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Interactive comment on "Characterisation of extreme events waves in marine ecosystems: the case of Mediterranean Sea" *by* Valeria Di Biagio et al.

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We thank Reviewer 1 for his/her insightful comments, which we will thoroughly take into account in our full revision. Here we would just like to briefly clarify some key aspects regarding the focus of the paper.

This study aims to propose a methodology for the analysis of "extreme event waves", defined as a set of "extreme events" which are contiguous in space and time.

To do this, we started from the statistical definition of "extreme event" in each and every point (x,y): at each point, an extreme event is an event that occurs very rarely (in our

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example less than 1% of the number of observations) and it is statistically defined as a value over a predefined percentile threshold (in our example arbitrarily chosen to 99th percentile), which is computed with reference to observations (time series) recorded at that specific point (i.e., the threshold is site specific, p99(x,y)). This definition can be applied to any time series, and also to deseasonalized time series, depending on the scientific question. If the methodology is applied to a variable which is driven by a strong seasonal signal, the extreme events might result more or less "regularly" distributed over the years, however they still are "rare events" (the top 1%).

Then, we introduced the concept of "wave" of extreme events, as a set of those extreme events which are connected in space and time. The paper focuses on the identification of these "extreme events waves" (EEWs) and on their characterization, by means of some novel indexes (e.g. duration, severity, anomaly). In particular, our method is able to distinguish between EEWs which occur regularly/irregularly over the years, by means of low/high values of our anomaly index, respectively. Moreover, our method distinguishes between EEWs which occur with high/low absolute values of the chosen variable, by means of high/low values of our severity index, respectively.

We selected the chlorophyll as the variable of application of the method. The time series of chlorophyll show impulsive dynamics, modulated in time (mainly by the seasonal cycle) and dependent on the location (i.e., geographical point). We observed that extreme events computed on the time series of chlorophyll occur quite regularly over the years in many points, but not everywhere: in northern Ionian Sea, for example, they occur only in some years. One of our indexes (i.e., anomaly) has been designed to track this feature in the EEWs. Indeed, the strong inter-annual variability in northern Ionian Sea is well detected by EEWs with high anomaly values. Moreover, the EEWs of chlorophyll are associated both with "blooms" (e.g. in the Gulf of Lion) and with chlorophyll values which are too low to be properly considered as "blooms" (e.g. in southern Levantine Sea). Our method is able to distinguish between these two cases, by means of high and low values of the severity index, respectively. However, we are

aware that our use of the term “bloom” was quite confusing and we will avoid it in the revised manuscript.

On the other hand, we will carefully revise the use of the “extreme” term in the text, to further clarify our terminology, by highlighting the points above.

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