We sincerely thank Reviewer#1 for his/her comments, which gave us the opportunity to clarify some key points of our paper.
We indicate our reply in blue colour and some corrections we propose to implement on the text of the manuscript in italic red. The full version of our reply, if accepted, will include all the corrections declared here.

== Overall Comments

In this Study, Valeria Di Baggio et al. use an extreme event identification method to track the late winter-early spring blooms in the Mediterranean sea. Their method enable to identify and follow day by day the bloom propagation, and characterize the event with different indexes.
Although the method is shown to be powerful and useful, I have some questions/concern with the application done here with the Mediterranean surface chlorophyll, as I am not sure what we are looking for, and getting in the end... Are we looking for extremes ? blooms ? strong blooms ? blooms maxima ? maxima of surface chl maximum ? we are not sure, and the way it is done probably allow all of those. But then... Are blooms considered as extreme events ?

This study aims to propose a methodology for the analysis of "extreme event waves" (EEWs), defined as a set of "extreme events" which are contiguous in space and time.
We defined statistically an “extreme event” in each point (x,y) as a value of the variable which is over a given threshold. In our case, the threshold is set as the 99th percentile of the time series recorded at that specific point (i.e., the threshold is site specific: p99 = p99(x,y)).
Extreme events are thus represented by the maxima of the variable distribution in that point (i.e., represented by the upper tail of the distribution). They are “rare” events (i.e., their number is equal to 1% of the total records; right panels in Fig. R.1.1 and R1.2), selected independently from their distribution over the years. In fact, the temporal regularity over the years (i.e., the inter-annual variability) is one of the features which, in retrospect, can be quantified in the analysis of the “extreme events waves” by means of our “anomaly” index.

In our specific application focused to surface chlorophyll, the “extreme events” are strictly defined as the maxima of the local distribution of surface chlorophyll, corresponding to the highest values recorded in the point. These maxima of the distribution can be distributed quite regularly over the years and thus correspond to annual maxima (i.e., in the seasonal cycle), or they can spread among a few years, as in case of the northern Ionian Sea (as shown in Fig. R1.1, below). In the latter case, such high inter-annual variability has been detected in the EEWs covering that area, by means of high values of the anomaly index.
On the other hand, the maxima of the chlorophyll distribution can correspond to blooms (e.g., in the Gulf of Lion), but also to chlorophyll values which are too low to be properly considered as “blooms” (e.g., in the southern Levantine Sea). Our method is able to distinguish between these two cases, by means of high and low values of the severity index of the EEWs, respectively.

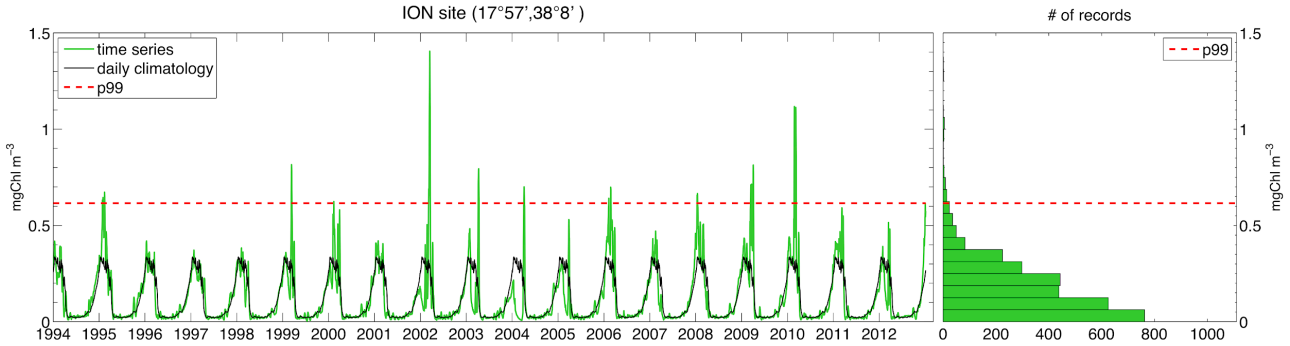

Fig. R1.1 Time series of surface chlorophyll in a site belonging to northern Ionian Sea, with daily climatology computed in the site (left) and histogram of frequency of the chlorophyll values recorded in the site (right). In both panels, the horizontal dashed line indicates the 99th percentile threshold computed in the site.

Thus, considering Reviewer#1's objection, we propose a method to analyse the extreme events; based on our analysis, blooms can be extreme events, but not all extreme events can be classified (generally speaking) as blooms.

