>> Referee comments
-- Authors replies
Blue: text addition
Red: text removal

>> Main comments

>> My main comments are regarding the hazard set used in this analysis. While I understand that this is (probably) the exact same hazard dataset as was used in Rana et al (2021), I still think it's good to provide a bit more information on the construction of this hazard set. Particularly since this manuscript focuses on uncertainty analysis.
-- Thank you for pointing out the lack of clarity concerning the hazard element of the case study. We implemented all the proposed changes as listed below to improve the understanding of our manuscript.

>> (Line 270). Could you please explain in more detail what the event set is; what input data is the set based on, how exactly is this event set perturbed in CLIMADA?
To my understanding, CLIMADA will only perturb tropical cyclone tracks present in this event set. Does this mean that unprecedented events won't be simulated by CLIMADA? How certain are you that the resulting set of tropical cyclone events presents the full range of all possible events near Vietnam?
-- The probabilistic event set is generated using a random perturbation algorithm of the historical tracks from the IBTrACS dataset. The windfields are then generated with the algorithm from Holland et al. 2008. The event is perturbed by bootstrapping for the uncertainty assessment. Thus, unprecedented events are simulated in this event set. We cannot be certain that the resulting set of tropical cyclones events presents the full range of all possible events near Vietnam, and to our knowledge no work exists that could claim so. This is precisely why there is a need for uncertainty and sensitivity. We added a note on this point in the manuscript.

For the hazard, we apply a bootstrapping technique, i.e., uniform re-sampling of the event set with replacement, in order to account for ~~uncertainties in the probabilistic event set definition~~sample estimates uncertainties. Since the default Sobol′ global sampling algorithm requires repeated application of the same value of any given input parameter, here we define H as the parameter that labels a configuration of the re-sampled events. Errors from the hazard modelling (c.f. Appendix C) are not further considered here. A more detailed study might want to explore further uncertainty sources, such as the windfield model, the hazard resolution or the random set generation algorithm.

We would also like to clarify two points that might be unclear. CLIMADA is a risk framework model. Thus, it is not bound to one hazard model. The sentence "CLIMADA will only perturb tropical cyclone tracks present in this event set.» is thus correct in the narrow sense that in the presented case study, we used perturbed tropical cyclone track set. It is not correct in the general sense though, as any other tropical cyclone model can be used in CLIMADA. See eg. Meiler et al. (2022) https://doi.org/10.21203/rs.3.rs-1429968/v1 .

Furthermore, the bootstrapping perturbation is a choice made here mainly to illustrate the module. It allows to capture the sampling uncertainty within the probabilistic event set.

Other forms of uncertainty could be explored if desired. For instance, one could generate different probabilistic sets with different parameters for the random perturbation algorithm. Or one could use another probabilistic event set, such as the one presented by Bloemendaal et al. (2021).

We understand that these points were not clearly stated enough in the manuscript, as noted also by the other referee, Francesca Pianosi. In response, we added substantial clarifications (for the detailed text changes, please see the response to the comment by Francesca Pianosi).

>> Section 3.3.1. Could you please elaborate a bit on how exactly the original case study uses the parameters from Knutson et al. (2020)? Does the future-climate event set also contain information on shifts in tracks/genesis locations? And are the changes in intensity uniformly applied across the track, or does this only apply to the peak intensity?

-- The parameters are only used to homogeneously scale the tracks intensity and frequency by basin. There is no track location change included. This is a limitation of the study by Rana et al. 2022, which was partially explored in the current uncertainty analysis by the bootstrapping uncertainty. We added a note on this in the manuscript.

et al. (2021). Future climate hazard sets were created for two Relative Concentration Pathways (RCP) (Pachauri et al., 2015), RCP6.0 and RCP8.5, based on parametric estimates(Knutson et al., 2015). For each storm, the intensity and frequency where homogeneously shifted by a multiplicative constant derived from (Knutson et al., 2015) based on the storm's Safir-Simpson category.

>> I like the final sentence of Section 3.2.6 "Together, these results hint to potentially hidden high-impact events in unexpected areas" (line 338), but it also feels like a cliffhanger! What events are we talking about, could you please give an example of such event in the text/figure?

