



## **Unsupervised clustering of infrasonic events at Mount Etna using DBSCAN and SVM**

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Active volcanoes effectively generate sonic and infrasonic signals, whose investigation provides useful information for both monitoring purposes and study of the dynamics of explosive phenomena. At Mt. Etna volcano (Italy) a clustering algorithm based on infrasonic waveform features has been developed. It allows to recognize the active vent with no location algorithm and by using only one station. Firstly by a parametric power spectrum method we extract the features describing and characterising the infrasound events: peak frequency and quality factor. Then, we consider such features together with the amplitude in a 3D “feature space” and by making use of DBSCAN algorithm (Density-Based Spatial Clustering of Applications with Noise) we identified the main clusters inside it. After the clustering process, by using a traditional location method (semblance method) together with a visual inspection of the video camera images, we were able to associate each cluster to a particular source vent and/or a kind of volcanic activity. Next, clusters were used to train a model based on Support Vector Machine (SVM) for the automatic event location.