We are aware that our use of the term "bloom" in the previous version of the manuscript was quite confusing, and we will avoid it in the revised manuscript. On the other hand, we will carefully revise the use of the terms "maxima" and "extreme", to further clarify our terminology, by highlighting the points above.

Apart from this main and i think important concern, the study is nice and relevant. the way the authors manage to track and characterize these events is shown to be useful, with lots of relevant information, and could be exported for all kind of extreme event study.
I really appreciate this study, but it has to make clear what we are looking at: extreme? or surface chlorophyll maximum ? depending on the answer, the amount of work needed to correct the paper will be different, corresponding to a major review if you want to make it an extreme event analysis; or a minor review if it rather is a surface chl maximum analysis using an extreme event tool (what i think the authors are doing here).

As previous clarified, we actually conducted an analysis on the maxima of the surface chlorophyll distribution (i.e., "extreme events", with respect to p99(x,y) of the local chlorophyll distribution) and the subsequent steps of the method (i.e., the identification of the extreme event waves (EEWs), their characterisation and classification) can be defined an "extreme events tool", as Reviewer#1 suggests. Nevertheless, we hold that the validity of the whole method is general, i.e., the same definitions can be applied also to deseasonalized time series (see also the second next point). In that case, the "extreme events" under study would be identified by the values differing the most from the daily climatological mean (where "the most" would be set by the 99th percentile threshold of the distribution of the anomalies). The "extreme events" identified in this latter way do not necessarily correspond to the highest values of the variable recorded in the point and identify local perturbations with respect to the seasonal cycle. The choice to deseasonalize or not the time series depends on the scientific question.
In our analysis, we focused on maxima of surface chlorophyll distribution and limited their characterization and classification to the winter-spring period.
We recognise that the difference between absolute and time-dependent thresholds, as well as the possibility of following the latter approach in the first part of our method, deserves an explicit mention in the manuscript. We propose to add the following sentences in the Discussion section, line 393:
Finally, it is noteworthy to specify that our method of EEWs identification, characterisation and classification can be applied also to extreme events defined starting from seasonally varying threshold (as e.g. in Hobday et al. 2016). In this case, "extreme events" would correspond to the

highest anomalies recorded with respect to the climatological seasonal cycle of the variable, and generally not to the highest values of the variable recorded in the whole time series (as in our case of temporally fixed threshold). Such an application would allow to investigate scientific questions of a different kind, such as chlorophyll anomalies in summer time.

== Extreme, Bloom, or Surface Chlorophyll Maximum ?

Although the method is shown to be powerful and useful, I have some questions/concern with the application done with the Mediterranean surface chlorophyll, as I am not sure what we are looking for extremes ? blooms ? strong blooms ? blooms maxima ? maxima of surface chl maximum ? it seems you see all of those including extremes, like the one you have selected for the example. But then... Are blooms considered as extreme events ?

Please refer to our reply to Overall Comments to clarify the concepts of "extreme", "blooms" and "maxima".

From the definition you give (Page 2, line 35) "a large deviation from a reference state", but i think the reference state should include the annual cycle... if you are looking for extreme. If your targets are extremes of surface Chl, you still could use the 99th percentile threshold, and only keep those going above the local annual cycle + STD (or 1.5 * STD) for example, or instead of a 2D threshold make it 3D, including an annual cycle, that could also show extreme in summertime (maybe due to dust events for example),... The choice of a 2D 99th percentile on the whole period is somehow too broad if you look for extremes, and of course you will get completely different results in the different area of the Mediterranean sea. In the North-Western part with strong and spiky blooms,you will overshoot the threshold at least once a year, because of this spiky bloom configuration (but that's not extreme... it is the every year bloom), whereas in the oligotrophic region, where the chl phenology is smooth, a relatively stronger event can cover the whole 99th percentile. So, if you were looking for extreme, you should change that, adapt the threshold which seems to be the key of the method. But i am not even sure you are looking for extreme.

As we replied also to the Overall Comments, we think that deseasonalizing or not the time series is a choice that depends on the scientific question. In our case, we investigated the highest values of surface chlorophyll defined by the tail of the distribution of chlorophyll in each point. The investigation of "extreme events" of anomalies with respect to the daily climatological mean is a different (and, for sure, interesting) study. It would give us results of a different nature, which would deserve a separate paper. However, our method can be applied also to the deseasonalized time series, since it analyses the spatio-temporal contiguity of "extreme events" and provides a "tool" for their characterisation and classification.
In our analysis, we propose a description of the phenomenology of extreme events of chlorophyll through the "extreme events waves", defining a tool which is able to detect events with a wide range of values of the variable, as guaranteed by the site-specific threshold. The heterogeneity of the maxima of the Mediterranean surface chlorophyll is captured by our severity index, which shows the highest values in northwestern Mediterranean Sea and the lowest ones in southern Levantine Sea. The fact that a single relatively strong event in the oligotrophic region can cover the whole p99 is a result of the analysis, which highlights the heterogeneity of Mediterranean dynamics.
Moreover, we would like to point out that the time series of surface chlorophyll in northwestern Mediterranean Sea (NWM) do not necessarily overshoot the p99 threshold in each year. We report in left panel of Fig. R1.2 an example of local time series of surface chlorophyll in NWM, which shows that the local threshold is not overcome in 5 of the 19 years (i.e., 1995, 1996, 2007, 2009, 2012):

