Reviewer 1

The manuscript entitled “Marine heatwaves across the central South Pacific: characteristics, mechanisms, and modulation by the El Niño Southern Oscillation” by Bastien Pagli et al., submitted to Ocean Science, investigates the contribution and importance of El Niño Southern Oscillation (ENSO) to marine heatwave occurrences and evolution in the central South Pacific and across French Polynesia.

Overall, I find the manuscript to be a valuable contribution to our understanding of ENSO on marine heatwaves across this region that is sensitive to ENSO phase both temporally and spatially. I recommend the manuscript be potentially acceptable for publication once the comments below have been satisfactorily addressed by the authors.

We would like to sincerely thank the reviewer for their comments and for the time spent reviewing the manuscript, which has improved its readability and content. Please find below our point-by-point responses to the reviewer’s comments. Our responses are shown in blue.

Comments and Concerns

L2: In the title, I recommend deleting “the” as with “the El” it’s like a double-“the”
We thank the reviewer for this comment. Indeed, this can alleviate the title. We deleted “the El”. But we kept the first “the”.

LL18-19: “MHW exposure varies widely across the region” – at this point, the reader is unaware what the authors mean by “exposure” here, which is a term most often used when referring to species and/or ecosystem exposure to a hazard
We thank the reviewer for this comment. Here, the term “exposure” was intended to encompass event intensity, duration, and their combined effect (as represented by the DHW metric). To avoid ambiguity, we have replaced “exposure” with “characteristics.”

L23: “FP” acronym is undefined; delete “of”
We have now defined the FP acronym above at the first mention of “French Polynesia”. We have deleted “of”.

L24: Is there really a “cold season” across French Polynesia?
Although French Polynesia does not experience a true “cold” season, we use the terms cold and warm season here to refer to the austral dry and wet seasons, respectively, during which temperatures are relatively cooler and warmer. For the ocean, surface temperature are warmer during the warm season and colder during the cold season.

L26: change “MHWs occurrence” to “MHW occurrences”, here and throughout the manuscript
We modified accordingly throughout the manuscript.

L33: “known as prolonged periods of extreme ocean temperature” – MHWs are not periods of extreme temperature (which would be measured in time units), but rather they are temperature extremes that persist (measured in temperature units)

We have revised the text accordingly: “Marine heatwaves (MHWs), known as extreme ocean temperature persisting in time, have significant impacts on …”

LL35-36: “and are projected to continue rising in the future (Oliver et al., 2018)” – this last part of the sentence is not covered by the cited reference which focuses on historical data, and not projections. The authors should cite another reference for this.
We agree with the reviewer’s comment. We have added Oliver et al., (2019).

L36: “Developing skillful … their impacts.” – This is a leap in a single sentence. It needs to be explained further. Skillful forecasts do not necessarily translate to reduced ecological impacts.
We added an explicit causal link between «the improved forecasting » and « the reduction of ecological impacts » by introducing the term “anticipate.”:
“Developing skillful forecasts of MHWs is therefore essential to anticipate their impacts and, in turn, support effective mitigation. »

LL37-38: “Such forecasts … variability.” – A relevant paper to cite here is Holbrook et al. (2020, NREE) which makes and builds the case for understanding MHW predictability and prediction.
We thank the reviewer for this suggestion. The corresponding reference has been added to the manuscript.

L43: “increased MHW” – also include “and suppressed MHW”
We agree with the reviewer’s comment and have added the following text:
“In the South-Central Pacific, El Niño Southern Oscillation (ENSO) with its different phases El Niño (EN) and La Niña (LN) are known to be important drivers of increased and suppressed MHW occurrence (Holbrook et al., 2019, 2022) and MHW intensity (Sen Gupta et al., 2020).”

L45: “(Gregory et al., (2024)” should be “Gregory et al. (2024)”
Corrected

L47: acronym “SST” is undefined
We have now explicitly written « sea surface temperature (SST)”.

