

Interactive comment on “Correlation between the fractal of aftershock spatial distribution and active fault on Sumatra” by Bahary Setyawan and Benyamin Sapiie

Anonymous Referee #2

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This paper analyses the aftershock spatial distribution of 15 mainshocks, and the corresponding originating faults, in the Sumatra region, in terms of their correlation dimension and box-counting dimension, respectively. Then the authors find three classes of correlation (plus two cases of outliers). The ambitious intention of the authors is from this analysis to understand something about the earthquake mechanism produced by the corresponding fault system.

My surprise is the naïve application of the fractal methods to the available data. I am sorry to say, that the authors ignore most of the literature on the critical topics, and all related pitfalls occurring when applying blindly the fractal methods (in this case,

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correlation dimension and box-counting). About this aspect, I would like to mention, just to remind one of the most important, Thelier (1990), from which it is clear that in the present paper there are many problems, for which I list only the main ones:

1. Too few data (especially in the aftershock spatial distribution)
2. Too small estimation of errors, because simply deduced from the linear regression in the log-log plot. If we estimate a more realistic error with an average of around three times that given, it is evident that many estimations can be considered almost the same within the (new) given error, so vanishing any possible inter-correlation and/or classification.
3. The two methods tend to behave differently within the range of the fractal dimension variation: for example the box-counting often tends to saturate when increasing the fractal dimension providing an under-estimation (please also look at Liang et al. 2012).

In addition to the above points that concern the way the methods are applied, I would like to add that there is some confusion when introducing some concepts like fractals, SOC and critical point, without state the most important differences among them.

Among the minor points, I do not understand the units of figure 2 (by the way, there is $\log r_0$ at the x-axis that I do not understand, too), that, strange enough, is given as example, but it is one of the two outliers of the overall analysis.

The last but not the least, the level of written English, which is very poor and plenty of refuses.

Therefore, I am sorry to say that my personal opinion is to reject the paper in the present form.

References

Liang et al., Comparison of fractal dimension calculation methods for channel bed profiles, *Procedia Engineering*, 28, 252-257, 2012.

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Theiler J. , Estimating fractal dimension, J. Opt. Soc. Am. A, 7, 6, 1055-1073, 1990.

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