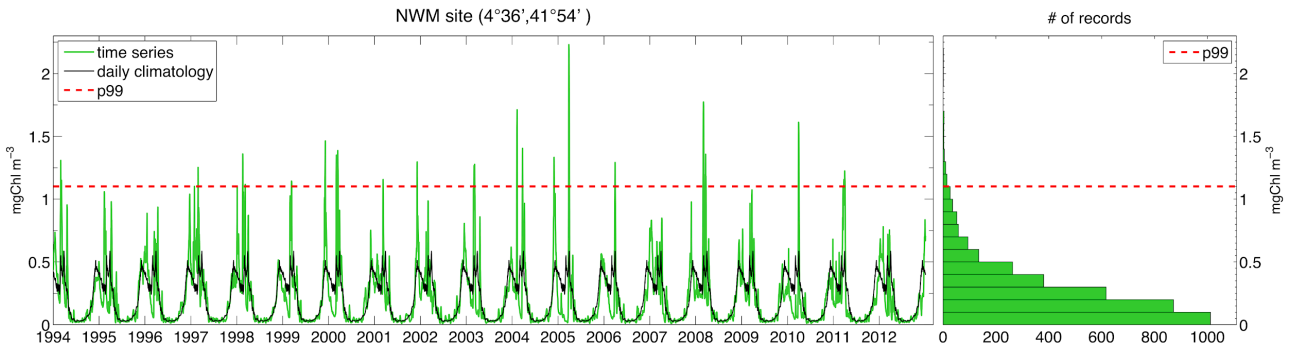

Fig. R1.2 Time series of surface chlorophyll in a site belonging to northwestern Mediterranean Sea, with daily climatology computed in the site (left) and histogram of frequency of the chlorophyll values recorded in the site (right). In both panels, the horizontal dashed line indicates the 99th percentile threshold computed in the site.

Thus, we suggest that our method identifies extreme events that not necessarily are blooms (i.e., in the oligotrophic areas) and that not all blooms are necessarily extreme events (as shown in Fig. R1.2).

The text and the title are confusing. If you are characterizing blooms (or maxima in chl maximum) using an extreme event method, it is great, but present it like this. Please, don't try to oversell it. A title like "Tracking the Mediterranean blooms using Extreme event waves method" or something like that. Of course the current title is more punchy, but personally, when i read it i've imagined dozens of possible things.

Thank you for this comment. Since we will exclude the reference to "blooms" and we think that the validity of the model is more general than our specific application to the surface chlorophyll (i.e., it can be applied to integrated chlorophyll, to other ecosystem variables, and to both time series as derived by the model output and deseasonalized time series), we propose to modify the title as:
Extreme events waves in marine ecosystems: an application to Mediterranean Sea surface chlorophyll

Also, make it clear in the text :
-p1 l14: identify the maxima of chlorophyll as exceptionally high and prolonged "blooms"
We propose to modify it as:
identify the maxima of surface chlorophyll distribution as continuous and prolonged "waves" of events

-p2 l54: This allowed to identify maxima of phytoplankton blooms (Desmit et al., 2018), but also positive anomalies with values too low to be actually considered "bloom""
We propose to modify it as:
This allowed to identify the maxima of surface chlorophyll distribution, which can correspond to phytoplankton blooms (as in Desmit et al., 2018), but also to positive anomalies with values too low to be actually considered "blooms""

-p6 l172 : (i.e., exceptionally high and prolonged "blooms", as clarified in Introduction)
We propose to modify it as:
(i.e., continuous and prolonged "waves" of events, as clarified in Introduction)

-p9 l272 : probably the clearer explanation : "we propose a new method to tackle extreme events in the marine ecosystems on the basin scale. The method is then applied to the surface chlorophyll in Mediterranean open-sea areas to investigate maxima in the winter-spring blooms".
We propose to modify it as:

We propose a new method to tackle extreme events in the marine ecosystems on the basin scale. The method is then applied to the surface chlorophyll in Mediterranean open-sea areas to investigate the maxima of chlorophyll distribution in the winter-spring period.