L53: “MHWs” should be “MHWs’ “
Corrected

L59 and L64 and throughout: I consider it more appropriate to replace “impacts” with “influences”, since the word “impacts” is more appropriate for socio-ecological impacts, while “influences” is between the physical components
We have changed “impacts” to “influences”.

L81: “OISST” – write in words first and then use the acronym
We first mentioned the full name according to the reviewer’s comment: “Daily SST data were obtained from the Optimum Interpolation Sea Surface Temperature version 2 (OISSTv2) dataset, …”

L82: delete “resolution” – the data are interpolated to a 0.25o grid, which does not necessarily reflect the true “resolution” of the original sampling

We agree with the reviewer's comment. We have corrected accordingly.

LL88-89: "Due to the known … ERA-Interim" – why not use ERA5 throughout?
For consistency we have used the forcing fields of GLORYS in the heat budget analysis part. These are described in the text: "In addition, surface heat and momentum fluxes used to force the oceanic model (including the large-scale corrections applied by Lellouche et al., 2021), were analyzed. GLORYS reanalysis is forced by ERA-Interim until 2019 (Dee et al., 2011) and ERA5 afterwards (Hersbach et al., 2020). »

LL138-140: "Whether or not … Amaya et al., 2023; Capotondi et al., 2024)." – This is not a sentence, please rewrite. Also, note that the Amaya et al. (2023) paper was challenged by Sen Gupta et al. (2023, Nature) and which helped lead to the paper by Smith et al. (2025, Prog Oceanogr). It would be good to reflect this in the manuscript.
See below

LL140-141: "Both approaches are complementary … address." – The key reference here is Smith et al. (2025, Prog Oceanogr).
See below

LL141-144: Another approach would be to follow the guidance of Smith et al. (2025), as the terminology "total heat exposure" suggests that species are indeed exposed to the hazard. I'm not sure we can absolutely assume that?
We thank the reviewer for the last three comments. We agree that it would be good to include these recent discussions and guidance in the manuscript, as we followed them in the methods. We rephrased this part of the text as follows:
"Removing a long term temperature trend (shown in Fig. S2 for FP region) before applying the detection method is a methodological choice as is the selection of a fixed versus a shifting baseline, both of which can influence the results and their significance (Amaya et al., 2023; Sen Gupta, 2023; Capotondi et al., 2024; Smith et al., 2025). A central question underlying these methodological choices is the definition of the "normal" state against which extreme ocean temperatures are identified. This ambiguity complicates both the definition of MHWs and the communication of MHW-related risks to the public. As a result, considerable discussion has emerged regarding MHW naming conventions and definition (Amaya et al., 2023, Sen Gupta, 2023, Smith et al., 2025). While some disagreement persists in the community regarding the definition of a MHW, it appears that both approaches are complementary, and the most appropriate depends on the specific research question to address (Smith et al., 2025). Here, we followed the guidance of Smith et al. (2025) by explicitly distinguishing MHW events identified using each approach and by clearly stating the motivation underlying the results presented. In the context of a fixed-baseline framework, retaining the long-term trend is particularly appropriate when assessing the impacts of MHWs on ecosystems or organisms with limited adaptive capacity such as coral reef. Conversely, when the focus is on interannual variability, climate-mode relationships, or the physical mechanisms driving MHWs, removing the trend can be advantageous for isolating these signals. For these reasons, the part that describes the MHWs metrics over FP was made without removing the trend (section 3) and the part analyzing the link with ENSO and the mechanisms of MHW was made with detrended SST data (section 4-5). For section 3 ,

complementary results based on detrended SST data—where the MHW detection method and threshold computation were reapplied—are provided in the Supplementary Information (SI). Briefly, detrending does not alter the main results — such as differences between archipelagos, ENSO modulation, dominant mechanisms — but does slightly affect some quantitative MHW characteristics, including their duration, intensity, and onset/decline rates. "

L179: acronym "MLD" is undefined
We have explicitly defined mixed-layer depth.

