

EGU2020-4714

<https://doi.org/10.5194/egusphere-egu2020-4714>

EGU General Assembly 2020

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Characterizing the long-period seismicity of Teide volcano in Tenerife (Canary Islands, Spain)

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The volcanic long-period seismicity, composed of long-period events and volcanic tremors, constitutes an important attribute of volcanic unrest. Its detection and characterization is therefore a key aspect of volcano monitoring. In the present work, a method based on the seismic network covariance matrix, the equivalent in the frequency domain of the cross-correlation matrix, is used to automatically detect and locate long-period events of the Teide volcano on the island of Tenerife (Canary Islands, Spain). The method is based on the analysis of eigenvalues and eigenvectors of the network covariance matrix.

Long-period events are detected through the time evolution of the width of the network covariance matrix eigenvalues distribution, which is a proxy of the number of sources acting in the wavefield. Each detected long-period event is then located using the moveout information of the corresponding first eigenvector. Three years of seismic data (from 2017 to 2019) continuously recorded by the Red Sísmica Canaria (C7), a permanent monitoring network composed of 17 broadband stations operated by the Instituto Volcanológico de Canarias (INVOLCAN), are analysed. The obtained locations are compared with potential locations from INVOLCAN's catalog, obtained by a standard approach based on manual phases picking.