Responses to the Reviewer#1 Comments and Suggestions

Journal: Natural Hazards and Earth System Sciences (NHESS)
Manuscript number: egusphere-2022-990
Manuscript title: Assessing the coastal hazard of medicane Ianos through ensemble modelling

The original Reviewer's comments and suggestions are shown in regular typeface, while our responses are shown in italics. The line and figures numbers we use refer to the revised document.

R1.1 General comments: "The paper presents results of an ensemble of barotropic ocean models, coupled to a wave model and a number of atmospheric models, to give a probabilistic forecast of coastal sea levels in Greece during medicane Ianos.

The paper is clearly written and the Figures are clear. There are benefits (and pitfalls) of a large ensemble spread during an extreme event, but the most interesting takeaway to me seems to be that higher resolution is not automatically the holy grail of ocean modeling and will not, in itself, solve the prediction problem. I recommend publication after some minor revisions.

Response: We appreciate the comments and we improved the manuscript following all reviewer's suggestions.

R1.2 page10, L175: can the authors be more specific of what SLA product exactly they use. SLA netCDFs give sla_filtered variable, but according to the variable attribute, this is

sla_filtered:comment = "The sea level anomaly is the sea surface height above mean sea surface height; the uncorrected sla can be computed as follows: [uncorrected sla]=[sla from product]+[dac] +[ocean_tide]+[internal_tide]-[lwe]"

The authors state that they use sla_filtered, "uncorrected for the " dac. Can the authors please provide the exact arithmetic expression of what is included and what is subtracted in SLA that they use?

Response: We concur with the reviewer that the use of satellite sea-level products was poorly explained. In our study, we considered the filtered sea level anomaly (SLA) data uncorrected from the dynamic atmospheric component (i.e., SLA_{unc}=SLA+DAC). In the revised manuscript, we will improve the altimeter sea level data description and include the arithmetic expression used for computing the DAC uncorrected SLA.

R1.3 Page11, L185: perhaps it would be useful for readers to mention that this is a UTIDE package.

Response: We will mention the UTIDE package.

R1.4 Figure 8: a-c: are red lines further filtered after subtraction of tides? I am surprised that UTIDE itself would make such a good detiding job ...

Response: Yes, the red lines identify the residual sea levels obtained by detiding the sea level observations. We will improve the figure's caption to mention "residual sea levels" instead of just "sea levels".

R1.5 page14, L237: yes, mean+stdev could provide a conservative estimate of risk - but they could also lead to so many false positives that the product would cease to be taken seriously by downstream stakeholders. Perhaps this could be mentioned as a downside of such conservative estimates. Figure 11 would be a dramatic false positive if this conservative approach were to be used. There is an compromise to be found between model precision (how many predicted floods occurred) and its recall (how many occurred floods were predicted). It is not obvious to me that simply adding mean+stdev leads to a good compromise.

Response: We thank the reviewer for highlighting this issue. The mean+stdev technique is just one of the approaches that can be derived from an ensemble of simulations. As mentioned by the referee, this approach can lead to many false positives. We will improve the discussion by mentioning the limits of such an approach. We will also state that more complex probabilistic approaches (e.g. probability of hazard threshold exceedance) should be further implemented knowing the site-specific characteristics of the different coastal segments.

R1.6 Page15, L245: I suppose it would also be interesting to employ deep-learning classifiers instead of binary threshold based methods for this task ...

Response: We thank the reviewer for the suggestion. We will mention deep-learning classifiers as a methodology for flood hazard mapping and risk assessment. We kindly ask the referee to provide some references about deep-learning classifiers.