

General Comments

In this second iteration of the manuscript, the authors have clearly devoted significant effort to refining and restructuring their work. The result is a substantially improved document that showcases clearer objectives, methods, and outcomes. Across all sections, the organization and writing style have been noticeably enhanced, making the overall manuscript much more coherent and accessible.

The Introduction is particularly strong, providing both a concise background and a clear statement of the research motivation. In addition, **Section 2**, which focuses on seismic signals and data catalogs, has been reconstructed in a way that captures the essential details of catalog construction and usage. This section now offers a thorough explanation of how seismological data is collected, cataloged, and analyzed, setting a solid foundation for the subsequent methodological discussion.

The **Methodology** section has also undergone a marked improvement compared to the previous version. The authors' decision to outline each step more systematically—especially how the three experiments are structured—makes it much easier for readers to follow the logic and replicate the work. Notably, the emphasis on **pseudo-labeling** as part of their weakly supervised learning strategy deserves commendation. By using a pre-trained model as a pseudo-labeler and then re-training with the newly labeled data, they demonstrate an innovative approach to semi-supervised or weakly supervised classification in seismo-volcanic signals.

Regarding the Discussion, one of the central points the authors address, which is particularly interesting for the field, is the relatively low recognition rate compared to existing reference catalogs. They offer a plausible explanation that these catalogs, while established, may be incomplete or biased toward particular classes of events. Consequently, a strict comparison against them can underestimate the efficacy of the new system.

Along the same line, the authors highlight the **quality vs. quantity** dilemma. While the weakly supervised methodology might introduce some degree of noise or misclassification, it also increases the overall number of detected events, thus expanding the catalog. According to their description, it would be ideal for future users of this methodology to strike a balance by conducting manual checks on a fair portion of newly labeled events to verify their authenticity. These checks not only help mitigate the risk of accumulating errors from pseudo-labels but also lend credence to the claim that genuinely overlooked events are being discovered. Nevertheless, **we recommend** that the authors (and future users) **explore additional statistical consistency checks and cross-comparison with alternative detection methods** to further

strengthen the reliability of these expanded catalogs in subsequent research projects. By systematically verifying or filtering pseudo-labeled events—through model agreement, confidence thresholds, statistical checks, and domain-expert reviews—one can reduce the risk of error accumulation and improve the quality of the final training data.

From a **contextual usefulness** standpoint, the authors argue that any additional events—correctly identified or carefully verified—enrich our understanding of volcanic processes, potentially offering earlier or more nuanced insights into volcanic unrest. They stress that while it is important to measure success against established reference catalogs, it is equally crucial to recognize the value in uncovering smaller or subtler events that might have gone undetected. As a result, even if the system does not perfectly align with existing catalogs, it may enhance real-time monitoring, inform hazard assessments, and ultimately lead to more comprehensive research in volcano seismology.

Nonetheless, **further elaboration** on the potential pitfalls of pseudo-labeling, along with **additional quantitative** or **expert-driven validations**, would strengthen the overall argument.

Despite these minor weaknesses, this manuscript now provides a valuable contribution to the application of machine learning within volcano seismology. The authors' demonstration of how to construct and refine catalogs, leverage pre-trained models, and evaluate performance across multiple experiments will be extremely useful in guiding future research. Overall, the revision is a notable success, and the text should serve as a new reference for continued advances in the automated recognition and analysis of seismic-volcanic signals.

About very Minor writing issues:

- Introduction.
 - line 52: A period "." is missing after "etc".
 - line 54: Maybe lose instead of *loss*?
 - line 54: an interesting topic: "*monitoring systems loss effectiveness when recognizing events over time.*" it would be ideal to include some references to support this point.
 - line 83: *Deception* misspelled.
 - line 108: there is an extra period ".".
 - line 110: "volcano" misspelled.

- Seismic data and catalogs.
- line 123: as stated in fig.1., the data was also collected in 1996 and 2001-2002?
- lines 150 and 151: are we using "Popocatépetl" with or without an accent?