LL184-186: the word "net" should be explicitly used in each term in the equation, e.g. "LHF the net latent heat flux" etc.
We adjusted accordingly in the text.

L191: In Equation (5), why is "dk" used rather than "dt"?
It is to avoid using the same letter for the integration variable and the bounds of the integral. We changed 'dk' to '$d\tilde{t}$' to avoid any confusion.

L199: "sea-level (SSH)" – should this be "sea surface height"? Sea level and sea surface height can be subtly different.
We have replaced sea level by sea surface height.

LL210-212: Following the Hobday et al. (2016) definition, why isn't the average total number of MHW days/year close to 10% of the year (~36/year) everywhere?
Here, MHW days are defined as days for which SST exceeds the 90th-percentile threshold (SST^{90th}) and this condition persists for at least five consecutive days. This duration criterion explains why the number of MHW days is not exactly 10% of the total number of days. Among all days exceeding the SST^{90th} threshold, the fraction that satisfies the five-day persistence requirement varies depending on atmospheric conditions (e.g., wind, air–sea fluxes) and oceanic conditions (e.g., mixed-layer depth, heat advection).

L213: "During the cold season … compared to the warm season." – Based on the 90th percentile seasonally varying threshold applied using Hobday et al. (2016), why are there less cold season MHWs than in the warm season?
Based on the previous comment, we suggest that several factors (stronger wind for example) may explain why it is more difficult to satisfy the five-day duration criterion during the cold season than during the warm season and then explain the difference between warm season and cold season MHW days.

L233: "cumulative impacts" should be "cumulative intensities"
We have changed « cumulative impacts » by "cumulative intensities" in the text.

L250: Figure 2 caption – "map", I think should be "legend"
We thank the reviewer for pointing out this issue. This is an error. This sentence has been removed.

LL273-274: “However some differences … than in OISST.” – This is consistent with the analysis of Pilo et al. (2019) based on ACCESS-OM2 simulations across different model resolutions. I suggest this would be an appropriate reference to cite as context.
The study by Pilo et al. (2019) is now cited, and we have now added it to the main text : « However some differences can be seen, detected MHWs are generally longer and weaker in GLORYS than in OISST in agreement with (Pilo et al., 2019; Chevillard et al., 2025)”

L394: Figure 6 choice of colorbar for panels a-c and e-g make it difficult to discern proportions <40%.
We thank the reviewer for noting that. We have changed the colormap in order to better discern proportions <40%.

L542: Conclusions section usually follows the Discussion section.
We have moved the conclusion section after the discussion.

L568: I think “types” would be better used to replace the terminology of “categories” in the context used here, as “categories” is typically reserved for measures of MHW intensity.
We have modified the text accordingly.

LL605-606: Another earlier study of MHWs in the region and relevant reference here is Holbrook et al. (2022, Glob Planet Change).
We have added this reference.

L632: “Gupta and Sil (2024)” should be “(Gupta and Sil, 2024)”
We have corrected accordingly.

References

Holbrook NJ et al., 2022: Impacts of marine heatwaves on tropical western and central Pacific Island nations and their communities. Global and Planetary Change, 208, 103680, https://doi.org/10.1016/j.gloplacha.2021.103680.

Holbrook NJ et al., 2020: Keeping pace with marine heatwaves. Nature Reviews Earth and Environment, 1, 482-493, https://doi.org/10.1038/s43017-020-0068-4.

Sen Gupta A et al., 2023: Marine heatwaves: definition duel heats up. Nature, 617, 465, https://www.nature.com/articles/d41586-023-01619-4.

Smith KE et al., 2025: Baseline matters: Challenges and implications of different marine heatwave baselines. Progress in Oceanography, 231, 103404, https://doi.org/10.1016/j.pocean.2024.103404.

Pilo G S et al., 2019: Sensitivity of marine heatwave metrics to ocean model resolution. Geophysical Research Letters, 46, 14604-14612, doi:10.1029/2019GL084928.

