Nat. Hazards Earth Syst. Sci. Discuss.,
https://doi.org/10.5194/nhess-2018-23-RC2, 2018


Natural Hazards and Earth System Sciences
Discussions

# *Interactive comment on* "Implementation and validation of a new operational wave forecasting system of the Mediterranean Monitoring and Forecasting Centre in the framework of the Copernicus Marine Environment Monitoring Service" *by* Michalis Ravdas et al.

**Anonymous Referee #2**

Received and published: 3 April 2018

The paper is rather well organized and well-written, supported by interesting data. It could deserve publication on NHESS provided some further aspects are discussed and cleared. Most of all, I think that better acknowledgements or pin-pint to existing publications referring to the atmosphere-ocean-wave interactions should be given. At the moment, this is just very briefly mentioned in the Introduction (line 9). This part remains indeed in the shadow; however, although this is surely not the core of the MS discussion, it should be clearly stated that fundamental steps have been taken into the



direction of "coupled" modeling. I will then address to some possible references concerning the Adriatic sea (where the model performs at its minimum) and other regions, since course similar efforts exist also in other regions of the Mediterranean. The fact that this MS is using off-line currents is a step into the right direction, but it does not exempt the authors to mention that this should follow a real coupled approach. There are, therefore, two main aspects that need to be well recalled in this work. a) The need of a real, full two-way coupling has to be recalled and well stated b) 1/16° is probably a too coarse resolution to expect improvements from the wave-currents feedbacks!

The authors justify the less-good performances of the model in enclosed basins and near the coast, calling for unresolved topography and fetch limitations. I would recommend some more details on the bathymetry chosen by the modle, since there exist several efforts to provide a higher-resolution bathymetry of this region (see for ap ossible check the EMODnet portal)

In general, the new forecast system provides reliable forecasts. However, model performances appear to be better in winter rather than summer, since in winter "the wave conditions are well-defined". What do the authors mean exaclty by this? Could this again be linked to the specific metocean conditions? Is this valid throughtout all the regions explored? Again, I wonder if this could be explained by a lacking consideration of the oceanic and mixed layer depth area dynamics, that could be introduced by a coupled model approach.

Future improvements: authors mention data assimilation and higher resolution wind forcing. Again, no mention is done to the coupled atmosphere-ocean-wave models, although this has proven to be a not-negligible source of increased performances exaclty in semi-enclosed seas (see references at the bottom).

Moreover, I would welcome few strategic lines discussing the scenarios under plausible climate change in the enxt decades (also with this respect I have suggested some readings to the authors)

As I stated above, the MS is too much focused on the “pure wave forecast”. I think the MS would benefit a lot from an approach showing that ocean-atmosphere and waves are actually connected in a delicate interplay of energetic exchange and feedbacks. I therefore recommend to modify the Introduction and Discussion with the aim of mentioning already existing *coupled* (not just off-line as used) numerical model approaches, where the global physics of A-O-W is actually taken into account. Below here I suggest some reading/references that may be mentioned in the MS.

For improving the introduction, where possible effects of appropriate or un-accurate wave modeling efforts mya have on the overall Adriatic basin dynamics: Boldrin A. et al., 2009. The effect of Bora wind on physical and bio-chemical properties of stratified waters in the Northern Adriatic. Journal of Geophysical Research – Ocean, 114, C08S92. DOI:10.1029/2008JC004837 Bonaldo D. et al., 2015. Modelling wave-driven sediment transport in a changing climate: a case study for Northern Adriatic sea (Italy). Regional Environmental Change, 15(1), 45-55, DOI: 10.1007/s10113-014-0619-7

For mentioning the relevance that coupled approaches may have in forecasting waves in the Adriatic sea, going therefore beyond the pure wind-wave relation: Carniel S. et al., 2016. Scratching beneath the surface when coupling atmosphere, ocean and waves: analysis of a dense-water formation event. Ocean Modelling, 101, 101-112. DOI: 10.1016/j.ocemod.2016.03.007 and references therein incluided Ricchi A. et al., 2016. On the use of a coupled ocean-atmosphere-wave model during an extreme Cold Air Outbreak over the Adriatic Sea. Atmospheric Research, 172-173, 48-65. DOI: 10.1016/j.atmosres.2015.12.023

For a recent assessment of wind storminess under climate change scenarios: Bonaldo D. et al., 2018. Wind storminess in the Adriatic Sea in a climate change scenario. Acta Adriatica 58(2), 195-208

---

Interactive comment on Nat. Hazards Earth Syst. Sci. Discuss., https://doi.org/10.5194/nhess-2018-23, 2018.