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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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Anonymous Referee #3 Received and published: 14 February 2019 Earthquake forecasting is very important but challenging. Due to the inherent randomness and complexity of rupture process, the forecast can only be made in probabilistic manners rather than in the form of deterministic predictions. Therefore, statistical methods play an important role in earthquake forecasting and hazard assessment. Taylor's power law (TPL) has been widely testified across space and time in biomedical sciences, botany, ecology and many other fields. The current manuscript shows its application in the study of Wenchuan earthquake sequence. The results suggest that the mean–variance relationship of the energy release from the earthquakes could be predicted and the exponent of TPL are approximately 2. The manuscript is well organized. The discussion

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Discussion paper

is thorough and the methods are solid. I recommend that the manuscript could be considered for publication after replying the following questions. 1. What is the minimum magnitude of completeness in the catalog? Will the missing events affect your results (such as the exponent in TPL)? The catalog of the Wenchuan earthquake sequence includes all events with the magnitude M > 0, which has been labeled in red in the paper. The missing events can lead to the exponent in TPL increase, for example, the estimated exponent b $\sim$ 2.1–2.2 when the magnitude of the events used is with M > 1.0. We also added some words to the revised paper in red.

2. Line 336, you mentioned about space and time, but you only showed results for different temporal blocks. May you need to give some results using different spatial blocks (divide the study region in Fig.3a into several sub-regions) In fact, the aftershock area is changing as the time span changes during our calculations because different events occurred in different locations. As for dividing the total aftershock area into several sub-regions, it will be our consideration in near future because we now find not enough evidence on how to divide this region. This problem is also mentioned in Section discussion and conclusions of the paper in red.

3. How would you results benefit earthquake forecasting? You may need to reference the following two papers, which are important pioneer work about scaling law for earthquakes. 1. Unified Scaling Law for Earthquakes, P H Y S I C A L R E V I E W L E T T E R S, 2002; 2. Unified scaling law for earthquakes, PNAS, 2002 We thank the reviewer for the interesting problem and valuable references! Earthquake forecasting is a complex problem and it depends on many factors. We do not explicitly discuss this problem in the paper although our results show some law of energy release during the Wenchuan earthquake sequence. But we tend to think that most of statistical results may finally attribute to physical mechanism of earthquakes, for example, nonzero driving force in the crust of the Earth as mentioned in references listed above or regional stress adjustment and redistribution we have mentioned in the paper. Of course, we also cite some results attained by Bak et al. (2002) and

Christensen et al. (2002) and add the references into the reference list of revised paper.

Please also note the supplement to this comment:
https://www.nat-hazards-earth-syst-sci-discuss.net/nhess-2018-315/nhess-2018-315-AC5-supplement.pdf

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