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Natural Hazards and Earth System Sciences
Discussions

Interactive comment on "High-resolution marine flood modelling with coupled overflow and overtopping processes: framing the hazard based on historical and statistical approaches" *by* Alexandre Nicolae Lerma et al.

Anonymous Referee #1

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1. Line 11, expected frequency of occurrence or the probability that the event will be exceeded in any year.

2. Line 25, Expand the term SWASH model.

3. Line # 15 – 21, authors pointed that it does not require any assumption of dependence structure and extended to higher dimension. However, they only multivariate GPD model in their analysis. On the other hand, the marginal variables can follow any distributions, and copula modeling offers this advantage over other multivariate distri-

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Discussion paper

butions. In addition, they also offers tail dependency through various metrics, such as, CFG, LOG or SS estimators. Extension to higher dimension is feasible using Vine or t-copulas.

4. Line 19, is the peak period unit is in 'seconds'?

5. Some of the references are missing, such as, Stepanian et al. 2014, Lazure and Dumas, 2007. Please check others.

6. Line 25 $\sim$ 30, will land cover and land use data remain stationary since 2006 even if considering impact of urbanization?

7. Line 6, 'Nord' is to be replaced with 'north'.

8. Line 7, 'IFREMER MEDNORD' model. In summary, it would be good to give short description of the various models used in this analysis either in the Appendix or in Supplements. Further, in all cases, only abbreviation of the model names are used. It would be nice to include full model name for the first time and use the abbreviation subsequently.

9. Line 31, please provide information regarding temporal resolution of the data here. The period of data (1996-2015) used are of 20-years, but it is mentioned as 16.4 years. Is this due to a few years of missing data?

10. Line 4 – 5, no autocorrelation, cross correlation analyses are shown to prove independence.

11. Wave angles between 60° and 210° were kept for the analysis. Do they represent extreme scenario?

12. Does threshold of the GPD model is kept as a fixed value throughout or it is considered as variables based on moving window time frame?

13. Line 14, "To finish" could be replace with "Finally" or "The next"

14. The joint exceedance can be calculated using ‘AND’ and ‘OR’ cases. In general, the joint probability is underestimated in ‘OR’ case and overestimated in ‘AND’ case. When author(s) said ‘the response variable is an underestimation’ I presume calculation of return periods are performed using ‘OR’-case. Refer foll. for details: Ganguli and Reddy (2013), Probabilistic assessment of flood risk using trivariate copulas. Theoretical and Applied Climatol.

15. Line 26, explain the term ‘instationary’ in this case. In general, instationary refers to transient or quasistationary. Do authors perform nonstationary simulation in this case?

16. To analyze impact of climate change, a scenario-based analysis is performed based on earlier literature, which might carried out using older generation climate models. It would be nice to see climate change impact using finer resolution regional climate models considering future change using set of RCP scenarios after employing an appropriate bias correction scheme.

17. Page 16, Line 2, “Results of the SWASH model simulations concur with these observations”. Refer to appropriate figure number.

18. In section marginal distribution, no model fitting is shown either graphically or using KS-statistics at an appropriate significance level.

19. Some of the limitations of the study include: first, this study uses a multiple model chain which itself can lead to propagation of cascade of uncertainty based on model parameterization and initial and boundary condition of the models. Secondly, one of the assumption of development of environmental contour is environmental variables are considered as independent of time or stationary.

20. In Figure 7, environmental contours are calculated at five different points. âĂć Authors have not mentioned the list of angles at which the calculations are performed. âĂć Also, please mention the number of Monte Carlo simulations to derive these contours. âĂć In x-axes of the diagram what the unit (m/0 hydro) signifies?

21. In Table 5, what CE1, ..., CE5 infer? Univariate probability?

22. Some of the words in the manuscript appears little non technical, such as "to bracket 100-year flood hazard".

23. Instead of percentage increase in flood risk in the order of 200th or 300th, which appears little unrealistic, the statistic could be presented in the form of ratio. for example, 3.84 or so.

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