Natural Hazards
and Earth System
Sciences
Discussions

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

Anonymous Referee #1

Received and published: 15 December 2015

General comments

This paper consists of a model parameter sensitive analysis, based on Delft3D numerical simulation of Hurricane Bob (1991) in the North Atlantic US coast. Several parameters show no sensitivity, whereas others show some. Model uncertainties have also been computed. We of course understand the interest of parameter sensitivity for determining which parameter affects – or not – outputs, and the comparison of model results associated with uncertainties with observations is certainly interesting but the style of this article is more like a research report than a paper. The scientific questions/issues don't appear clearly, and the results could be analysed in more details; conclusions are not so clear, particularly the surprising deterioration of the precision of the model at some locations, whereas increasing the resolution, is not really analysed.

Specific comments

Here are some suggestions:

p 6493 line 1 A paragraph describing scientific questions and the aim of the paper could be added.

p 6493 line 7 It is specified that tide gauges records are generally shorter than return periods, making [. . .] this methodology unreliable, but some statistics methods exist allowing to compute return periods longer than records, and confidence levels are also computed.

p 6498 line 11 "This paper aims to . . ." objectives appear late in the paper (page 5).

p 6499 line 23 Boundary conditions is not a part of numerical settings, but an input.

p 6500 line 25 The wind drag formulation (Ub, Cb, Cc) is not clear enough, and could be specified.

p 6500 line 25 Drag coefficient dependence of sea state have been demonstrated (Janssen 1989, 1992, Oost et al. 2002, Drennan et al. 2003) and is here also mentioned, but the choice to take a formulation only wind-dependant could be justified.

p 6508 line 1 Figures are not really introduced, it could be explained how is computed sensitivity indice for example.

p 6510 line 25 Model is of high precision because "the bounds of simulations are quite tight" is not fully exact, it means that model is not so sensitive to selected parameters. Outputs are probably also very sensitive to other parameters, which are not mentioned here (bathymetry for example). Criteria to say if a model is of high precision would be more a low RMSE and bias (based on model/observations comparisons).

p 6512 line 12 Better performance is found for the Rankine model, this is really not surprising because figure 2 shows that Rankine wind model is the best match with observations, it could be mentioned.

p 6512 line 27 Increasing resolution leads at some locations to deterioration in the precision of the model, this is quite amazing, and these surprising results could be explained. The results could be presented in a more synthetic way (results for 5km is on figure 9, and "multiple" resolution on figure 10, is multiple resolution equivalent to 500 m resolution ?).

p 6513 line 10 Model reproduces the observations with "reasonable precision and accuracy", but we notice that even taking into account 95% uncertainties, model is in some locations still quite far from observations, particularly for waves. This shows that it is probably not just a question of parameters – or that all sensitive parameters haven't been explored. Results could be analysed more deeply.

Technical corrections

p 6497 line 18 New York appear twice

All the figures are very small, and medium quality doesn't allow reading it easily. Moreover, legends are really not enough precise (colours and markers should be detailed). For example, for figure 1 the area (US North Atlantic Coast) could be added.

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