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Natural Hazards and Earth System Sciences
Discussions

Interactive comment on "Can an early warning system help minimize the impacts of coastal storms? A case study of the 2012 Halloween storm, Northern Italy" *by* M. D. Harley et al.

Anonymous Referee #3

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The manuscript by Harley et al. deals with the problem of predicting the storm hazard along the Emilia Romagna coast, Italy. The manuscript is well written and is concise on its argumentations, results and conclusions. Despite all these facts, however the presented results fails to demonstrate the capacity of the developed Early Warning System to forecast storm hazards.

Major comments:

1. The weak part of the forecast chain seems to be the offshore models (ROMS and SWAN) which fail to predict water level and significant wave height during the selected

storm (water level is underestimated by almost 1 m). To my opinion such results could not be presented in a scientific publication, also considering that recently Mariani et al. (2015) reported a much accurate forecast of water levels in the North Adriatic Sea for the same storm event. Probably one of the reason of water level underestimation resides in the fact that water level set-up due to wind waves is not considered in the hydrodynamic model. For this reason I would not consider this model chain as a state-of-the-art coastal forecasting system.

2. The authors performed three set of simulations: (1) a default forecast (DF) mode based on three-day wave and water-level forecasts and default XBeach parameters, (2) a "perfect" offshore (PO) forecast mode using measured offshore values and default XBeach parameters; and (3) a calibrated XBeach (CX) mode using measured offshore values and an optimized parameter set obtained through an extensive calibration process. The models have been applied and tested for a unique storm event (31 October 2012). I think that they should instead follow the standard procedure of model calibration and validation in order to demonstrate the effective forecast capacity of the developed system. Therefore, I suggest to consider not only one but several storm events and to: (1) calibrate the XBeach model using measured offshore values; (2) validate the full Early Warning System for storm events different from the ones used in the calibration process.

3. The maximum waterline over-prediction of the PO forecast mode is probably due to the fact that the water level imposed as open sea boundary condition for XBeach (at about 3 km offshore) is measured inside the harbour of Ravenna and already includes local wind and wave set-up. For this reason I would not call this simulation set-up a "Perfect" Offshore forecast (PO) mode. Consequently, the XBeach parameters calibrated using the water level measured by the Ravenna tide gauge as a boundary condition could not be used in a forecast system. XBeach have instead to be calibrated using offshore observations (see comment above).

4. Please provide some results about the accuracy of the wind forecasts derived from

the atmospheric model COSMO-I7.

5. The simulated what-if scenarios based on alternative artificial dune designs represent a nice effort to analyse different management strategies along this coastline. These simulations should be carried out only once the model system has been properly calibrated and validated.

Specific minor comments:

- Pg 3411, Lines 4-9: I suggest to include some Mediterranean storms in the list reported at the beginning of the Introduction section.

- Pg. 3411, Line 23: Cite also Bajo, M. and G. Umgiesser, 2010. Storm surge forecast through a combination of dynamic and neural network methods. Ocean Modelling, Vol. 33 (1-2), 1-9, doi:10.1016/j.ocemod.2009.12.007.

- Pg. 3419, Line 8: Give a reference for the flooding of Venice.

- Pg. 3423, Line 3: Please give more details about the calibration procedure. Did you used an automatic optimization algorithm? Did you carry out separate calibration for each profile?

Interactive comment on Nat. Hazards Earth Syst. Sci. Discuss., 3, 3409, 2015.