

Forecasting the Mediterranean Sea Marine Heatwave of summer 2022

General review

Marine heatwaves are attracting increasing interest from the research community, but their prediction lacks sufficient attention. This manuscript helps to fill this gap by analysing and extreme marine summer in the Mediterranean. The authors show the skill of a short-term forecasting system at basin-wide and regional scales. Results show the adequacy of short-term forecasting in the Mediterranean with fairly good accuracy.

The topic of the paper is interesting and the approach to it is correct, but it suffers from a certain lack of consistency in justifying the results and conclusions. I am sure that the authors have sufficient data and results to make their conclusions more robust, as the wording is sometimes vague. I think it is more a problem of how to explain the work done than of the work itself, which I think is very relevant.

Through the text you are using different activity definitions. Be consistent throughout the manuscript and use a single definition if possible. If not, please make clear which one you use any time you refer to it. Suggestion, change the name of your definition to “cumulative activity”, “basin activity” or similar. This is one of my main concerns as it can be confusing for the reader.

“Discussion and summary” look more like a review paper than the discussion of your results. Consider moving some references to the introduction section or extend the section by adding more discussion of your own results.

Therefore, my recommendation is to accept this work with minor revisions aimed at better clarifying the work developed by the authors. Please, see the comments below.

Other comments

Line 24: “Zi et al., 2020” do you mean “Li et al., 2020”?

Please check “Benthuyssen et al” as there is a typo across the text.

Lines 79-80: “we define activity as the sum of the intensity over the area undergoing a MHW in the Mediterranean Basin.” But in figure 1 activity is “the daily product of area and intensity”. Which is the actual activity metric used in figure 1? Have you used your own definition in the rest of the paper?

Line 94: “and conditions remained above a third of the basin area until the decay at the end of September” Above what? Do you mean about SST threshold? Do you mean MHW conditions were present on more than a third of the basin?

Line 96, 103, 105, 155, 156, 166: Please check typo when writing “°C”.

Lines 104-105. The persistence of a minimum activity (greater than 0) is not enough to state that 2022 holds a new record for MHW activity. Please, add more justification for this statement (higher mean, higher max, greater area...) that explains the record.

Line 150: Why do you choose the Ligurian Sea and Gulf of Taranto? Why not the Alboran Sea if maritime activity is the selection criteria? Why not other areas of interest? You could choose many other criteria (oceanic circulation, upwelling areas, heavy precipitation prone coastal areas, high biodiversity areas, highest MHW intensity in 2022,...). Please, better explain why

using maritime activity. Later in the same paragraph biological importance of these two areas is explained.

Lines 156-157 *“This activity is indicative of the conditions experienced by the rest of the western part of the Mediterranean basin”*. How do you support this statement? Not all the western basin experienced MHW and its intensity showed noticeable variability. Do you mean that the Ligurian Sea is a proxy for the whole WMED?

Line 159: Please add a value (percentage?) for *“the vast majority of days”*.

Line 170: *“upon visual inspection the forecast temperature was very similar to the observed”*. Could you add some mean bias or other accuracy measure?

Lines 171-176: Is the analysed accuracy basin-wide? Or for the two previously mentioned areas? You should extend this paragraph as it does not provide a clear idea of the forecast accuracy.

Line 180: Another definition of activity. Please check out consistency of activity definition across the text.

Lines 180-181: *“Other contributions to this report also define 180 the MHW of 2022 as a record-breaking event, using various other definitions.”* Please, better explain this sentence. It does not make sense in its actual form.

Line 188: Please use an acronym or the full name for the Copernicus Med Phys forecasting system instead of *“the system”*.

Lines 188—192: Yours and other author results show the CMPF system is capable to forecast a range of extreme events, but this is not a conclusion of your work. This would fit better in the introduction or methods section to justify the use of CMPF data.

Figures

Figure 1b-c. Please, add the grey line to the legend. I assume it is satellite data.

Figure 3: Please, change colour for Near-Real-Time Obs. And MEDFS Analysis. They are too similar and confusing right now.

Figure 4: Please, add the satellite to the legend and caption (thick grey?)

General recommendation: Some lines on the figures look hand-drawn and some of them overlap the other so it is difficult to understand. Please, try to improve figures readability.