So sometimes it is "exceptionally high and prolonged", some other time it is "maxima in the winter-spring" blooms. The second (which includes the first) sounds more accurate, but read both is confusing. please make it clearer.
Thank you for the comment. We have just replied point by point in a consistent way.

What struggles me is the lack of definition for bloom and for bloom maxima, Or at least what you consider "blooms" and "bloom maxima" in this study. what gives me the impression of not being sure of what we are looking for, and results with places where a bloom maxima appears every year, and other places where it happens once or twice in 18 years and last 90 days. In the oligotrophic region, where there is no blooms, an EEW is found by construction (as said p6,l181 : "Considering the temporal extension of the simulation (approximately equal to 7000 days), the number of POTs in each grid point is by construction equal to 70.") the long EEW might well be an eddy with higher surface chl concentration inside. It cannot be considered a bloom.

We agree that the use of term “bloom” was misleading in the previous version of the manuscript. As already replied to previous comments, we will avoid the use of term “bloom” in the new version of the manuscript and we will define more precisely the maxima of chlorophyll distribution as our “extreme events” at each point (see also the second next point).
However, we would like to specify that in each point we find by construction 70 Peaks Over Threshold (POTs), since our threshold is equal to 99th percentile and we use a simulation of daily chlorophyll for 19 years. The occurrence of an EEW is instead restricted to the chance of occurrence of POTs in consecutive times and neighbouring points (i.e., spatio-temporal contiguity of extreme events). Additionally, we imposed further criteria on duration (at least 2 days, to avoid possible transient spikes) and area (greater than 4 $\Delta x \times 4\ \Delta y$, with Δx, Δy grid spacing in the zonal and meridional direction, respectively, Grasso 2000). Not all POTs obtained are thus included in a EEW (the percentage of POTs not included in EEWs is equal to 0.5%). Conversely, an EEW can include different POTs recorded in the same point at different times.
Moreover, for sure there are EEWs also in oligotrophic regions, since the thresholds are site-specific, and we observed also long EEWs in these regions. We will avoid the term “bloom” in those cases, but the obtained results are valid anyway.

A solution could be to:
– Stop talking about blooms for the whole Mediterranean sea. It would make more sense if you were talking of "(...) investigate maxima in the winter-spring surface chlorophyll maximum". That would be more correct, the maxima being not necessarily extreme, and not saying the word "bloom" don’t mislead the attention on something specific that does not occur everywhere in the Mediterranean sea.

We thank the reviewer for this suggestion: we propose to avoid the term “bloom” and to specify the expression “maxima of chlorophyll distribution” in the reviewed version of the manuscript. Nevertheless, these maxima are strictly our “extreme events” at each point, i.e., the values over the 99th percentile threshold at each point. Please see our general reply to the Overall Comments.

– And stop talking about extremes everywhere. The method you use is a method that is first made to find extreme events, but the way you use it, you don’t only find extremes. an extreme event that comes back at least once a year is not an extreme, it is part of the normal annual cycle.

As we have already replied to the Overall Comments, we consider maxima of chlorophyll distribution (i.e., our "extreme events") independently from their spread over the years. The inter-annual variability is evaluated in retrospect, on the EEWs, by means of the anomaly index and, as pointed out previously, it highlights the great heterogeneity of the Mediterranean Sea.
We propose to add new lines in the section 2.1.1 of the manuscript, at line 84:
Extreme events are thus represented by the maxima of the variable distribution in the (x,y) point. They are "rare" events, selected independently from their distribution over the years, in a number equal to 1% of the total records.
and to substitute line 284 in the Discussion section with:
In our specific application, it is noteworthy to specify that maxima of surface chlorophyll distribution (i.e., the extreme events, as defined in Sect. 2.1.1) do not necessarily correspond to "blooms" (Siokou-Frangou, 2010), since the extreme events are identified in all points of the domain, including the oligotrophic areas. Moreover, these maxima of chlorophyll are not necessarily distributed in a regular way over the years, due to the inter-annual variability of chlorophyll time series.
Our method is able to characterise intensity and regularity of the extreme events in retrospect, by means of mean severity and anomaly indexes computed on the EEWs.
In particular, the mean severity index associated to a chlorophyll EEW can be ...

– Something else that could help to better visualise how extreme the EEW are. You could try to plot the surface Chl annual cycle (with STD in dashed line) for each Mediterranean regions (Fig 3), with the averaged 99th percentile threshold represented on top. that way we can appreciate how "extreme" an EEW is for each area (Maybe you want to adapt the area so it looks more like the fig 6 ? might be more relevant).

