

Review of the manuscript entitled « Clustering of eruptive events from high precision strain signals recorded during the 2020-2022 lava fountains at Etna volcano (Italy) » by L. Carleo, G. Currenti & A. Bonaccorso.

First of all, I apologize for the delay in preparing the review. In this study, the authors apply an unsupervised machine learning approach (k-means algorithm) to borehole strainmeter signals (DRUV station) to automatize and enhance detection of strain variations associated with eruptive events. They focus their analyze on the intense activity of Etna volcano (> 60 lava fountains recorded) from December 2020 to February 2022.

The paper is well-written, the strain data pre-processing (i.e, correction of external influences) and the k-means approach are well-described. Based on the clustering approach, they are able to isolate common processes from strain signatures and further decipher the complexity of the volcano dynamics. Notably, the protocol helped to improve manual event detection (Carleo et al., 2022a) by revealing a new class of transient deformation on Etna volcano (Cluster 4). I only have minor comments :

- 1) It is interesting to see authors using strain rate in their analysis. Since, it is not often used in the literature, the authors may further comment on the interest of using strain rate for crustal deformation observation and how they complement the use of strain signals to study volcano dynamics.
- 2) I believe that the study is the very first to apply a machine learning approach to strainmeter data, and that is very interesting. Maybe the authors can insist on that aspect. This protocol is also promising to investigate other kind of processes using strain data (aseismic events, creep on volcanoes or faults), coseismic slip detection for instance. Maybe the authors can add a comment about that.

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