

Nat. Hazards Earth Syst. Sci. Discuss., referee comment RC1  
<https://doi.org/10.5194/nhess-2022-67-RC1>, 2022  
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## **Comment on nhess-2022-67**

Anonymous Referee #1

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Referee comment on "A coupled modelling system to assess the effect of Mediterranean storms under climate change" by Riccardo Alvisè Mel et al., Nat. Hazards Earth Syst. Sci. Discuss., <https://doi.org/10.5194/nhess-2022-67-RC1>, 2022

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**Title:** A coupled modelling system to assess the effect of Mediterranean

storms under climate change

**Authors:** Mel et al.

RECOMMENDATION: Major revision

This work describes the first steps towards an innovative fully coupled modelling system composed of a hydrodynamic (2DEF) and wind wave model (SWAN). Numerical simulations have been performed to identify the impact of extreme storms at Calabaia beach by combining sea level rise and extreme wave projections with the most recent georeferenced territorial data both in a case study and in a climatological perspective. The paper is appropriate for publication in NHESS but it requires major revisions.

MAJOR POINTS:

- The title "A coupled modelling system to assess the effect of Mediterranean storms under climate change" is extremely vague. It may refer to meteorological, ocean, wave models so you should clarify already in the title its specific focus on coupled hydrodynamical and wave models.
- The abstract should focus on the results of the paper. Its first part is very generic and can be applied to any work in the field. There is no indication on the application of the model to a case study and to the climatology, which is not appropriate.
- Line 201: what do you mean with "wave climate"? here, you are not referring to a wave climatology and to different possible wave directions. Please, clarify.
- Line 244-245: the meteorological description is confusing, for example:

a strong divergence area may be relevant for cyclone development, but divergence does not originate cyclones;

extra-tropical cyclones have diameters of about 1000 km, 300 km is not realistic at all;

Line 251: "the medium wind speeds were within the range expected for a strong storm": sorry, but I do not understand what you mean here;

- Lines 267-287: this part provides unnecessary results, since they are well known and references would be sufficient; Figure 7 is not necessary, but if you want to include it, you should ask the permission for reproduction;
- Section 3: The entire section should be rearranged, distinguishing the case study analysis from the climatological results. Now you go back and forth, and the two parts are not clearly distinguished. I think that separating the two different analyses, the one referring to the case study from that considering the synthetic (climatological) analysis would strongly improve the readability of the paper;
- Figures

Figure 8: what is the interpretation of the squares in panel a?

Figure 9: the figure is not commented on in the text;

- Conclusions: I do not think you show in any place that "The coupled system improves the performance of the simulation with respect to the uncoupled system".

MINOR POINTS:

Line 63: change "the Mediterranean cyclone" into "the presence of Mediterranean cyclones ..."

Line 66: change into "... makes the Mediterranean sea subject to ..."

Line 67: ... southerly winds ...

Line 68: ... easterly winds ...

Line 99: ... affecting the ...

Line 102: you mention that you are using ERA-INTERIM but in other points you indicate ERA-5. Please clarify!

Line 103: "The most important recent storm which affected the Mediterranean Sea (25 – 29 December 1999)": several intense storms affected the Mediterranean Sea in the last 20 years. It is not clear why this should be the most important.

Line 123: "the eastern, southern and eastern sides": please correct;

Line 126: I do not understand why you refer here to a meteorological paper while you are describing geographical features;

Line 133: defenses -> defences;

Line 139: third and fourth quadrant: you should clarify which direction you are referring to;

Line 146 and elsewhere: statistics instead of statistic and it is plural (e.g., statistics have ...);

Line 197: "The model grid is closed 4 km north of Diamante, 3 km south of Cape Bonifati ...": either you should report the places on the map or you should not mention them in the text;

Line 420: again, please clarify what you mean with wave climate;

Line 450: change into "A long term planning is crucial".