References

Oliver, E. C. J., Burrows, M. T., Donat, M. G., Sen Gupta, A., Alexander, L. V., Perkins-Kirkpatrick, S. E., Benthuysen, J. A., Hobday, A. J., Holbrook, N. J., Moore, P. J., Thomsen, M. S., Wernberg, T., and Smale, D. A.: Projected Marine Heatwaves in the 21st Century and the Potential for Ecological Impact, Front. Mar. Sci., 6, 2019.

Reviewer 2

General comments

This study provides a comprehensive assessment of the characteristics and drivers of marine heatwaves (MHWs) in the central South Pacific, in particular across the archipelagos of French Polynesia (FP). The authors use sea surface temperature observations for the period 1981-2024 to assess MHW metrics (frequency, duration, intensity) over FP, as well as their relations to ENSO and various ENSO flavors. An ocean reanalysis product for the period 1993-2024 is used to classify MHWs into types according to their main physical driver (e.g., air-sea heat flux or horizontal advection), and to investigate the relationship of mixed layer depth, wind stress, and sea surface height to ENSO and MHW occurrence.

Overall, this study provides a very thorough and comprehensive analysis of MHWs in the central South Pacific, which will be useful to regional stakeholders as well as to the broader research community working on MHWs at regional scales. The results are novel, the methods are clearly defined, and the presentation is easy to follow.

I recommend this manuscript for publication after the minor comments below have been addressed.

We gratefully thank the reviewer for his comments and corrections, which have improved the manuscript. Please find below our point-by-point responses to the reviewer's comments. The authors' responses are shown in blue.

Specific comments

Ln. 23: "FP": define abbreviation on first use
We thank the reviewer for noting that issue. We have now introduced the full name "French Polynesia" at the beginning of the abstract.

Ln. 29: "This modulation arises from...": during which ENSO phase (El Niño or La Niña)?
This applies to both El Niño and La Niña; however, the regions affected differ between the two phases. The original statement was intended as a general description of ENSO modulation. We have now clarified this point in the manuscript as follows: "This modulation arises from reduced wind-evaporation cooling with reduced wind speed, shoaled mixed layers, and enhanced horizontal heat advection, occurring primarily to the northeast of French Polynesia during El Niño and to the southwest during La Niña."

Ln. 36: include another reference for future MHW projections (Oliver et al. 2018 is about MHWs in the past)
We've added Oliver et al., 2019.

Ln. 33-56: the terms frequency, occurrence, and likelihood seem to be used interchangeably for the same concept (e.g., Ln. 35, 43, 45, 47). It could be useful to harmonize the terminology in order to clarify that the same thing is meant in each context
We modified accordingly by changing 'likelihood' by 'frequency'.

Ln. 55: "This highlights the need for regional studies...": it also motivates the need for observation-based studies, as in this manuscript
We've added this statement:
« This highlights the need for regional studies and observation-based studies to better understand MHWs »

Ln. 80: "Data and model simulations": since no model simulations were performed for this study, the section could be called "Observational and reanalysis data" or similar
We've changed the title of the section accordingly.

Ln. 128-133: It would be good to motivate the choice of this particular method to quantify cumulative heat stress
We agree with the reviewer's comment. We've added the justification that this metric is widely used : "In order to quantify the variability of the cumulative heat stress felt by the marine ecosystems, the daily Degree-Heating Weeks (DHW), **commonly employed in coral bleaching risk assessments**, were computed for each austral summer from 1981 to 2024 following Skirving et al., (2020)."

Ln. 154: "N phases": define this (neural phases)
Done

Ln. 195: "separately as well as their sum": is this criterion also used for Q-MHW and HADV-MHW?
No this criteria is not applied for Q-MHWs and HADV-MHWs.

