



Monitoring temporal seismic velocity fluctuations in the interiors of volcanoes on Saba and St. Eustatius using ambient seismic noise analysis

Reinoud Sleeman and Caron Vossen
KNMI, R&DSA, De Bilt, Netherlands (sleeman@knmi.nl)

The volcanoes on Saba (Mt. Scenery) and St. Eustatius (The Quill) in the Caribbean Netherlands are stratovolcanoes with moderate to high volcanic hazard. Neither volcano has had a recent eruption (1640 AD Saba, 400 AD St. Eustatius) but their structure and composition resemble other dormant and active volcanoes of the Lesser Antilles. Both The Quill and Mt. Scenery show clear evidence of past pyroclastic flow activity. The time interval between eruptions of Lesser Antilles volcanoes is estimated between tens and several thousands of years.

Since 2006 the Royal Netherlands Meteorological Institute (KNMI) is building up a seismic broadband network on both volcanoes, comprising one seismometer per island in 2006 and four since 2015, to monitor in real time the (a) seismic activity and (b) temporal seismic velocity fluctuations in the interiors of the volcanoes by the application of passive interferometry on the continuous seismic recordings. We present recent results of measurements of these temporal changes within the volcanoes on Saba and St. Eustatius based on cross-station correlations and cross-component correlations (using MSNoise), using up to 10 years of data. We also conducted synthetic experiments to investigate the sensitivity of the technique to verify our results. The objective is to apply this technique to real-time data recorded at the volcanoes and to build a system to provide the earliest possible warning of significant seismic velocity changes to decision makers. Saba counts about 1900 inhabitants, St. Eustatius about 3800.