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Discussions

Interactive comment on "A Taylor's power law in the Wenchuan earthquake sequence with fluctuation scaling" *by* Peijian Shi et al.

Peijian Shi et al.

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We thank the reviewers for their comments. Answers are given below in red. Changes in the revised version of the paper are also in red.

Anonymous Referee #1 Interactive comment on "A Taylor's power law in the Wenchuan earthquake sequence with fluctuation scaling" by Peijian Shi et al. Received and published: 26 December 2018

Ms. No.: nhess-2018-315 Title: A Taylor's power law in the Wenchuan earthquake sequence with fluctuation scaling General: This manuscript applied Taylor's power law (TPL) into the released energy of earthquakes in the Wenchuan aftershocks. It confirms the existence of TPL in earthquake sequence, i.e. the variance is shown as a

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Discussion paper

power law function of the mean. TPL holds for different time spans, although the intercept values of the linear regressions increase with the increase of time spans. I think this is a good paper that is well written and scientifically interesting. I applaud the general approach and central research question of the paper. I did not find any major problem. Here I listed my suggestions which may help in improving the manuscript.

1. I suggested incorporating section '2 Taylor's power law' into 'Introduction', and adding a new section 'Data source and processing method' (or similar subhead) which includes section '1 Wenchuan earthquake sequence' and part of section '3 Data processing method and results'. Finally I would expect four sections in the main text: 'Introduction', 'Data source and processing method', 'Results', and 'Discussion and conclusions'. It is done as the reviewer has suggested but with a little difference. Changed Sections are in red in the revised version of the paper.

2. I think lines 181-182 can be deleted as they are duplicated with lines 178-179. It is done.

3. It is not clear for me why the authors placed Figures 5 and 6 into Discussion but not Results. Would it be better to move them into Results? We have put Figures 5 and Figure 6 and corresponding words into Section results. We also add some words in red into the revised version of the paper.

4. It is interesting that the authors showed the positive relationship between the intercept and the interval (Figure 6). Inspired by them, I drew the relationship between the slope and the interval (see attached figure, panel a). Furthermore, the interval shows strong negative relationship with the slope (panel b). This is interesting and I have no idea to explain them. I understand this may be out of the scope of the current manuscript, so the authors do not need to discuss them here. This may be helpful in their future work. We thank the reviewer for the interesting work and figures! Yes, it is important to do further investigation on this topic in the near future.

Anonymous Referee #2

A Taylor's power law in the Wenchuan earthquake sequence with fluctuation scaling by Peijian Shi et al. The authors explore Taylor's power law (TPL) of the released energy of Wenchuan earthquakes sequence on varying timescales. In my opinion the paper is interesting and well written. Here there are a couple of major comments: - The authors show that the exponent of the TPL is a value independent of timescale equal or almost equal to 2. Why does it happen? The authors mention some general explanations, some of them related to Ecology, but none of them is focused on the released energy of earthquakes along time. In other works, my question is, for what physical reason would the exponent of the TPL be equal to 2? Considering the previous investigations, we think the physical reason of the slope b=2 in TPL during our work is that, after the main shock, there is a stable spatial–temporal dependent energy release caused by regional stress adjustment and redistribution during the fault revolution after the main shock. The related words are also added to the revised paper in red.

- Note that using the logarithm to model the intercept as a function of the temporal block size A, the overall formula of the TPL remains, V = kA$\beta\mu$b This is an interesting expression that would deserve more attention in the paper. In particular, the exponent of A (it is around 0.2) is an interesting parameter that should be highlighted and discussed in the paper. We have added something respectively to Section results and discussion in red.

Minor comments - Lines 20-22: "On the other hand. . .approximately definite and deterministic". This paragraph is not clear, what does it mean? - I realize that the authors are using along the paper logarithms with base 10, it should be mentioned. Moreover, notation "lg" for logarithms is not standard and it would be better changed to "log" along the paper. We have changed "lg" into "log10" in revised paper.

- Usually, when the mean is denoted with the Greek letter μ the variance is denoted as σ2. We have changed "V" into "σ2 " in revised paper.

- Lines 296-298: "The variations of the estimated exponent b. . . are shown in Figure

6". Something is wrong here because Figure 6 shows the variation of the estimated intercept. Yes and the reviewer is right. We have changed the sentence "The variations of the estimated exponent b of the Wenchuan sequence... are shown in Figure 6" into "The variations of the estimated intercept of the Wenchuan sequence... are shown in Figure 6".

Please also note the supplement to this comment:
https://www.nat-hazards-earth-syst-sci-discuss.net/nhess-2018-315/nhess-2018-315-AC4-supplement.pdf

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