

Interactive comment on “Conditions for the occurrence of seismic sequences in a fault system” by Michele Dragoni and Emanuele Lorenzano

Anonymous Referee #1

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This work is interesting and potentially significant; however, that significance is not clear in the current version.

More details on the data and seismic sequence are required, particularly the 2012 Emilia sequence. This should include details on data source, plots of historic time series and, again, the Emilia sequence in particular. I suggest a map showing the location of the events and the associated fault network, where available.

Seven is a lot of assumptions or constraints. In particular, assumption 6 concerns me. How do we know that the sequence time is short versus interevent time? Again, more details on the sequence time series would help to inform that question. It also is necessary to expand on all assumptions, particularly 4, 5 and 6.

The abstract is unclear and does not preface the work properly - it favors details without sufficient motivation or background to place the research in context, particularly for the uninitiated.

My biggest reservation is the significance of the work and what is innovative or new here. Based on the substantial body of work in this area, the results here are not particularly surprising - what is new and significant in this work is not clear from the results or conclusions. We would expect, for example, for the sequence to change in time as a result of the Coulomb interactions. Part of the problem is the large volume of research in this area. The original work of Stein and King has expanded (Toda, Jaume, Sykes and others) and evolved to study many different cases. In particular, many researchers have studied CFF interactions in network fault systems, many that include realistic geometry and often are more complicated. For example, Rundle and others have studied Virtual California for many years (references 1988 through the present), a simplified CA fault model that produces complex seismic time histories based on CFF interactions, Steacey, referenced in this paper, is only one of a number of researchers that have looked at Coulomb stress interactions in detail. Others have added other features and phenomena (Ben-Zion, Dieterich, Main, among others). Simple models with CFF are less common but there is still a substantial body of work, including CA models. Placing this research in context would help, but is not sufficient. The authors need to revise the text, particularly the results and conclusions, to make it clear what is new and innovative and/or interesting and significant about this research.

Minor revisions: The paper is missing many references. For example, on p. 2 (~line 5), the authors state 'Fault interaction and its role in earthquake triggering have been widely studied (e.g. Steacy et al., 2005).' Fault interaction and triggering have been researched for decades and a large volume of literature accompanies that work. Although it is not appropriate to list them all, the salient work should be cited. Or, on p. 4, the double-couple point source is discussed and should be referenced. The manuscript should be rewritten with this in mind.

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The figures are not detailed well enough, and their motivation or use is not clear; this applies, in particular, to Figure 2.

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