Thanks for raising this point.
In the present reply we show examples of local time series of surface chlorophyll in Ionian Sea and northwestern Mediterranean Sea, in Figs. R1.1 and R1.2, respectively. These plots show how "extreme" are the POTs in the selected sites, through the chlorophyll values with respect to the thresholds and the inter-annual variability (i.e., the regular/irregular occurrence of POTs over the years). The plots show also how the daily climatological series computed in the selected sites are well below the p99 thresholds in the sites.

Moreover, a figure reporting the p99 spatially averaged over regions, superimposed to the spatially averaged annual cycle, would mislead the p99 meaning, since p99 is defined locally. A comparison among different areas which is based on spatial means would not have a direct link with the EEWs indexes and would give information only about the heterogeneity of (mean) surface chlorophyll in the considered areas.
Understanding and thus quantifying how "extreme" are the EEWs in the different Mediterranean areas (e.g., their mean severity, anomaly, duration, uniformity) can be instead done from Fig. 5 and Table 2 of the manuscript.

We propose not to add figures like R1.1 and R1.2, since they do not add information needed for the method illustration. Nevertheless, if Reviewer#1 think that figures like R1.1 and R1.2 are important, we would add one figure for each area of Figure 3, in a new Appendix of the revised manuscript.

Unless you want to talk about extremes and only extremes. Then you have to adapt the threshold by taking into account the surface chlorophyll annual cycle as suggested above.

We do not agree with this point, since we think that our study tackle "extreme events" consistently from a statistical point of view, as rare events corresponding to the upper tail of the distribution of

the chosen variable, as the highest values recorded in a certain time period. Moreover, conducting the same analysis on the deseasonalized time series (which is anyway possible within our scheme) would give different results, which answer to a different scientific question. Please see also our reply to the Overall Comments.

Apart from this (important) semantic question, the method is nice and prove to be able to identify, characterize and track the EEW beautifully.
– Also, talking about extremes, i wanted to rise a question, just for discussion. I understand the choice of surface Chl maxima is mainly to test the method and show how it works. But thinking about Mediterranean sea, climate change and extreme events, i wonder if tracking maxima of surface chlorophyll maximum is what i would do. I don't think we can get hypoxia or eutrophication with 12th degree model, this is rather a coastal and river mouth problem. We know that a climate impact could be to lower the deep water formation and hence the bloom. We could use your method (adapting the threshold, considering the Annual cycle) to track years with little or no bloom, and understand why, and see the trends. Or in summertime if your model include dust deposition on high frequency, see if the model shows EEWs linked to dust deposition events,... There is lots of other application of your methods that could make lots of sense (Lots of nice study in perspective).

Thank you for this meaningful observations.
As a first application of the method, we chose the surface chlorophyll since: it is representative of the marine ecosystem functioning; it has been widely investigated in previous studies; model simulation is comparable also with remote sensing measurements (as done in Sect. 3.1, Fig. 4), which increases the confidence level on our model-derived results. These reasons make the chlorophyll a good choice to show how the method works, as you wrote.
However, we agree that there are a lot of possible and interesting applications, thanks for your suggestions.
As written in the last part of our reply to the Overall Comments, we propose to explicitly add in Discussion section the possibility to apply our method starting from seasonally varying threshold, with a mention of the anomalies of chlorophyll in summer as example of investigated process.

== Text remarks

– I think there are few places where the English could be corrected, but not being a native English myself, i am not the right person to do that. Maybe you could ask a native English around you to double check your manuscript.
Thank you for the suggestion. We will send the new version of the manuscript to an English Editing Service.

– from p5.l134 and all units following : double check the units the -2 and -1 should be up, if you write with latex, you should write kg kmˆ{-2} dayˆ{-1}
Thank you. We will correct these typos.

– p6 l73 : " chlorophyll as a proxy for the phytoplankton biomass" Surface chlorophyll is representative of the surface biomass (probably why one of your idea in the discussion is to check the event in 3D)
We will correct the expression by:
surface chlorophyll as a proxy for surface phytoplankton biomass

– p6 l82 to 85: "Mapping the 99th percentile threshold values computed at each grid point on the whole basin (Fig. 3), it can be noticed that grid points that are near in space exhibit small differences in their threshold values and also that different patterns are recognisable in the basin. Hereafter, we

use the abbreviations indicated in Fig. 3 to refer to different Mediterranean regions" – So the 99th percentile is fixed in time. This means that you compare toward an ~annual 99th percentile threshold of Chl. basically you will only have EEW during the bloom period. A summer with exceptional summertime Chl will not appear with this method as it will never exceed bloom period values. can't you do a time varying 99th percentile threshold to be able to see non- bloom period EEW ? otherwise you will probably miss the most interesting events... probably needs a longer run to get enough data to keep it statistically feasible.

