Nonlinear Processes
in Geophysics
Discussions

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Interactive comment on "Critical behavior in earthquake energy dissipation" *by* J. Wanliss et al.

Anonymous Referee #1

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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.

4) even if some true signal is captured by their analysis, there is no proof that this dis-
covery 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 argumented 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 un-
derstand 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).

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