

Dear Referee #2,

Thank you so much for reviewing our paper.

The manuscript will be, therefore, modified to consider your constructive comments. In the following, a point-by-point response to your comments will be presented.

Detailed comments:

page	Line/equation	comment	response
2	51	<p>1- You doubt that Boulonge-Sur-Mer and Calais belong to two different regions because they are so close together. However, is mere distance a good argument?</p> <p>2- The two locations face different seas. Calais is oriented to the North Sea, while Boulonge faces the Channel and perhaps even the Atlantic. So I do not see an a priory reason why they could not belong to different regions in terms of surge heights.</p>	<p>We agree with referee #2. This is a very interesting comment.</p> <p>Indeed, Calais is located on the Opal Coast, at the edge of the Pas de Calais which is at the limit between the English Channel and the North Sea, facing the English coast, while Boulogne is located on the edge of the English Channel, also facing the English coast.</p> <p>The climate comparison (url provided) from the website of Meteo France indicates that those 2 cities have the same climate.</p> <p>the text has been changed to take it into account (lines 54-58)</p> <p>" For instance, in the regions of interest obtained by Weiss et al. (2013), the two French sites, Boulogne-Sur-Mer and Calais are located in two different regions while they are geographically close with a distance of about 30 km. Indeed, despite the fact that the two sites face different seas (North sea and English chanel), they have the same climate (according to the Meteo-France's climate comparator). "</p>
3	<p>eq. (1)</p> <p>eq.(2)</p> <p>eq. (2)</p>	<p>- How are the intervals A and B defined?</p> <p>- Comparing with (1), shouldn't it read $X(t+h) > q_x$ and $Y(t) > q_y$?</p> <p>- Why is the upper bound of the summation in the nominator given by $D-h$?</p> <p>According to the explanation below the equation, D is the number of events, while h is a measure of time. $D-h$ then does not make much sense to me.</p> <p>In the denominator, the upper bound is N . How is N defined, and why are the upper bounds of summation different in nominator and denominator?</p>	<p>We agree with referee #2 A more clearer and straightforward explanation of the empirical extremogram is rather proposed. Intervals A and B and time lag h no longer appear in the equations.</p> <p>We agree with referee #2. D (Instead of $D-h$) and N are used now.</p>
2	101	I guess $I_f = I\{f\}$ to conform with the notation in eq. (2). Please clarify.	Yes. Clarified.

2	101	D is the number of events that “occurred at the same time” - I think it should be “that occurred within a time of h ” at the two sites.	That was right. But there is no longer time lag h in the equation
2	103	Why does the fact that $\rho \in (0,1]$ indicate a dependency between X and Y? What would ρ be in case of no dependency?	0 is a very small dependency and 1 is a very high dependency (site with itself). 2- In case of no dependency, ρ would be equal to 0.
3	eqs(1,2)	Please explain the the equations in more detail and make sure that the notation is consistent.	We agree with referee #2. The equations were modified and are clearer now.
2	104	Start a new paragraph before “Let ρ_0 be ...”	Done.
3	108	What do you mean by “confusion”?	Good point. The sentence is deleted.
3	133-138	Please give the definitions of H and D_c , perhaps in an appendix	Line 155: H is the heterogeneity indicator which is a measure of whether the dispersion between sites. Lines 156-158: The discordancy criterion D_c to ensure that any site is not significantly different, in terms of L-moments, from the other sites. Hosking and Wallis suggest that a site is discordant if $D_c < 3$.
4	141	“duration” - I guess you mean “length of time series”? I was confused because I associated duration with “duration of a storm”. This applies for the whole paragraph.	Yes it is. The term duration of observations is used instead.
sect. 2.3 – General		As far as I understand there are two issues: First, to define “Neighbourhood”, you need time series that overlap as much as possible. Second, to obtain as many independent events as possible, you would prefer nonoverlapping time series. The effective length of overlapping series is shorter than their sum because some events are “extreme” in both locations and thus not independent. You should clarify these concepts and perhaps show a figure as an example (appendix?).	Very interesting comment. This may seem paradoxical. So, on the one hand we use the dependency (when we need it), on the other hand we bypass it. And it works!
4	147	1- Define a symbol when you introduce it 2- But more important: What is ϕ ? If you say that it was shown that $\phi = \lambda_r / \lambda$, then you have to say first what ϕ stands for.	1- done 2- more explanation about ϕ is proposed.