We are aware that a percentile threshold which is fixed in time allows to recognise only the highest values of chlorophyll in the considered time period, and in this paper we focus on those events.
We do not exclude to investigate also fall blooms, or high anomalies of chlorophyll in summer, but these are different processes, and would deserve separate papers. Please see also our reply to the Overall Comments.

– p7 l191 : " The model-derived chlorophyll patterns (Fig. 4, second column) are in good agreement with the remote sensing data (first column) in the same temporal interval of the EEW" – Hard to tell, seems the sat Chl has a more extended bloom than the model, and starts slightly later (and probably ends later as well). But both model and sat presents an EEW on the same period, what is already a nice model performance ! And you have a nice bloom in the Ligurian sub-basin, that's impressive! Talking about e Ligurian bloom, it does not appear in the EEW area. it is considered as a separated EEW ?

Thank you for this comment. We think to substitute lines 191-193 "The model-derived chlorophyll patterns (Fig. 4, second column) are in good agreement with the remote sensing data (first column) in the same temporal interval of the EEW. In fact, a strong increase…" with:
Both model and remote sensing data show patterns of high values of chlorophyll in the period of EEW occurrence (second and first column of Fig.4, respectively). A strong increase…
However, the high values recorded in the Ligurian Sea are included in another EEW. We think to add this information at (old) line 204 as:
The high values of chlorophyll recorded in the Ligurian Sea on 20th March are associated to a separate EEW (not shown).

– p8 l235 : " are around half of the ones of ALB or NWM." needs to be rephrase.
We think to rephrase it as:
are about half of the values displayed by ALB or NWM

– p8 l239 : "with a similar chlorophyll EEWs phenomenology."
We think to rephrase it as:
with a similar phenomenology of chlorophyll EEWs.

– p10 l288 : "pointed out the heterogeneity of the blooms intensity in the Mediterranean Sea" - back to my main comment, you don't see blooms everywhere...
As we replied to the Overall Comments, we will avoid the use of the term "bloom" in the new version of the manuscript. We think to substitute that expression with:
pointed out the heterogeneity of the maxima of chlorophyll in the Mediterranean Sea

– p10 l310 : Furthermore ?
Thank you for this correction. We will substitute "further" with
furthermore

– p10 l310 : you could have shown the "spatio-temporal persistence", it looks like a nice index. Why not show it ?

We did not include the map of the spatio-temporal persistence in the previous version of the manuscript because this additional index is directly obtained as the product of two indexes, more meaningful in our opinion, which have been already shown in Fig. 5: uniformity, i.e., (spatial) persistency of the EEW, and duration, i.e., total time of occurrence of the EEW.
We recognise that this index should have been defined in Sect. 2.1.2 before its mention in Discussion, but we prefer to avoid it, to not weigh down the manuscript. Therefore, we would like to delete the sentence at lines 310-311.

– p12 l360 to 374 : Good idea!

Thank you for the comment.

– p12 l375 : "A critical parameter of our method is the choice of the local percentile threshold" - I agree looks like one of the key of the method. but why this choice of a simple percentile threshold, and not include the local annual cycle (maybe + a*STD) in the threshold (As i mentioned above depending what you want to analyse, it can be justified, it can be the right choice) ?

We agree that the choice of the threshold depends on the scientific question. Please see our reply to the Overall Comments.

– p13 l 197 : "Of the clusters with the highest content of all the indexes has been generally maintained both in case of higher and lower thresholds" - rephrasing : of the clusters with the highest index values,...,
Thank you. We will follow this suggestion in the reviewed version of the manuscript.

– p13 l396 : "A key issue" - not issue, it is one of the strength of this method, not issue i think, and from all what you could do in your study because of that.
We agree with your comment. We will rephrase “key issue”, by using:
key point

– p13 l400 : "The time series in the grid point" - rephrase : Each grid point’s time serie
We will rephrase it.

– p13 l400 : " allowed to maintain a definition of “extreme” relative to the local ecosystem properties." This i do not agree. in some places like the most oligotrophic regions, you probably find extremes, but in the bloom regions, it is not.
We do not agree with this observation. Also the time series recorded in points belonging to bloom regions (e.g. Gulf of Lion) can show an inter-annual variability such that the 99th percentile threshold is overcome only in some years, as shown in Fig. R1.2 in the first part of this reply.

