Natural Hazards
and Earth System
Sciences

Open Access

EGU

Discussions

Interactive comment on "Coastal Impacts of Storm Gloria (January 2020) over the Northwestern Mediterranean" *by* Angel Amores et al.

Anonymous Referee #1

Received and published: 21 April 2020

The reviewed manuscript "Coastal Impacts of Storm Gloria (January 2020) over the Northwestern Mediterranean" is a numerical study on storm surge, primarily using SCHISM for hydrodynamics and WWM-III for wave dynamics. A baseline 2D model was set up and validated considering the compound effects of wave, atmospheric pressure, and wind. The contribution from each effect were investigated individually by sensitivity tests. Locally high-resolution was implemented in the 2D mesh for a coastal site; a 1D non-hydrostatic model was implemented for another local region with high cliffs using SWASH. The simulation results of Storm Gloria were analyzed and then put into a historical context. The research is the earliest model study on Storm Gloria. The set up and validation of the numerical model are rigorous. The discussion on individual contributors of the total surge, spatial variabilities and historical context are of scientific

and practical importance. I find the manuscript very well written. It generally meets NHESS's standard (attached in the previous page); only minor revisions are required. Specific comments 1) The authors should try to expand on the analysis of the spatially varying wave contributions to the total surge, specifically on why there are two hotspots (Ebro Delta and Denia in Figure 6b) along the coast. In Section 3 (Ln 194), Ebro Delta and Denia are found to differ from other along-shore regions in wave contribution (>20 cm, compared to mostly <7 cm elsewhere; 40-50% of the total surge, compared to mostly <10% elsewhere, as estimated from Figure 6b). Is this pattern related to shore-line geometry, topography/bathymetry, or forcing? Does mesh resolution have anything to do with it (seems not, since Denia is not refined)? Please elaborate either before or within Section 3.1; a short paragraph or 2-4 sentences will do.

2) A short paragraph needs to be added in Section 4, summarizing the major accomplishment and findings of the current work. Right now, the last paragraph (which I assume serves as the conclusion) only slightly touches the current work in the 2nd sentence. Technical corrections 1) Ln 55: consider adding some background for the two selected localities. Did you select them arbitrarily as long as they differ in morphology and forcing? Are they the most severely impacted area? Do they have any significance in agriculture, human residence, or wild life habitat? Some aspects are mentioned later, but a brief description here before delving into the modeling work would be nice.

2) Ln 62: discusses the results and "provides" the final remarks.

3) Ln 86: More details should be provided on the model setup, e.g.: dt, bottom friction, etc. Also consider showing the computation speed, e.g., number/type of cores and the ratio of simulation time to real time.

4) Ln 94: use the multiplication symbol instead of "x".

5) Ln 120: "m" should be in normal font.

6) Ln 121: provide a brief explanation on why a non-hydrostatic model is needed here in addition to the coupled SCHISM-WWMIII model, so that readers with less background can follow.

7) Ln 135: because model results were not interpolated onto observation points, the authors should provide the maximum distance among all pairs of observation and model grid points.

8) Ln 141: Add one or two sentences, providing possible causes of underestimating Hs.

9) Ln 158: "cm" should not be italic.

10) Ln 158: provide possible causes of underestimating elevation at Tarragona. Uncertainties in forcing, DEM, etc.?

11) Ln 197-202: [no corrections needed] If differentiating river flooding and storm surge is of interest to the authors, there are some recent publications on compound flood modeling using SCHISM and WWMIII.

12) Ln 277: . . . a mistral sea storm "with" maximum significant wave height . . .

13) Figure 6: put the subplot labels (a,b,c,d) into the titles.

Interactive comment on Nat. Hazards Earth Syst. Sci. Discuss., https://doi.org/10.5194/nhess-2020-75, 2020.