

Automatic Detection of Volcanic Eruptions at Turrialba Volcano, Costa Rica, using a Neural Network Approach

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Considering the hazards of volcanic eruptions, especially the influence of volcanic ash on human health and infrastructure incl. aviation, good monitoring systems are important in order to warn the population of dangers at an early stage. Using radar systems it is possible to detect small particles like rain drops or volcanic ash during most weather conditions. To increase the speed and reliability of an eruption notification we implemented a supervised neural network for the automatic detection of eruptions in Doppler radar data recorded at Turrialba volcano in Costa Rica.

We demonstrate that the automatic classification of eruptions, rain and noise in the data is possible with an accuracy of 98 %. For supervised learning, manually labeled radar data from July 2017 to February 2019 is used. Problems arise in the classification of light rain and the precise determination of the beginning and end of an eruption due to ambiguities. Therefore, a high reliability of the monitoring system is only ensured with additional information such as meteorological data or webcam images. In addition to the eruptions reported by national Costa Rican authorities, at least 40 additional eruptions could be found by the neural network between August 2017 and August 2018.

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