–P23-Fig4–You talk about the MLD in the text,but you don’t show it on the plot. Of course, we can guess the Mixed layer is very deep where the NO3 is high and Chl low, but, it might be good to add iso-contour with depth values on the Chl plot for example. That would help both the writer and the reader. – very nice bloom in the Legurian sub- basin! You must have a very high res atm model with high freq coupling. you should add these details in the model description. It help understand the results.
In the reviewed version of the manuscript we will add further details related to the atmospheric forcing in the model description, at line 155:

The atmospheric fields used to force the simulation come from a 12 km horizontal resolution regional downscaling of ERA-Interim reanalysis (Llasses et al., 2016; Reale et al., 2017) and drive the simulation every 3 hours.,
thanks for the suggestion.
With regard to MLD, we have already plotted its time series in three points, internal, peripheral and external to the EEW in Appendix (Figs. A.2-A.4) to help the interpretation of the results.
We recognise that including MLD also in Fig. 4 can help the reader, but we are worried about the readability of the new resulting figure, since Fig. 4 is already full of detailed information. Thus, we propose to keep Fig.4 as it is now and to refer to Figs. A.2-A.4 for MLD evolution.

– P24 - Fig 5a – Difficult to interpret.... and the color-scale does not help. how many EEW occur per year ? how many on the hole period ? I don't understand what you mean here.
We recognise that Fig. 5a in the manuscript needs graphic improvement. It represents in each grid point the probability of occurrence of more than one EEW per year.
However, considering Reviewer#1's comment, we decided to modify it, by representing more simply the total number of EEWs in the period 1994-2012. Therefore, we propose to substitute Fig. 5a with the following (Fig. R1.3):

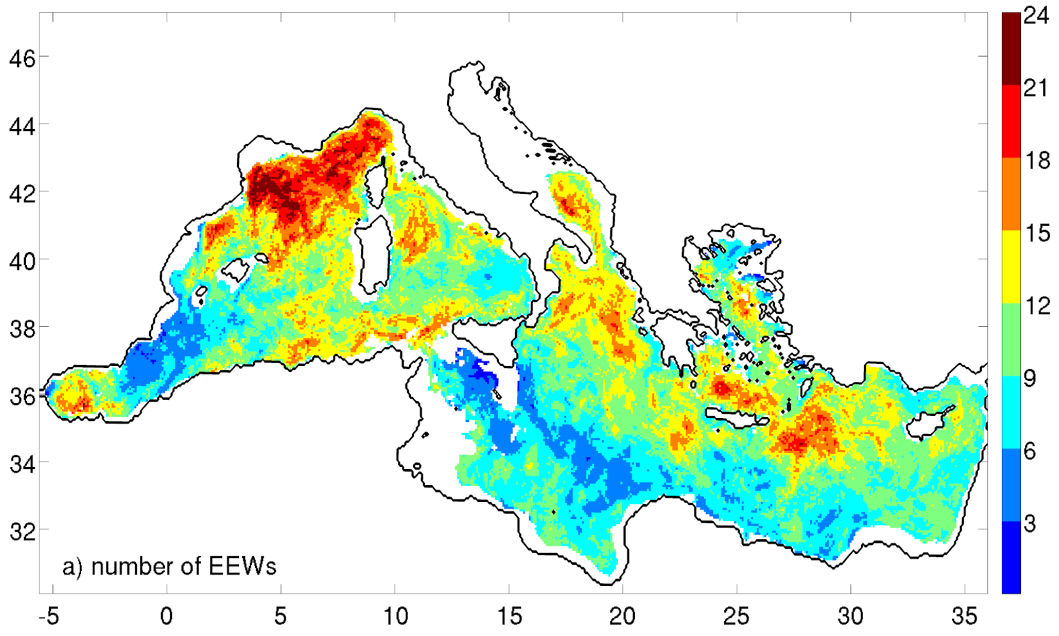

Fig. R1.3 - Proposed reviewed Fig. 5a.

and the first part of the Fig.5 caption accordingly:
Fig.5: Number of surface chlorophyll EEWs occurred in 1994-2012 (a) and means of the indexes of chlorophyll EEW occurred in the Mediterranean Sea in 1994-2012:...
Moreover, we propose to modify the text referred to Fig. 5a, in Sect. 3.2.1 at lines 224-227, as:
Figure 5 displays the total number of EEWs occurred in each Mediterranean point (Fig.5 a) and the mean values of the EEW indexes, computed as the mean of indexes of all the EEWs that involved that point (Figs. 5b-f). Since there are Mediterranean areas showing more than one EEW per year (as can be inferred from Fig. 5a), the initiation time in each grid point and year was associated to the most severe EEW of that year.
and in Discussion, at lines 313-314:
The initiation index was excluded from the computation since there are areas of the basin showing more than one EEW per year per grid point (Fig. 5a).

