

General Comment

The paper “*Extraction of Pre-earthquake Anomalies in Borehole Strain Data Using Graph WaveNet: A Case Study of the Lushan Earthquake*” presents a Graph Wavenet method to analyze the large amount of data collected at four borehole strainmeters before and after the Lushan Ms 7 earthquake. The authors highlight an acceleration of anomalies accumulation, and they infer a possible release of energy from a weak fault section and a strain accumulation on a strong section of the fault.

Although this work proposes a promising approach to analyze large chunks of data, two main drawbacks emerge in this reviewer opinion: (i) the paper does not flow optimally and it would need a better re-organization (see specific comments); (ii) it seems like the authors focused on the Graph Wavenet sometimes leaving behind a more accurate physical interpretation of the results obtained. As a suggestion, after having recognized the anomalous days, it would be interesting to have a more detailed discussion of these “anomalous data”. Have you compared your results with different data (e.g., seismicity rates, pore-pressure data, deformations from GNSS measurements...)?

Specific Comments:

-Line 15: “acceleration of anomalous accumulation” of what? And in general I believe that the term “anomaly” should be better defined at the beginning of the paper.

-Line 48: which type of borehole strainmeters have been installed? Please specify...

-Lines 73-85: maybe this is too premature here? There is no need to go into the details of the algorithm here. I'd re-organize the introduction moving the description of the earthquake (lines 95-100) before the state of art (before line 28). I'd also be more concise on the description of previous works on this earthquake.

-Lines 86: which two sections?

-Section 2: change title in “Observation data” and you may want to move lines 73-85 here.

-Line 122: please specify which type of strainmeters you are working with.

-Line 175: how did you choose the window length? How does it influence your analysis?

-Line 183: can you explain or add references for the “expansion factor”? Also, is it the factor d that you introduce on line 190?

-Line 201: please uniform the notation that you use for convolution with respect to equation 4.

-Section 3.2.3: do you mean “Spatio-temporal”?

-Line 254: what do you mean by “strain conversion equation”? Please be more specific. How have the strainmeters been calibrated? Did you carry out the calibration yourself or were you provided with the matrices?

-Figure 6: what are the units of y-axis?

-Line 260: how have you validated the results of the SVM decomposition? What are the modes that you separated and how have you associated them with earthquake-related strain or other influencing factors?

-Line 265: have you looked only at surface strain or your methodology has been applied to shear strains as well? If not, please justify your choice.

-Figure 10b: can you comment on the further accelerations that we observe in this figure (e.g., around 2012.08.31)?

-Lines 328-330: maybe something like this to explain what are these anomalies could be anticipated in the text.

Line 363: have you made any inference about this anomaly-distance dependence? Do you think it is related to stress and/or fluids migration?

-Lines 365-375: following also my previous suggestion in General comment, have you compared your results with independent data? It is sometimes difficult to follow the causal relation between your observations and the inferences you make.

-Lines 379-386: since this analysis is preliminar to the definition of the anomalies it should be anticipated in the paper as well.

-Figure 12: I do not fully understand what this figures shows and what is the difference with respect to Figure 11.

Typos:

- Throughout the whole paper (e.g., lines 19, 24 and so on...) there is a dash among words where it should not be. Please double check the text.

-Line 46: pre-earthquake?

-Line 175: sliding step = shift ?

-Line 184: enabling to capture longer time series

-Line 341: Qiu et al. ?

-Line 361: situated farther or the farthest