Referee's report on the manuscript nhess-2024-106

In this manuscript (ms) the authors use the Tsallis entropy and the mutability on seismic data from Alaska for understanding the seismicity in subduction zones. This work is interesting and within the scope of the journal. However, before its publication, the authors should consider the following improvements:

In Line 48, the authors write `` We include an Appendix …''. The appendix is missing from the ms.

Line 54, it is written `` … and −161.0∘…''. The limits for longitude should be written as for latitude.

Figure 2 should be improved to show the fitting of the data. The a and b values should also be given in the text.

In Line 72 Fig. 4 is mentioned. However, Fig. 3 is not yet discussed in the text. The authors should interchange the position of these figures.

In Line 84 `` mobile'' should be change to ``moving'' throughout the ms.

Say something about wlzip on line 111. Besides the authors refer to Pasten et al., 2023 for the technical details on the mutability, definitely a short description of this method in Subsubsection 2.2.1 will help the reader.

Studies for the seismicity of California and Japan by means of non-extensive statistical mechanisms have been published earlier by N.V. Sarlis, E.S. Skordas and P.A. Varotsos, Nonextensivity and natural time: The case of seismicity, *Phys. Rev. E* **82**, 021110 (2010). http://dx.doi.org/10.1103/PhysRevE.82.021110 .This paper is not mentioned in the first paragraph of page 8 lines138-147. The authors should also comment on the results of this paper for the sake of the reader's better information.

In the Section "Results and Discussion" in the Subsection 3.1 entitled "Tsallis Entropy", for the sake of the readers completeness of information the authors should discuss their results with respect to the very recent application of Tsallis entropy for improving the estimation of the occurrence time of an impending major earthquake (see the following two references):

P.A. Varotsos et al., Natural time analysis together with non-extensive statistical mechanics shorten the time window of the impending 2011 Tohoku M9 earthquake in Japan, Communications in Nonlinear Science and Numerical Simulation, 125 (2023) 107370. doi:10.1016/j.cnsns.2023.107370

P.A. Varotsos et al., Improving the Estimation of the Occurrence Time of an Impending Major Earthquake Using the Entropy Change of Seismicity in Natural Time Analysis. Geosciences, 13 (2023) 222. doi:10.3390/ geosciences13080222

In line 147 the authors should also refer to the very recent work of Flores-Márquez, E.L.;Ramírez-Rojas, A.; Sigalotti, L.D.G. Non-Extensive Statistical Analysis of Seismicity on the West Coastline of Mexico. Fractal Fract. 2024, 8, 306. https://doi.org/10.3390/fractalfract8060306 , along with some discussion since they also calculate q-values for the seismicity on various regions of the West Coastline of Mexico.

In view of the above, I will be glad to suggest publication of an appropriately revised manuscript.