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Discussions

Interactive comment on "Measuring the seismic risk along the Nazca-Southamerican subduction front: Shannon entropy and mutability" *by* Eugenio E. Vogel et al.

Anonymous Referee #2

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The manuscript studies the evolution of seismicity in four different regions of the Nazca plate. In my opinion the main result is the very slow recovery time exhibited by the mutability after the largest mainshock, with significant differences in its specific value observed in the three different regions. This result can be very interesting but, unfortunately, I am not able to appreciate it, in the present form.

My main problem is the understanding of the meaning of the mutability. My first suggestion is to give a more detailed definition of μ with also some practical example of how to measure it. My second suggestion is to study this quantity for a synthetic catalog. More precisely, the main statistical features of aftershock clustering is cap-

tured by the ETAS model (see for instance de Arcangelis et al., Phys. Rep. 2016 and references therein). The ETAS model has only one characteristic time scale which is the occurrence rate of independent mainshocks and therefore it is very reasonable to explore if the slow recovery time is also found in synthetic catalogs. In the case of a positive answer its specific value must be related to the mainshock occurrence rate. More interestingly would be the case of a negative answer, which suggests some feature not captured by the ETAS model, like incompleteness (de Arcangelis et al., Journ. Geophys. Res., 2018), magnitude correlations (Lippiello et al., Phys. Rev. Lett. 2007), foreshocks (Lippiello et al., Entropy, 2019) ....

Minor points

- Figure 3 is missing; - In general I suggest the use of a semi-log scale in Fig.s 2,7,8. In particular it would be interesting to check if the relaxation to the background level of μ (Fig.8) is also compatible with the power law decay reminiscent of the Omori law; - For Fig.4-6 I don't find any particular useful information in plotting the quantities as function of both t_i and i. I suggest to chose just one of the two panels and to plot in the same figure the results for the four regions; - The open star is not easily found in Fig.4 and Fig.6, i suggest to use a different symbol. The open star should also be not present in Fig.5. Please, correct the caption; - Is it possible to motivate the choice for $m=50$ in the definition of C and, more importantly, for $\ni=24$ in the definition of entropy and mutability? In particular, I find important to discuss, and eventually show, how results are affected by the precise value of $\ni$. - The interval distribution plotted in Fig.2 is more commonly defined as intertime or inter-event time distribution. I suggest to rescale the horizontal axis in Fig.2 by the average occurrence rate of each region. This should allows to stress deviation from the universal scaling behaviors (see Lippiello et al., Phys. Rev. E, 2012); - I believe that it is difficult to extrapolate the the stationary value of the mutability from the best fit of Eq.6 since it appears that μ is not yet relaxed to its stationary value. I suggest to also evaluate the average value of μ before the mainshock occurrence. - I also suggest to consider the connected

correlation function, by subtracting the average value $<H><\mu>$.

C3