– P27 - Fig A.2, A.3, A.4 – I cannot do the difference between the climatological line end the 2005 one. Please, try with different dashed or doted line to find one that we really can see.

Thank you for your comment. We will improve the graphic quality of the Figs. A.2, A.3, A.4 in the new version of the manuscript, as reported here for the new Fig. A.2 (Fig. R1.4). The other figures will be modified accordingly.

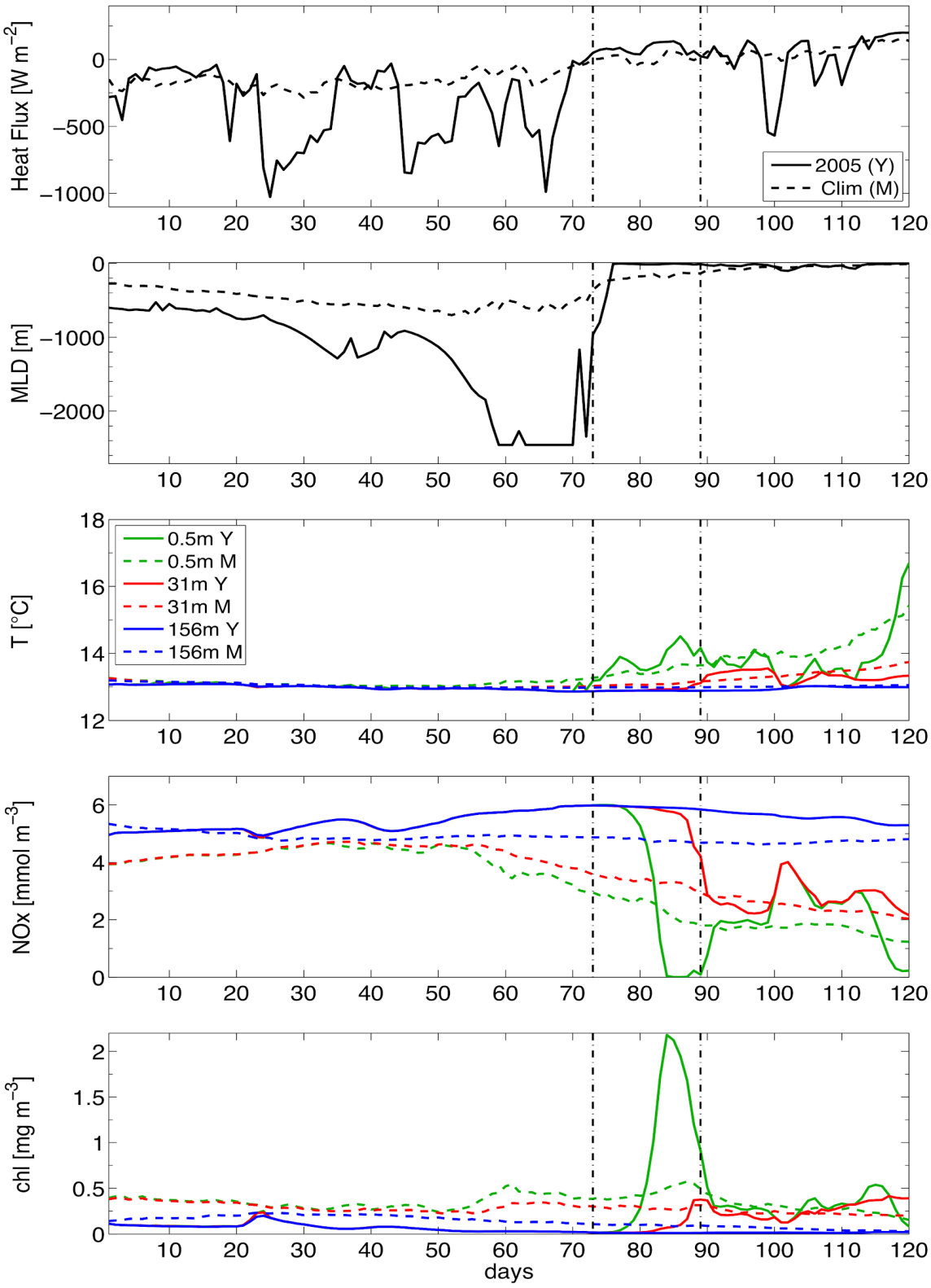

Fig. R1.4 - Proposed reviewed Fig. A.2.

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