Ln. 194-197: does this classification assign every MHW to one of the categories, or does it leave out any events?
For events where none of the 3 terms of the heat budget equation were positive, these events were leaved out and assigned to the class 'NOT DEFINED'. They represent only few events. Figure R1 shows the proportion of events attributed to all classes including MIXED and NOT DEFINED MHWs:

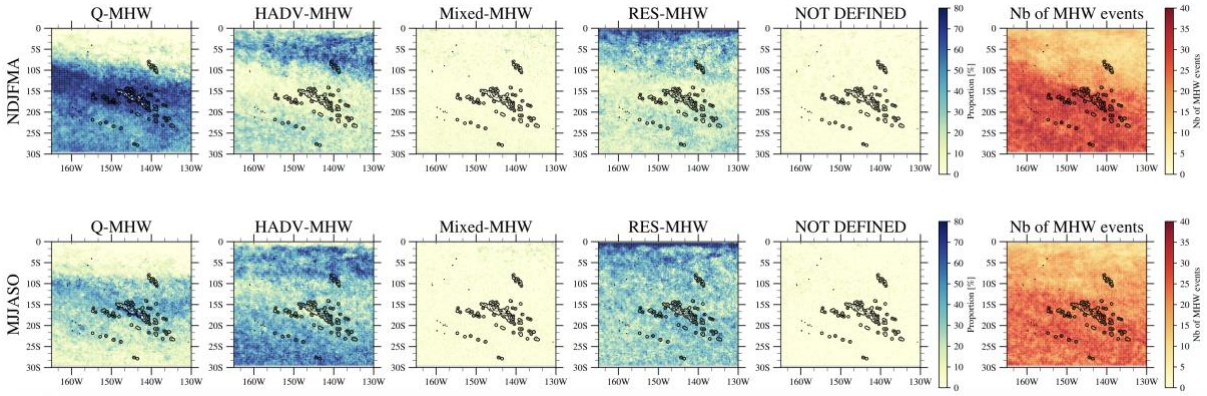

Figure R1: Same as Fig. 6 but including Mixed-MHWs and NOT DEFINED MHWs.

We have added a sentence about that in the text:
"For only a few events, none of the three terms on the right-hand side of Eq. (3) acted as positive drivers during MHW onset. These events were therefore excluded from the analysis. »

Ln. 202: "all MHWs [...] were used": is this not a contradiction with the previous sentence?
We thank the reviewer for this question, which highlighted a lack of clarity in the sentence. We have rephrased it as follows:

« These averages were computed separately for each MHW type during the development phase, defined as the period from MHW onset to its peak intensity. During the decay phase, defined as the period from the peak to the end time, composites were constructed using all MHWs, including HADV, Q, and RES-MHWs."

Ln. 213: why are there "fewer MHW days" in the cold season compared to the warm season, is this because of the minimum duration of 5 days?
Yes indeed. Here, MHW days are defined as days for which SST exceeds the 90th-percentile threshold (SST^{90th}) and when this condition persists for at least five consecutive days. This duration criterion explains why the number of MHW days is not exactly 10% of the total number of days. Among all days exceeding the SST^{90th} threshold, the fraction that satisfies the five-day persistence requirement varies depending on atmospheric conditions (e.g., wind, air–sea fluxes) and oceanic conditions (e.g., mixed-layer depth, heat advection) that vary in space and according to the season.

Ln. 241: "In the Austral islands, MHWs happen more regularly each year, with some bigger peaks": this is imprecise wording, it is not clear what is meant by "regularly" (more even gaps? More frequent? What is the quantitative meaning of "some bigger peaks"?)
We have rephrased it more clearly and have replaced "regularly" by "more frequently each year":
"In the Austral Islands, MHWs are occurring more frequently each year, although substantial interannual variability remains, with some years—such as 2021 and 2022—characterized by a high number of MHW days."

General: I recommend to avoid using the jet/rainbow colormap (e.g. in Figs. 1, 4, 6, etc.), see e.g. https://doi.org/10.5194/hess-25-4549-2021

We thank the reviewer for this comment. We have modified the different figures accordingly by choosing sequential colormaps.

