Natural Hazards
and Earth System
Sciences

Discussions

# Interactive comment on "Wide sensitive area of small foreshocks" *by* Chieh-Hung Chen et al.

**Anonymous Referee #1**

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The authors of the submitted research analyse with mathematical/statistical tools published seismic event catalogues from areas of high seismicity (Taiwan and Japan) in an attempt to identify patterns in the distribution on time and space of foreshocks of larger events. The presented results point to a distribution much wider of the foreshocks in time (up to 60 days) and space (up to 400 km of the main shock epicentre) of those currently accepted, even for main shocks of moderate magnitude. Such kind of analysis is promising; but I think as performed and presented in the submitted research is not yet ready for publication.

To me, it looks like the pieces of the submitted paper have been assembled in a hurry. The used methodologies need more explanation (why and how they are applied). Even more comments on the choice of the data are also needed. Moreover, a revision of the English syntax is needed. The sense of phrases is difficult to follow in many cases.

For these reasons I think the submitted research needs a deep and throughout revision before it can be accepted for publication.

In the following paragraphs I point some specific questions to be addressed on the submitted text.

-Methodology- Line 85. Citation Chen (2014) is not in the reference list. Lines 87-89. It is necessary to introduce a minimum description on how ZMAP software removes aftershocks. Lines 89-95. Idem: a minimum description on how clusters are classified and the meaning of the input parameters is necessary. Line 95. "The 10 of crack radii. . ." Do you mean 10 times the crack radii? Please, make clear this phrase. Line 96. Cite Stiphout (2012) is missing in the reference list. Lines 99-102. If I understand properly "crack" and "break" events are definitions you introduced in your analysis, being "crack events" quite equivalent to foreshocks and aftershocks. Please, make clear all these terms. Lines 102-104. There is some problem with the minimum completeness magnitude of the catalogues. Looking at figures S1-S4 it looks like the events in the Taiwan catalogue are included in the Japanese catalogue. Something should be said about this fact. Moreover, the Japanese catalogue comprises many events far away from the main islands (23-34N, 138-147E). I think this whole region does not have the dense seismometer network claimed in lines 83-85. All these points should be clarified in the text. Lines 109-110. I assume the spatial and temporal resolutions of the grid are a choice of the authors. If so you may comment if you try other resolutions and/or the reasons for your choice. Lines 113-116. The superimposition process statistical tool should be described. It is not a common tool in seismicity studies. Lines 118-121. It is not clear to me what "migrate rare characteristics" means. Please clarify this phrase.

-Analytical Results- Lines 130-132. All M2 events are foreshocks or aftershock of M3 events? Cannot they be independent events? Lines 132-134. What does it means that S/N ratio increases 135 times? Please clarify. Another issue: 17993 M3 events in the period 1991-2017/6 mean 2 events per day roughly. As Taiwan is 400 km long approx., it means that in a period of 60 days and 400 km as you are using in your analysis

there are many M3 earthquakes (100 approx.). It is not clear to me how the M2 events are associated with the M3 events. Maybe a good description of the superimposition process as applied in this case clarifies this issue. Lines 145-164. The previous pointed issues make difficult to follow the discussion on the results.

-Discussion- In fact this section presents a different analysis, using seismograms and the PCA method. Certainly, the presented analysis has been inspired by the results obtained in the previous section; but it can be performed and presented in a totally independent form. Thus, it should be better presented as another section of analysis results. It is not clear how you are using the PCA analysis in this case. Some figure showing an example of the procedure described on lines 217-222 can help. Lines 237-246. There are a lot of suppositions on the used dimensions. If horizontal dimensions (100 x 100 km2) can be roughly deduced/assumed from the previous results (obtained in this section and the previous one), the thickness between 500-1000 m needs a good explanation. Lines 275-276. I cannot see the need for this citation here. Even more, I has been unable to find the value 2700 km/m3 in the cited paper or on the additional information.

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