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Comment on nhess-2022-164

Anonymous Referee #2

Referee comment on "Multi-station automatic classification of seismic signatures from the Lascar volcano database" by Pablo Salazar et al., Nat. Hazards Earth Syst. Sci. Discuss., <https://doi.org/10.5194/nhess-2022-164-RC2>, 2022

Review of the manuscript nhess-2022-164 by P. Salazar et al.

Multi-station automatic classification of seismic signatures from the Lascar volcano database

The topic of the paper interesting, but the manuscript is not fully informative and not well elaborated. Most sections are too compact and are not very informative. The current manuscript requires a quite substantial revision, but it could be in future a good contribution.

My major concern is that the approach and the results are not well presented, elaborated and discussed. These limitations concern the methodological text, the result as well as corresponding figures.

First, I would more extensively describe and discuss AlexNet discussing (a) its implementation, (b) target, and (c) recognized advantages and limitations. These should then be discussed in the light of the analysis of spectrograms, which is here proposed.

Next, authors should better introduce the classification and elaborate on the different classes of signals. This classification is, I believe, inherited from previous manual catalog, where volcano-seismologists introduced the different classes on the base of visual observation of a large amount of data. How is the classification done in the original catalog? What are the typical features? Can one show a compact example of different waveform types and corresponding spectrograms?

Adding some more information on the typical spatial and temporal evolution of these type of events, and the different amount of signals in the original catalog, would also make the paper more interesting and easy to read.

From the technical point of testing the performance of the approach, it would be good to make explicit e.g. the advantage to add merged data-synthetic datasets. Here, I think the first part of the result section could be extended, accompanying the description of each processing with the aim of such test(s).

Authors use only Z component seismograms, and mention 3-component data may be used in future (in a future work). This is acceptable, but the authors should somehow justify this choice.

I am still confused about how the classification performed at different stations is joined into a single catalog. What, e.g. if differently detected and/or classified at different stations?

Results and discussion sections are too compact and not well separated: some of the text in the result section seems to be more adequate for the discussion.

A key issue for the proposed approach, and the interest it may have for a broader volcano-seismology audience, seems to be portability of this method, e.g. to other volcanoes, other time spans, or other monitoring setup. This can only be partially discussed here, as only one volcano monitoring is considered. However, one can still play with different observations. Can we train with one station and process another one?

This type of considerations should be included to extend the discussion, which at the present state is really too short and poor.

Finally, as mentioned above, figures are not fully informative and their layout not optimal. They are often too small, with small captions and need to be substantially improved:

Figure 1 could be more informative, plotting the regions where different type of seismicity was found in the original catalog and to inform the reader where does seismicity take place. Station symbols are too small, as well as labels. The figure size is too small

I would also add a figure showing the time evolution of detections of different classes over time for the study period; such figure could help to summarize these results.

Figure 2 is important and useful, but somewhere hard to read. Labels should be larger, to appreciate the (common) duration of the signal.

Figs. 3-5 can be possibly be merged into a single figure with different panels. Here, again, labels are too small.

Same for Figs. 6 and 7, join in a single figure

And same for confusion matrices (Figs. 8-11), they can be subpanels of a single figure, with no loss of information.