Reviewer Comments

The paper “On the calculus of smoothing kernels for seismic parameter spatial mapping: methodology and examples” by Montiel-López et al. presents a new method for the selection of smoothing kernels, based on the inter-event distance distribution between successive earthquakes, for the spatial mapping of seismic b-values. The adequate mapping of b-values in seismically active regions and their variations in time and space can contribute deciphering the state of stress and making inferences regarding seismic hazard. The main aim of the paper is to contribute to this field and clearly falls within the scope of Natural Hazards and Earth System Sciences. The paper introduces the topic in a consistent way, is generally well-written and structured, but there are some points that seem rather vague and require further clarification (see comments below). Therefore, I recommend revisions for the paper before it can be further considered for publication.

1) Inter-event distance is usually a term describing the distance between successive earthquakes. In the paper, it seems that this term is used to describe the distance between each event and all the other events in the catalogue. This point needs some further clarification in the part where Equation 2 is given. Apparently, only the coordinates of the epicenters are used to estimate inter-event distances. Is there a reason why depths are not used in the calculations? Please explain.

2) How exactly the weight function (Equation 3) works in the calculations? The authors cite the paper of Taroni and Akinci (2021), but some further clarifications and examples are needed to inform the reader how the weight function affects the b-value estimations.

3) Provide some more information regarding the Italian seismic catalogue (source etc.).

4) In Figure 3, the inter-event distance histograms are shown for different time periods. How were these time periods chosen by the authors? For instance, we see a 50-years interval followed by a 4-years and 1-year interval.

5) The authors consider two functions, the Gaussian and exponential functions, to obtain the smoothing kernel. However, power-law functions (e.g., Abe and Suzuki, 2003 and Corral, 2006) have also been considered in the literature, with their significance on the spatial clustering of earthquakes. Did the authors check the adequacy of such functions? A histogram in log-log axes will assist to show if power-law regimes exist.

6) In line 181, the authors say, “For this function to be fitted, the count distribution has been normalized”. How exactly it is normalized?

7) With which method exactly are the b-values and their uncertainties calculated?

8) Is the difference between the b-value spatial distribution for Italy obtained in this work (Figure 6) within the confidence limits with that of Taroni et al.? The authors provide only the percentage change.

9) For the Lorca case, are the coordinates in Figure 7 and 9 the same? In the first figure we see positive values and in the second negative values for Longitude. In addition, the authors say that they selected the events at 40 km radius circumference centered at Lorca's earthquake epicenter. However, in Figure 7 we only see a fraction in a much smaller area. The text and the figures should be consistent.

10) Why do the authors show the 1579 – 2021 seismicity in Figure 7 after all? Only 2000 – 2021 seismicity is studied.

11) Why is year 2011 excluded from the analysis for the Lorca case?

12) In the caption of Figure 11 in c), what is "down" stands for?

13) In Line 210, the 0 – 100 km distance range is mentioned, but the radius for the seismicity selection is 40 km. Please be precise.

14) In Line 214 correct date with data.

15) The use of the words "in each spatial cell" in the caption of Figure 9 adds some confusion. Do the authors mean the total number of events used in the analysis?

16) In Line 230, the authors say, "Taking into consideration that the region has suffered three earthquakes with Mw 5.5 in the last decade, then we have chosen the events from 2016 to 2020 in the Vrancea region." This sentence does not make much sense and the selection is not justified. Probably the sentence needs rephrasing.

17) Add the b-values in Figure 11 or discuss them in the text. Why not similar plots are shown for the Lorca case, or the G-R fitting for the Italian catalogue?

18) Again, the authors exclude year 2016 for Vrancea. Is this a form of "manual declustering" excluding major aftershock sequences?

19) Rephrase the sentence "Both b-value maps (with the different kernels) depict an increase of the b-value in zone where the the earthquake of 2016 (Figure 13c and Figure 14c) which could indicate tectonic stress relief and a slight b-value decrease towards the SW part of the area." I am not sure if I can see this b-value increase. The figures that are mentioned show the 2018 epicenter, while Fig.13a that shows the 2016 event, this increase is not clear.

20) Rephrase the sentence "which in also retrieves the smoothing parameters for it."