

## ***Interactive comment on “Integrated sea storm management strategy: the 29 October 2018 event in the Adriatic Sea” by Christian Ferrarin et al.***

**Anonymous Referee #2**

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General comments: I have just finished reviewing the manuscript entitled ‘Integrated sea storm management strategy: the 29 October 2018 event in the Adriatic Sea’ by Ferrarin et al. Overall the article provides a good description of system that combines information from different forecasting models in order to provide an ensemble prediction. I believe that the article is of interest for the journal. It has a high technical character that is justifiable by the nature of the topic. However, I believe that in order for the manuscript to be accepted some significant changes need to be addressed. There are some fundamental misuse of the risk terminology that need further clearance this is principally in the introduction but also thought the document (see detailed comments). Introduction needs improvement especially the first part with the incorporation of objectives of the study. Some interesting information of the state of the art is

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placed in conclusion but I think is more fitted for the introduction. A more detail comparison of the individual models and the model ensemble with observed data would be very interesting.

Specific comments:

2.2 Forecasting System: Given technical character and it is describing a complex method of forecast ensemble I believe that Tables 2 and 3 can be expanded to include details indicating the forecast characteristics (e.g. forecast window, update time) would be very interesting for some readers. Also the meteorological models resolution are interesting, some data are already given in the text but I believe that a thorough description could be useful. I also believe that Table 1 and 2 are not very interesting and good be eliminated or moved to an appendix.

2.3 Forecasting System: It is not clear if the IWS system is providing or receiving detail EWS. It would be useful to present the EWS in Figure 2. I believe that Figure 2 needs to be improved to provide a more detail presentation of the system. What about the other areas of the Adriatic that are not covered by the EWSs. Is a hazard map produced and how what kind of topographic information is used?

3.2 Storm Predictability: The section is well structured and with some interesting figures, however a more detailed analysis and statistical representation of the individual model and the model ensemble should be presented. An interesting question especial for regional assembles is the spatial performance of the different model. Although Fig 5 present a good synoptic view of the ensemble performance a more detailed look (Fig6) reveals that there are two models that substantially under predict the sea level height for the final part of the storm. Why is this happening, are there any performance criteria for the models to enter the ensemble?

3.3 Storm Hazard and Impact assessment on the coast: Is the model ensemble always under-estimates the events? Do you have other examples that also indicate the MEAN+STD is a better estimate for the events? Related with the hazard the authors

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mention that the calculated on each coastal assessment unit. Some more information on how many units were identified in the area and how they are distributed it would be interesting for the reader. It is unclear if the Stockton model is used in all areas. If yes this is contradicting the previous comments of the authors. Finally, the detail description of the storm in the study area gives valuable information however a directed comparison of the hazard intensity and extend predicted by the ensemble and the one observed is missing. Such comparison is important in order to identify the advantages of such a model.

4 Summary and Concluding discussion: The start of this section gives valuable detail information of the system that they should be placed in section 2.3.

Technical corrections:

Page 2 - Line1: 'Sea storm ... directly impact on the citizens quality of life'. This statement is not exactly true in my opinion. Sea storms are a natural phenomenon and they do not affect the quality of life. Possible risks associated with sea storms can have this effect. The second paragraph provides a description of the process based models and it is more suited for the introduction. Page 2 - Line14: The reference of Roland et al., 2009 is not appropriate for wave setup maybe an older reference would be more appropriate (e.g. Longuet-Higgins, M.S., Stewart, R.W., 1963. A note on wave set-up. Journal of Marine Research 21, 4-10.) Page 2 - Line14: 'they travel up and down the beach'. Are you referring to swash processes? Page 2 - Line16-19: 'Coastal flooding, erosion, impacts on ecosystems, damages to infrastructures and productive activities can worsen if combined with the absence of adequate early warning systems, coordinated strategies, intervention procedures, coastal management and planning with significant related economic costs'. This sentence is mixing hazards and consequences with primary measures and management strategies. This can results in a confusion of terms that is undisable. For example coastal flooding and erosion are not related with EWS. The absence of an EWS can results in increased damages if proper disaster risk reduction measures (DRRs) are not implemented. I suggest to restructure the

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sentence.

Page 3 and throughout the document: The terms 'Bora' and 'Sirocco' are local wind names it is better to use italic font style or directly use the English name. Figure 2 : What is the difference between the black thin lines the blue arrow and the dash line? Why the TMES exchanges information only with the Recourse layer (maybe a better explanation of what the TMES is doing could be useful). Only the resources layer is delimited I think it would be nice to show all 6 layers limits. Page 7 – Line6-7: 'hazard maps ... to identify vulnerable areas' there is a mix of the two terms that is common but not a good practice. I suggest following UNISDR Terminology where hazard is related with the physical aspects of the storm the coastal area and vulnerability with the socioeconomic aspects.

Page 7 – Line25: 'It must be pointed out that the widely used Stockdon's...' The Stockdon formula is not applicable in rocky and gravel beaches. The problem is not the underestimation of the runup is the use of an inappropriate formula that results in underestimation of the runup. Figure 3: Substitute the 'C' by 'L' for low pressure Page 12 – Line11-13: There is a large number of local names that are not shown in the figure and is difficult to follow by the reader. Please add a more detail figure. Page 14 – Line27: 'adaptation capacity' the dune and berm characteristics of a beach are not the adaptation capacity. The term adaptation is related with the ability of the system to overcome long term changes in forcing factors. Beach and berm characteristics can be combined with physical parameters (e.g. wave height water level) to calculate process based indexes that can serve as hazard intensity and extend parameters. A review of such indexes can be found in Ferreira, Ó., Plomaritis, T.A., Costas, S., 2017. Process-based indicators to assess storm induced coastal hazards. Earth-Science Reviews 173, 159-167.

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