**Natural Hazards
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Discussions

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Interactive comment on "Deep Learning of Aftershock Hysteresis Effect Based on Elastic Dislocation Theory" *by* Jin Chen et al.

Anonymous Referee #1

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The manuscript attempts to model the relationship between the elastic stress tensor components and the aftershock state at multiple time scales using fault source models of typical earthquakes across the globe. In addition, the aftershock hysteresis effect of the Wenchuan and Tohoku earthquakes is analyzed. The subject of deep learning is of interest for the Scientific Community and the work is worth being published. It is a well-written manuscript. However, certain necessary citations are missing and must be added to the manuscript, as indicated below in the detailed comments. In addition, there is a whole paragraph devoted to FCNN (also included in the Key Words), but the Acronym FCNN is not explained. What is it? I guess NN means neural network, but it is only a guess. The same problem stands for DNN, mentioned in Figure 1 and with ROC. What is DNN, what is ROC? All acronyms must be explained. This is self-evident. The

use of the English language is satisfactory, but several corrections are indicated in the attached pdf file.

Thus, the manuscript can be considered for publication in Natural Hazards and Earth System Sciences after minor to moderate revisions.

Detailed comments, corrections and additions are included, mainly as sticky notes, in the pdf file: nhess-2020-161-manuscript-version3_reviewer_1.pdf

Some of the main comments (also included in the .pdf file) are: 1. Page 2, Line 56: Add the references Kapetanidis et al. (2015) and Papadimitriou et al. (2018) regarding the spatial and temporal evolution of earthquake sequences: V. Kapetanidis, A. Deschamps, P. Papadimitriou, E. Matrullo, A. Karakonstantis, G. Bozionelos, G. Kaviris, A. Serpetsidaki, H. Lyon-Caen, N. Voulgaris, P. Bernard, E. Sokos and K. Makropoulos, 2015. The 2013 earthquake swarm in Helike, Greece: Seismic activity at the root of old normal faults. Geophys. Journ. Int., 202, 2044–2073. P. Papadimitriou, I. Kassaras, G. Kaviris, G.-A. Tselentis, N. Voulgaris, E. Lekkas, G. Chouliaras, C. Evangelidis, K. Pavlou, V. Kapetanidis, A. Karakonstantis, D. Kazantzidou-Firtinidou, I. Fountoulakis, C. Millas, I. Spingos, T. Aspiotis, A. Moumoulidou, E. Skourtsos, V. Antoniou, E. Andreadakis, S. Mavroulis and M. Kleanthi, 2018. The 12th June 2017 Mw=6.3 Lesvos earthquake from detailed seismological observations. Journal of Geodynamics, 115, 23–42.

2. Page 2, Line 64: Add the references Kaviris et al. (2017) and Kaviris et al. (2018) regarding stress accumulation: G. Kaviris, I. Spingos, V. Kapetanidis, P. Papadimitriou, N. Voulgaris and K. Makropoulos, 2017. Upper crust seismic anisotropy study and temporal variations of shear-wave splitting parameters in the Western Gulf of Corinth (Greece) during 2013. Physics of the Earth and Planetary Interiors, 269, 148-164. G. Kaviris, C. Millas, I. Spingos, V. Kapetanidis, I. Fountoulakis, P. Papadimitriou, N. Voulgaris and K. Makropoulos, 2018. Observations of shear-wave splitting parameters in the Western Gulf of Corinth focusing on the 2014 Mw=5.0 earthquake. Physics of

the Earth and Planetary Interiors, 282, 60-76.

3. Page 3, Line 89: Add the reference Mai and Thingbaijam (2014) regarding SR-CMOD: P.M. Mai and K.K.S. Thingbaijam, 2014. SRCMOD: An online database of finiteâĂŘfault rupture models. Seismological Research Letters, 85(6), 1348-1357.

4. Page 3, Line 104: Add the reference Bondár and Storchak (2011) regarding the ISC catalogue: I. Bondár and D.A. Storchak, 2011. Improved location procedures at the International Seismological Centre, Geophys. J. Int., 186, 1220-1244,

5. What is FCNN? The authors must explain in detail what this acronym is.

6. Page 4, Line 167: Add the reference Gutenberg and Richter (1944) regarding the G-R law: B. Gutenberg and C.F. Richter, 1944. Frequency of earthquakes in California. Bull. Seism. Soc. Am., 4, 185–188.

7. Page 5, Lines 168-169: "A low b value is related to a high stress background, i.e., 168 the b value is relatively low during strong aftershock activity (Yi et al., 2011)." The b value of aftershocks is widely known to have high values. The work you cite is in Chinese and obviously I am not able to read it. I suggest that the authors delete this sentence.

8. Figure 1: What is DNN? The authors must explain in detail what this acronym is.

9. Page 5, Line 211: What is ROC? The authors must explain in detail what this acronym is.

Please also note the supplement to this comment:
https://www.nat-hazards-earth-syst-sci-discuss.net/nhess-2020-161/nhess-2020-161-RC1-supplement.pdf

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Interactive comment on Nat. Hazards Earth Syst. Sci. Discuss., https://doi.org/10.5194/nhess-2020-161, 2020.