Nonlinear Processes
in Geophysics

Discussions

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comment

Interactive comment on "Magnitude correlations in a self-similar aftershock rates model of seismicity" *by* Andres F. Zambrano Moreno and Jörn Davidsen

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ROBERT SHCHERBAKOV COMMENTS
RC: referee's comment, AC: authors' reply to comment

RC1: "I think the authors should mention and cite two references, where the scaling for aftershock rates was recognised earlier than what is given in Davidsen and Baiesi (2016). Specifically this was done in the following works:

1. R. Shcherbakov, D.L. Turcotte, and J.B. Rundle, "A generalized Omori's law for earthquake aftershock decay", Geophys. Res. Lett., 31 (2004) L11613, doi:10.1029/2004GL019808.

2. R. Shcherbakov, D.L. Turcotte, and J.B. Rundle, "Complexity and Earthquakes" in Treatise on Geophysics, 2nd ed., Vol. 4, Ch. 24, ed. H. Kanamori, Elsevier, 2015, doi:10.1016/B978-0-444-53802-4.00094-4."

AC1: Both references have been added to the revised manuscript. The first one is referenced after Eq.(7) and the second reference was added after Eq.(3).

RC2: "- Page 5. Lines 30-35. I think the reference to the Southern California catalogue to explain the absence of correlations in synthetic data is not clear. The synthetic catalogue should not be affected by the incompleteness issue assuming that the simulations were performed properly. So this indicates that correlations diminish with increasing lower magnitude cutoff m_{th}. Any explanation for this effect?"

AC2: We believe that this refers to our discussion of Fig. 3 (page 7-8, section 3.2). There the absence of significant correlations for large m_{th} is simply a consequence of a lack of statistics (given the finite duration of the catalog). This was stated at the end of page 8. Please note that the synthetic catalogs do not suffer from incompleteness.

RC3: "- Page 4 Lines 15-24. What are the β and β_{as} values used in the simulations to generate the synthetic earthquake catalogue?"

AC3: They are $\beta = 2.49$ and $\beta_{as} = 2.07$. The corresponding values for b and b_{as} are now explicitly given in section 2.1.

RC4: "How the difference between these two values" — β_{as} and β — "affects the "trivial correlations" between magnitudes?"

AC4: Varying the values of b and b_{as} over relevant ranges ($0.5 - 1.6$), where we also allow variations in z and g individually, does not change our findings qualitatively. The larger the difference between β and β_{as}, the more pronounced the trivial correlations become. At the same time the non-trivial correlations remain largely unaltered. We have added a corresponding discussion to the end of section 3.