	eq(3)	Try to interpret this equation. I cannot recover the results for the limiting cases “completely (in)dependent”.	We agree with referee #2. Equation 3 is better interpreted in section 2.3. The two limiting cases are then clearly recovered.
5	162	predicted tide - you mean astronomical tide? And please give a definition of SSS. Is it water level, residual surge, or skew surge, or something else?	Done.
5	167	How is “greatest majority” defined? Serious: I think “majority” suffices.	Right.
sect. 3.1		Again I would like to see a figure with an example.	A figure was added (fig. 1): An illustrative example on how the extremal dependency coefficient is empirically computed.
7	211	Throughout the paper you refer a lot to Weiss (2014c), sometimes saying “confirming Weiss”, sometime saying “different from Weiss”. I have the impression (but I may be wrong) that one of the goals of the paper is to improve upon the results of Weiss. If so, you should clearly state this at the beginning of the paper and explain how Weiss did his analysis, what he found, and what the present paper is improving.	Even Weiss’ work is interesting, we still try to improve the methodology of constructing the homogeneous region (to be used in a regional frequency analysis). We added the following sentence in the introduction section (begining of §3) to clearly state that: "To address this limitation (the border-effect problem) and to form a physically homogeneous region centered on a target site, ..."
7	221	Duration → length of record	OK. The term duration of observations is used instead.
7-8	210-254	Figure 6 → Figure 4 (everywhere)	OK.
8	258	add the station number (5) to the name. That makes it easier to fin the station on the maps (also for other stations when they are mentioned)	Done.
8	271	Imply → implies	OK.
8	272	Duration → length (?)	OK. The term duration of observations is used instead.
8	275	Show → shown	OK.
9	280	Law → distribution	OK.
9	282-283	Define/explain Exp_{sin} and $Gpd_{cos sin}$.	the reader is referred to Weiss (2014c) for definition/explanation of these frequency models
9	292	Formulation: The same conclusion is not the same - sounds strange	OK.
9	300	Why interesting?	replaced by: " ... to a certain geographical consistency"
9	304	Again, which finding is interesting, and why?	particularly interesting for us because: - they are no longer close to the limit of a region and - since they can be representative sites for the Gravelines nuclear power plant in France.

			added in the text
9	306-308	See my remark about referring to Weiss above. - Why is the finding that regions 1 and 2 are statistically homogeneous, a progress?	What is new here is that the regions of interest are statistically homogeneous and centered on target sites. Made clearer in the paper.
10	312	Consider → considered	OK.
10	313	Take → taken; remove → removing	OK.
10	313	removing a site - the criterion should be the Dc-value, shouldn't it?	Yes, as well. you are right.
10	314-315	please show Dieppe - otherwise the remark cannot be understood	Sentence deleted.
10	315	not centered enough on the target site - what do you mean?	the sentence was deleted.
10	326	Duration → length	OK. The term duration of observations is used instead.
Fig. 2		Why do you reproduce a figure from Weiss? See my remark above.	We reproduce the results obtained by Weiss because it makes things easier to show the border effect in his results and it is easier for us explain things with a supporting graphic.
Fig. 3		The black background makes the figure hard to read. Try a background that gives a higher contrast to the other elements (bars, red line, numbers) in the plot.	OK.
Fig. 3		Give value for red line - 0:3, I guess.	OK.
Fig. 3		Units for the y-axis (Regional surge)?	OK.
Fig. 3		GPDcos _{sin} → Gpdcos sin; similarly for Exp _{sin}	OK.
Fig. 3		70% = dashed line, 95% = dotted line.	OK.