Ln. 247: “the gray dashed areas”: these areas are not clearly visible. Maybe if a different colormap is used (as suggested above), the areas will become more visible. If not, perhaps an extra figure showing only the general study area as well as the archipelagos and their names could be useful (e.g. as a new Fig. 1).
We have changed their color to black, which makes these areas more visible with the revised colormap. We thank the reviewer for pointing out this issue.

Fig. 2: In the legend, spell out “warm season” and “cold season” (“warm” and “cold” could be taken to mean warm/cold extremes at first glance). In panel b, why are the mean values not given as in the other panels? In all panels, the mean values are not clearly legible. The colors for Gambier and Austral are hard to distinguish

We thank the reviewer for these comments on Fig. 2. We have modified the legend accordingly. The mean values in panel b are not shown because the spread between the mean and the median values in maximum intensity, when expressed in absolute values, is small and difficult to distinguish visually; this information can instead be assessed in panel a, where values are expressed as anomalies relative to climatology. We have clarified this point in the figure caption:
“In panel b, the mean value is not shown because it is very close to the median, and displaying both would reduce the readability of the plot. The difference between the mean and median maximum intensity can be assessed in panel a.”

We have also revised the colors associated with the archipelagos to improve visual distinction.

Ln. 256: “The slope of the gray dashed line...”: it would be useful to test the statistical significance of these trends
We thank the reviewer for this comment. The significance, assessed by the p-values are:
Marquises p=0.26
Gambier p=0.0013
Archipel des Tuamotu p=0.003
Archipel des Australes $p<10^{-6}$
Archipel de la Société $p<10^{-5}$

The trend for the Marquesas is therefore not statistically significant at the 99% confidence level, whereas those for the other archipelagos are.

For the trend of the area covered by a MHW over FP the p-value is $< 10^{-6}$.

We’ve added that information in the caption of Figure 2 and S6:
« The estimated trend slopes expressed in MHW days per decade are 6.1 day.decade^{-1} for the Marquesas ($p = 0.26$), 8.6 day.decade^{-1} for the Gambier ($p = 0.001$), 8.5 day.decade^{-1} for the Tuamotu ($p = 0.002$), 13.9 day.decade^{-1} for the Austral Islands ($p < 10^{-6}$), and 10.2 day.decade^{-1} for the Society Islands ($p < 10^{-5}$). »

"In panel e, the trends for the number of MHW days per year are no longer statistically significant with p_values > 0.15. The estimated trend slopes expressed **in MHW days** per decade are 7.9 day.decade^{-1} for the Marquesas (p = 0.15), -1.8 day.decade^{-1} for the Gambier (p = 0.53), -0.7 day.decade^{-1} for the Tuamotu (p = 0.77), 0.01 day.decade^{-1} for the Austral Islands (p > 0.99), and -3.0 day.decade^{-1} for the Society Islands (p > 0.19). For the daily proportion of FP in MHW the slope is 0.003 day.decade^{-1} ($p<10^{-7}$)."

Fig. 3: what do the errorbars in panel d) quantify?
We have added that to the caption of Fig. 3: "Black error bars indicate the spatial standard deviation of the statistics calculated across grid points associated with each archipelago area (black dashed outlines in panel e)."

Ln. 590: "Our analysis gives confidence in GLORYS, to study [the] vertical extent of MHW[s].": how does this follow from the analysis?
We meant that the overall agreement between GLORYS and OISST in terms of MHW detection statistics provides confidence in the ability of GLORYS to investigate MHW characteristics, including their vertical extent. However, we did not perform any analysis on the vertical extent of MHWs in this study.

