

## ***Interactive comment on “Parameter sensitivity and uncertainty analysis for a storm surge and wave model” by L. A. Bastidas et al.***

### **Anonymous Referee #2**

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#### General comments

The paper reviews the sensitivity of storm surge and wave models to different parameters, what is in principle an interesting and useful analysis for improving performance of these models for operational sea level forecasts as well as for sea level hazards risk assessment. However, it seems more emphasis is made on this than on the real capability of the model to reproduce both the sea level and waves observations. In fact, this capability seems to be poor in general and does not improve when increasing the resolution of the model, what is not really explained in detail. In that sense, if sensitivity to the parameters is the only objective of the paper it should be clearly stated in the introduction. From a practical point of view, however, if validation with observations is presented, this should be the focus of the work and the most important goal at the end.

In this sense, looking for the more adequate meteorological forcing should be the first goal and, once found, the sensitivity parameter response of the models could be made just based on this “valid” meteo forcing.

### Specific comments

Section 2.1, p.6 line 25: “few coastal surge observations at tidal stations (NOAA, 2015b)”: is this true? Are the authors just referring to very extreme surges? Tide gauges in principle have been in operation for so many years that this sentence sounds strange. I did not find the report from NOAA according to the reference.

Section 2.1, p.7, line 10: “the past 60 years of coastal surge likely do not contain an observed storm surge. . .”: what about Sandy in 2012? There was flooding at least during this event and is very recent. Why is not mentioned in the text?

Section 2.2, p.8, line 26: how many and what (source) tidal constants are imposed in the open boundaries?

Section 2.2, p.9, line 21: it seems the gravitational constant is treated here as a parameter of the model. It is a datum, a known value. It is not possible to say “to vary physical settings” applied to it.

Section 2.2.2. p. 11, lines 8-9: “As we have selected a model grid resolution of 5 km, the horizontal eddy viscosity should be a significant consideration”: it seems a vague sentence, specify here how this parameter varies with the resolution or grid size if this parameterization is used in this study.

Section 2.4, p.15, lines 20-25: it is contradictory: it says that there are no wave measurements at the tidal stations but the effect of model parameters on peak significant wave heights are evaluated: in this sense, it should be said: “we evaluate the effect of model parameter values on simulated peak significant wave heights, although we can’t validate them with observations”. Other possibility is to evaluate their effect on the peak observed and simulated storm surge.

Section 3.4: a more detailed analysis of the discrepancy between models and observations should be made, e.g., why the tidal amplitude is so different in Bar Harbor?. Has the bathymetry, for example, been checked?

Section 3.5, p. 21, lines 24-25: I don't see such an improvement in Woods Hole, however it seems Bar Harbor improves. I don't see that the RMSE and MAE are so reduced.

Section 4 (Conclusions), p. 23: "overall, Delft3D shows an ability to reproduce the observations with reasonable precision and accuracy". This is not really the case, it should be a less positive sentence in this case.

Technical corrections

Increase the size of the text and the quality of all the figures, especially figures 3 and 4

Better explanation of the figures: how is the sensitivity index calculated?

Figures 8 and 10: indicate units of RMSE, MAE and Max diff..

Page 3, line 10: "limited" instead of "limiting"

Page 7, line 10: "likely do" instead of "likely does"

Page 13, line 6: delete "of" in "over of the current"

Page 13, line 20: "triad model is" instead of "triad model as"

Page 21, line 3-4: delete beginning of sentence "At the Woods Hole location..". Start with "It appears that the ..."

Page 21, line 20: delete the parenthesis in "Campolongo et al., 2007"

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