

Reviewer 1

Our warmest thanks to Francesco Pastor for his review and his very positive comments.

Answers to the questions are in red below and proposed text changes are in blue.

In this work, the authors examine the marine subsurface heatwaves recorded in the Gulf of Lion in summer 2022. The analysis is run from observations and, most importantly, numerical modelling. The authors describe the physical processes involved in a sound manner, properly separating different types of warm events depending on the wind conditions, and the presence of upwelling or downwelling. They also describe some biological impacts of the warm events in benthic ecosystems. This last part is the one that seems to me to be the least developed. From the title I would expect more information and discussion on the impacts, section 4.4 is too short. Maybe the authors should slightly change the paper title.

We propose to change the title from:

Extreme sensitivity of the northeastern Gulf of Lion (western Mediterranean) to subsurface heatwaves: Physical processes and devastating impacts on ecosystems in the summer of 2022

to:

Extreme sensitivity of the northeastern Gulf of Lion (western Mediterranean) to subsurface heatwaves: Physical processes and insights into effects on gorgonian populations in the summer of 2022

For all those reasons, I want to congratulate the authors for the work and recommend the publication of the paper with some very minor changes or clarifications (see below).

Minor comments

Línea 129-130 “but proved sufficient to achieve our objective.” How was this proved? Did the authors run horizontal resolution sensitivity tests?

The sentence was unclear. We simply meant that the resolution provides a satisfactory representation of the measured temperature time series. We propose to change this sentence to:

The horizontal resolution in the area of interest is around 1900 m, which may seem coarse for an application very close to the coast, but has proved sufficient to represent rapid temperature variations, as will be shown in section 4.1 devoted to simulation evaluation (Figures 2 and 3).

Lines 237-238: Change 4.4.X to 4.3.X (section numbers seem to be misleading)

Thank you. Done

Line 230 “A sensitivity study will explore the temperature response to an extension of the wind period”. What does this sentence mean? Does it refer to the next sections or to future work?

The sentence you refer to and the previous one were a declension of the last point quoted in the outline of section 4.3, namely the sensitivity of sub-surface warming to the duration of southeast winds (section 4.3.3). This was unnecessary and confusing. We have removed these two sentences. The justification for this test is given in section 4.3.3.

Lines 334-335: “During the summer of 2022, the atmospheric heatwaves that hit Western Europe gave rise to extreme marine heatwaves across the western Mediterranean”. Is this supported by the authors work or from recent literature? I am not saying I disagree with this sentence but that it should be supported somehow. In the introduction, the authors cite the work of Guinaldo, if this is the base of the sentence it should be properly attributed.

Yes, you're right, the reference to Guinaldo in the introduction does correspond to this statement. We therefore propose to reintroduce it here as follows:

During the summer of 2022, the atmospheric heatwaves that hit Western Europe gave rise to extreme marine heatwaves across the western Mediterranean as shown by Guinaldo et al. (2023).

General remark for figures: I would change the font for the axis labels and scales to be clearer and more legible, but this is a matter of personal preference.

At least the first author agree! We changed the font of Figs 3, 4, 5 and 6.