Ln. 599: "TCs": define abbreviation
Done

Technical corrections

Ln. 17: "of world's" -> of the world's
We have deleted this sentence during the reviewing process

Ln. 23: "most of MHWs" -> most MHWs
Done

Ln. 25: "reduce" -> "reduces"
Done

Ln. 33: "Marine heatwaves (MHWs), known as...": it should be the other way around (XYZ events are known as MHWs)
Done

Ln. 40: "...driving the MHWs" -> specify "driving MHWs over FP"
Done

Ln. 42: "are known to be important drivers" -> is known to be an important driver (referring to ENSO)
Done

Ln. 45: remove stray parenthesis "("
Done

Ln. 47: "intensity occurrence" -> intensity and occurrence? (or: intensity and frequency)
Yes, it is "intensity and frequency »

Ln. 54: "due to the resolution or not of...": improve phrasing
We have rephrased the sentence as follows:
« The dominant mechanisms during the MHWs' onset and decay are region dependent (Elzahaby et al., 2022; Bian et al., 2023) and also depend on the spatial resolution of the model, which controls its ability to resolve oceanic eddies (Bian et al., 2024)."

Ln. 59: "due to FP geographical position": due to FP's ...
Done

Ln. 60: "ENSO SST anomalies edges": this is unclear
We clarified this sentence as:
"Opposite influences across different parts of the country are observed depending on the ENSO flavor, due to FP's geographical position often near the transition zone where ENSO SST anomalies change sign and its effect on the South Pacific Convergence Zone (SPCZ) position »

Ln. 60: "its effect": specify the effect of what (ENSO?)
We have specified it as:" Opposite influences across different parts of the country are observed depending on the ENSO flavor, due to FP's geographical position often near the transition zone where ENSO SST anomalies change sign and ENSO non-linear effect on the South Pacific Convergence Zone (SPCZ) position »

Ln. 107: "were computed" -> was computed
Done

Ln. 111-113: the "number of events" and "gaps between events" are not really metrics for "each MHW"
We thank the reviewer for highlighting that issue. We separated these two metrics from the others: "These include the maximum, mean, and cumulative intensity, duration, onset and decline rates (defined as the mean SST change from start to peak and from peak to end, respectively). The number of events and the gaps between events were also computed"

Ln. 112: "SST change from start to peak": is this the rate of change (in K/day) or really just the change (which would be equivalent to the intensity)?
It is indeed the rate of change. We added this to the text: "(defined as the mean SST rate of change from start to peak and from peak to end, respectively)".

Ln. 113: "MHW intensity can be expressed either...": so which option did you choose?
We chose both actually. The formulation may be misleading we agree with the reviewer's comment. We rephrased as: "MHW intensity were expressed either in absolute terms (i.e., the actual SST) or relative to the mean climatological baseline. »

Ln. 118: “In the various sections”: sections of the manuscript, or geographical/time sections? If the former, it may not be necessary to specify this
It stands for the sections of the manuscript. We have specified: « Throughout the manuscript, a distinction was made between MHWs occurring during the austral winter and those occurring during the austral summer, according to the date of their peak intensity. »

Ln. 124: “cooler-than-average SST climatology” -> SST cooler than the climatology
Done

Ln. 136: It would be preferable to add an entry in the reference list for the cited website (including date of last access, etc.) and then citing it here. Also, mention what this data source is (“based on the French government’s XYZ”?)
We thank the reviewer for this suggestion. We added a proper reference entry for the dataset, including the date of last access, and clarified in the manuscript that this dataset corresponds to the official administrative geographic dataset for French Polynesia provided by the French government.

Ln. 138: “Whether or not...”: the wording should be changed as this structure makes the sentence difficult to parse. E.g., you can simply start the sentence with “Removing a long term temperature trend...”
We followed the reviewer’s suggestion, we started the sentence with “Removing a long-term temperature trend...”

Ln. 175: “Qnet”: check formatting
Done

Ln. 191: move the first minus sign on the RHS outside of the integral, specify which terms depend on the integration variable k, and maybe use a different symbol for the integration variable (e.g. t’ instead of k, as it represents time)
We thank the reviewer for suggesting these modifications. We followed them in the manuscript. However as ‘ is already used in the equation we used “dt̃ “.

Ln. 215: “median values” -> median maximum intensity values
Done

Ln. 220: “are found” -> is found
Done
Ln. 238: “MHWs occurrence vary” -> MHW occurrence varies
Done

Ln. 250: “see map on the right”: there is no map
This was an error in the manuscript, which has now been corrected. We thank the reviewer for pointing out this issue.