-- We are glad to have captured your interested here! We added an example as suggested.

distribution L. Furthermore, while for shorter return periods, the largest total-order sensitivity index is the impact function threshold shift ST_S, for longer return periods the sensitivity to the population distribution ST_L gets larger as shown in Fig. 3 (c). This might be because stronger events with large return periods consistently have larger intensities than the maximum threshold shift of $3m$. Together, these results hint to potentially hidden high impact events in unexpected areas . (e.g., a large storm surge in the less densely populated southern tip of Vietnam could affect a large number of people).

>> Line 325: For me, it's unclear why this number is 1.85m. Does this have to do with protection standards?

-- Thank you for the interesting suggestion. Actually, we were not able to clarify the origin of this number within this project. We added a brief discussion on it in the manuscript.

impact is discontinuous. Thus, the bi-modality of the uncertainty distributions, while caused by uncertainty in the impact function roots in the modeling of the storm surge hazard footprints. ~~We further note that the impact function shift from 0.5 to 3m~~ Further research beyond the scope of this paper would be need to understand whether this value of 1.85m has a physical origin (e.g., landscape features or protection standards), or is due to a modelling artefact. However, despite the discontinuity, the patterns are as expected: an impact function with a step at 0.5m results in many ~~values of a lower number of people 'affected ' - that is , fewer people are affectedby 3m-depth storm surge than by 0.5m-depth storm surge~~more people being classified as affected than when the steps is at 3m (in the latter case, only particularly large storm surges would results in people being affected). For planning purposes, the lower end of this impact function shift is most relevant – even 0.5m depth of storm surge can be dangerous for people - so the higher mode of the distribution in Fig. 2 is most relevant.

>> I recommend to acknowledge somewhere that the results obtained here are solely for storm surge, and that including wind and precipitation can alter the outcomes.
-- Thank you for the suggestion. We added a note in the conclusions.

the results of the study should have been subject to considerable uncertainty. The need of uncertainty and sensitivity analysis was identified within the original study, but deemed out of scope. This was in part due to the absence of a comprehensive and easily applicable scheme, now resolved with the uncertainty and sensitivity quantification module presented here. In addition, a full-fledged uncertainty and sensitivity analysis leads to a large amount of additional data to process. Indeed, the results shown in this section considered only a small subset of the original case study, which, among others, also considered the impact of tropical cyclone wind gusts, and the impact of wind and surge on physical assets in dollars. Nevertheless, the benefits of an uncertainty and sensitivity analysis are manifest. On the one hand, it provides a much more comprehensive picture on risk from storm surges and the benefits of identified adaptation measures. On the other hand, it allows to identify the main shortcomings

>> (Very) minor comments

>> Please check the reference style in lines 53 and 436, and the reference in line 347.
-- Thank you for the very attentive reading. We updated the styles appropriately.

>> Please consider writing "exposure" throughout the manuscript rather than "exposures". To my understanding, exposure is the more commonly used term to address the full set of exposed elements, and the use of exposures leads to some grammatically incorrect sentences in the manuscript(e.g. line 26)
-- Thank you for this remark. In turns out that the class name in the CLIMADA code-base is "Exposures" and we thus used a similar writing. However, we agree that "exposure" is less confusing, thus we adapted the text accordingly.

>> Line 301 - 303 is very hard to follow. Please consider breaking this sentence up in two or rewriting this sentence.
-- We understand that the sentence is too convoluted and rewrote the argument as two sentences.

~~As one could expect~~ The bi-modal form of the impact uncertainty distribution is interesting, as one could rather expect statistical white or colored noise (e.g., Gaussian or power-law ~~uncertainty distributions, we verified, as~~ distributions). As a proof-of-consistency ~~,~~ that this is not due to a computational setup error, we verified that the distribution of the total asset value, shown in Fig. 2 (d), aligns with the parametrization of the ~~exposures~~ exposure uncertainty (c.f. Table 1). For a better understanding of the obtained uncertainty distributions, and in particular understand the bi-modality, let us continue with the sensitivity analysis.

>> "Adaptation" is misspelled as "Adpatation" in multiple instances.
-- Thanks! We corrected the wrong spelling in the manuscript.