



Innovative passive seismic methods for imaging and monitoring volcanoes

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We will present novel imaging and monitoring approaches that make use of the ambient seismic field, and in particular, the multiply-scattered, highly sensitive coda waves. We will discuss these methods with a focus on monitoring volcanic eruptions from different years at Piton de la Fournaise volcano and the submarine 2011 El Hierro, Canary Island eruption.

At El Hierro, time evolution analysis of the waveform similarity from sparse data sets allows us to clearly identify different pre-eruptive phases of this new volcano, as well as three magmatic intrusions that occurred in 2012. We use probabilistic sensitivity kernels to locate the places of the highest dynamics within the magmatic accumulation zone and the extinct volcanic area of Tiñor that might have acted as stress barriers, guiding the magma from the North of El Hierro Island to the final eruption site at the South.

Piton de la Fournaise has a dense seismic monitoring network, allowing us to study localised edifice deformation as possible forcing mechanism of rockfalls.

Our results highlight the potential of ambient noise methods to monitor volcanic hazard and unrest even with sparse data sets and limited knowledge of the region.