Ln. 265: “1M km^2” -> 10^6 km^2
Done

Ln. 267: Equivalent analyses of that...” -> equivalent analyses to those
Done

Ln. 272: “that region”: what region?
It is for French Polynesia. We specified that: “For the FP region …”.

Ln. 279: “EN, LN or N conditions”: it could be useful to remind the reader of the meaning of these abbreviations
Done

Ln. 280: “using Pagli...” -> using the Pagli...
Done

Ln. 335: “MMM”: what does this stand for?
MMM stands for « Maximum Monthly Mean (MMM)”. We now remind in the caption the meaning of MMM.

Ln. 365: close the parenthesis
Done
Ln. 366: “year”: remove
Done

Ln. 380: “in surface”: at the surface
Done

Ln. 388: “firstly”: mainly?
Done

Ln. 398: “flux-driven”: does this refer to air-sea heat flux?
Yes it is. We rephrased as: “During austral summer, MHWs are primarily driven by air/sea fluxes in most …”

Ln. 425: “averaged across”: there is a word missing here
We thank the reviewer for noting that. We rephrased as : “In each panel, the composite represents the average across all MHWs of the corresponding type (Q-MHW or HADV-MHW) detected at each grid point.”

Ln. 439: “reinforces” -> reinforce
Done

Ln. 464: “smooth out eddies pattern” -> smooths out eddy patterns
Done

Ln. 473: “present” -> presents
Done

Ln. 474: “hardly interpretable” -> hard to interpret?
Done

Ln. 498: “back to normal” -> neutral/zero
We chose “neutral”.

Ln. 509: “to represent them”: remove
Done

Ln. 523: “and may also reduce” -> and potentially also reducing
Done

Ln. 572: “the most extreme events”: globally?
We aimed at highlighting that, when focusing on the French Polynesia region in the global-scale analysis of Marin et al. (2022), the dominant mechanisms driving the most extreme MHWs are similar to those identified in this study. We clarified the text as:
« It is interesting to note that the conclusions obtained here about the mechanisms of all MHWs in FP correspond to that obtained by looking at the most extreme events over the region in the global-scale study of Marin et al., (2022) (their Fig. 3 and 4). »

Ln. 600: “intra-seasonal, variability”: remove comma
Done

Ln. 626: “relating the” -> relating to the
We rephrased as : “Accordingly, Fig. 5 quantitative results should not be read as direct indicator of coral bleaching; “

Ln. 632: “While OISST dataset” -> while the OISST dataset
Done

Ln. 633: “some MHWs commonly used metrics” -> some commonly used MHW metrics
Done.
We also added a new reference related to that statement: “(Chevillard et al., 2025)”. The text is now:
“While the OISST dataset has been shown to be well-suited for the analysis carried out in this study (Gupta and Sil 2024), differences between SST products can be significant for some commonly used MHW metrics (Chevillard et al., 2025) and this should be kept in mind. »

Fig. S1: the colorbar label shold be degrees C, not “thresh”
We thank the reviewer for this comment. Figure S1 has been modified accordingly.

References
Oliver, E. C. J., Burrows, M. T., Donat, M. G., Sen Gupta, A., Alexander, L. V., Perkins-Kirkpatrick, S. E., Benthuysen, J. A., Hobday, A. J., Holbrook, N. J., Moore, P. J., Thomsen, M. S., Wernberg, T., and Smale, D. A.: Projected Marine Heatwaves in the 21st Century and the Potential for Ecological Impact, Front. Mar. Sci., 6, 2019.

Chevillard, C., Le Gendre, R., Menkes, C., Izumo, T., Pagli, B., Van Wynsberge, S., and Cravatte, S.: Sensitivity of marine heatwaves metrics to SST products, focusing on the Tropical Pacific, EGUsphere, 1–36, https://doi.org/10.5194/egusphere-2025-5417, 2025.