

Item

Using machine learning for the classification of Seismic Signals at Vulcano, Italy

Falsaperla, S., Ferrari, F., Langer, H., Spampinato, S. (2023): Using machine learning for the classification of Seismic Signals at Vulcano, Italy, XXVIII General Assembly of the International Union of Geodesy and Geophysics (IUGG) (Berlin 2023).
<https://doi.org/10.57757/IUGG23-0436>

Released

Basic

Item Permalink https://gfzpublic.gfz-potsdam.de/pubman/item/item_5015999 Version Permalink https://gfzpublic.gfz-potsdam.de/pubman/item/item_5015999_2

Genre Conference Paper

Files

Locators

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Content

Free keywords -

Abstract A Vulcanian eruption is described as an eruptive style with strong explosive characteristics. The name derives from the island of Vulcano in Italy, the first place in which it was observed during the last eruptive activity between 1888 and 1890. In this paper we analyze the seismicity recorded at Vulcano during a seismic unrest starting in September 2021 and still present as of November 2022. The distinctive feature of this seismicity is the presence of a variety of signals, most of which have a very long period (-0.5 s) signature. Low frequency content is interpreted as due to fluid involvement. Therefore, the high occurrence rate of VLP seismicity is a potential indication of pressure buildup within the volcanic system, and may herald phreatomagmatic activity (usually the first stage of a Vulcanian eruption), with serious consequences for inhabitants and tourists. Our analyses exploit machine learning procedures, with particular reference to pattern classification, at the aim of identifying varying classes of seismic events and trace their evolution over time. This classification can be useful for surveillance purposes contributing, along with other early warning methods, to reduce the devastating consequences of eruptions for people and property.

Details

Language(s) eng - English

Dates Finally published : 2023

Publication Status Finally published

Pages -

Publishing info -

Table of Contents -

Rev. Type -

Identifiers DOI: [10.57757/IUGG23-0436](https://doi.org/10.57757/IUGG23-0436)

Degree -

Event

Title XXVIII General Assembly of the International Union of Geodesy and Geophysics (IUGG)

Place of Event Berlin

Start-/End Date 2023-07-11 - 2023-07-20

Legal Case

Project information

Source 1

Title XXVIII General Assembly of the International Union of Geodesy and Geophysics (IUGG)

Source Genre Proceedings

Creator(s)

Affiliations

Publ. Info Potsdam : GFZ German Research Centre for Geosciences

Pages -

Volume / Issue -

Sequence Number -

Start / End Page -

Identifier -