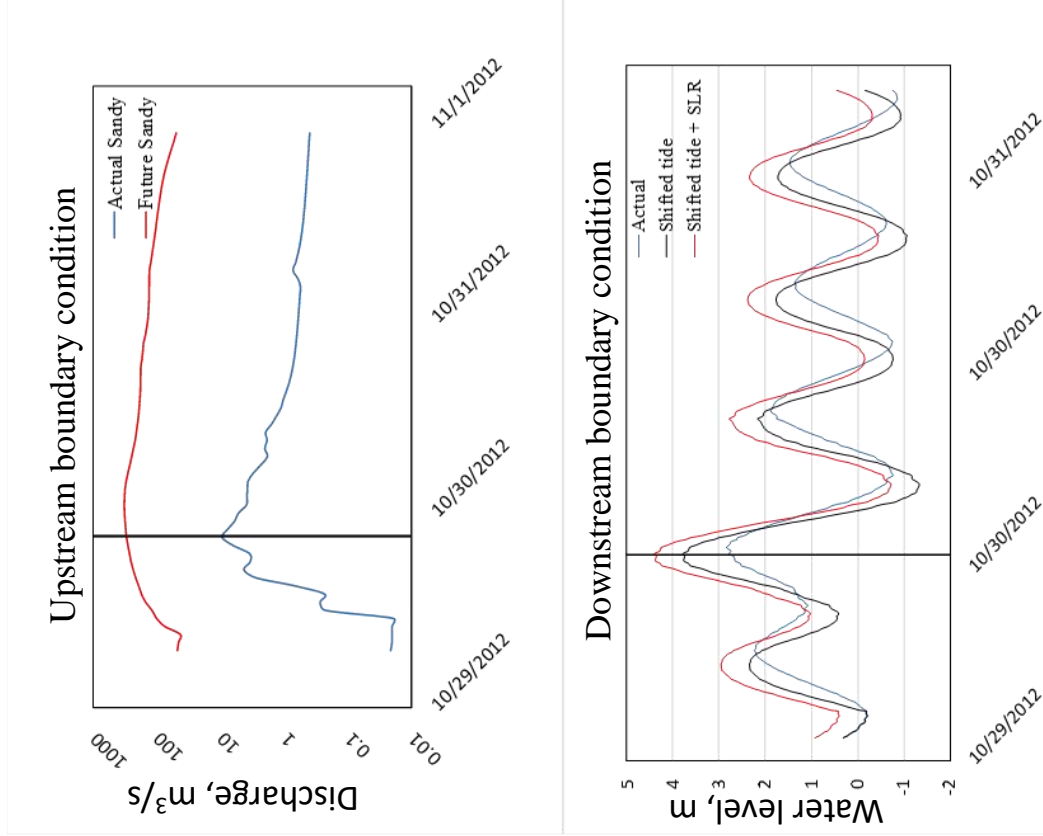
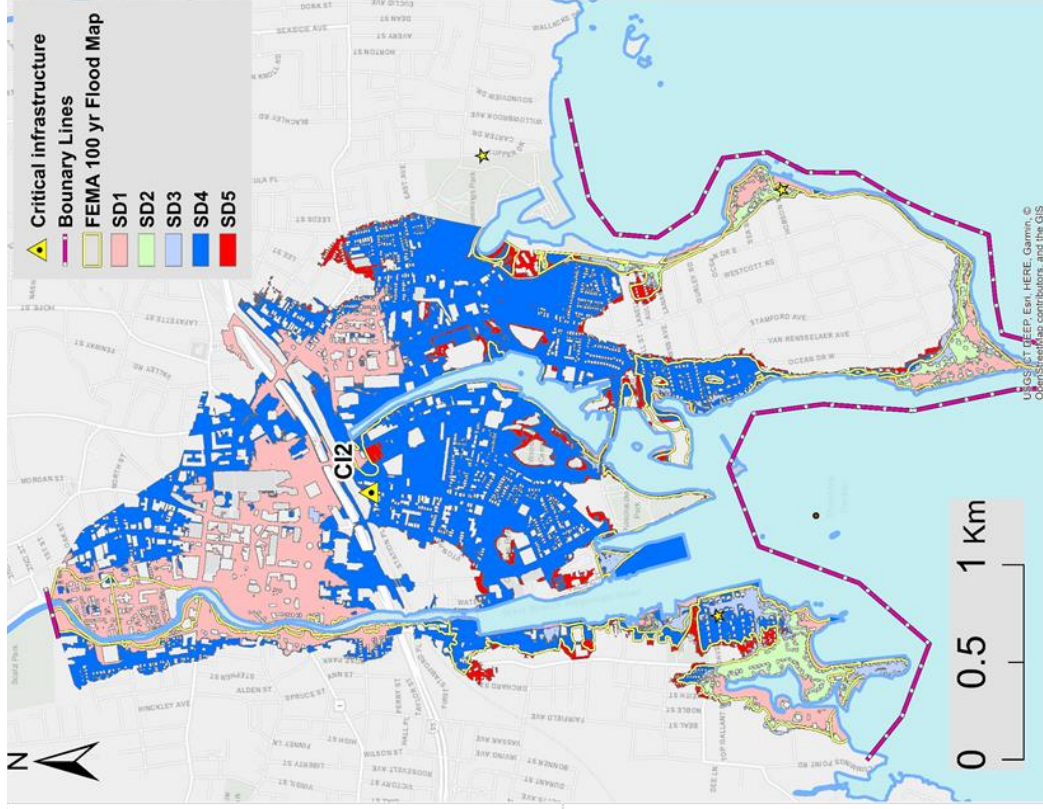


Figure 3: Example of different scenarios showing the upstream boundary condition (top left-hand panel, including the discharge for actual Sandy and future Sandy), and downstream boundary (bottom left-hand panel, including tide, shifted tide, and shifted tide with SLR). Output flood extent is also shown (right-hand panel), including results for SD1 to SD5 [reader should refer to Tab. 3 and chapter 2.2 for specification on the scenarios]. Background map on the right-hand panel by ESRI web-services, provided by UConn/CTDEEP, Esri, Garmin, USGS, NGA, EPA, USDA, NPS

- Caption of Figure 3: “firhg-hand panel” should read “right-hand panel”.
We fixed it. Please see the response above.