

Interactive comment on “Critical behavior in earthquake energy dissipation” by J. Wanliss et al.

Anonymous Referee #1

Received and published: 28 April 2015

1) the chosen earthquake catalog is processed without any preliminary completeness analysis. The minimum magnitude is said to be 1.6, but there is no proof that it is complete down to that magnitude. Such an effect can be easily seen on their Figure 1, where we clearly see a change of the minimum of the signal after January 2003, betraying the change of completeness and/or detection ability with time. 2) the 3D spatial window reaches a depth of 700km. This means that they mix events occurring within media with very different physical properties and boundary conditions (superficial events and deep-focus events). 3) bursts are defined naively using a simple filtering of the time series of released seismic energy. The whole preprocessing step is a bit unclear, but the signal is eventually filtered using a square window of length 1 week, which should thus filter out any fluctuation of length < 1 week. The surprise is that they then observe scaling laws which hold at scale lengths < 3.5 days. This makes me believe that they mainly measure effects of the filter on the data, and not data properties.

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4) even if some true signal is captured by their analysis, there is no proof that this discovery has to be considered as new. For example, the authors should perform an ETAS simulation to check if they find the same features on synthetic catalogs. If they do, this signifies that they just measure usual properties of the clustering of events which, in their case, would be totally predictable from the Omori and Gutenberg-Richter laws. 5) globally, the paper is not very clear, and the authors often reach conclusion which are not argued enough, like "our evidence points to the idea that earthquake radiated energy comes from a geophysical mechanism that connects a one-dimensional mass and/or energy transport realized in a medium of two-dimensions.", or "This suggests that both small- and large-scale ABs can be a indicator of emergent behavior allied with intensive cross-scale coupling of multiple intrinsic dissipation mechanisms." I understand the latter as "This suggests ABs as the signature of self-criticality" - so there is no need to use such terminology to express such a simple idea. 6) we don't really get what they want to demonstrate by their example on Fractional Brownian Motion on page 632. 7) I have a doubt about the variable 'tau' which is defined on page 624. It is first defined as the inter-avalanche time (line 6). On line 10 it seems to be the duration of an avalanche ('surviving time'). Maybe more care should be taken to define all variables and definitions at that stage. Moreover, the authors claim that details can be found in Munoz et al. (2001) but I've been unable to locate them in the cited paper (ArXiv version).

Interactive comment on Nonlin. Processes Geophys. Discuss., 2, 619, 2015.

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