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# Ambient noise tomography of Gran Canaria island (Canary Islands)

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The island of Gran Canaria is located in the Canarian Archipelago, with an area of 1560 km$^2$ and a maximum altitude of 1956 m.a.s.l., being the third island of the archipelago in terms of extension and altitude. The island has two very well differentiated geological domains: the southwest domain or Paleo-Canarias, which is the geologically oldest part, and the northeast domain or Neo-Canarias, where are located the vents of the most recent Holocene eruptions. This volcanic island hosted Holocene eruptions. Therefore, apart from being affected by volcanic risk, it potentially hosts geothermal resources that could be exploited to increase the percentage of renewable energy in the Canary Islands.

The main objective of this work is to use Ambient Noise Tomography (ANT) for retrieving a high-resolution seismic velocity model of the first few kilometres of the crust, to improve local earthquake location and detect anomalies potentially related to active geothermal reservoirs. Currently, the 1-D velocity model of the island does not allow a correct determination of the hypocenters, being unable to take into account the substantial horizontal velocity contrasts correctly.

To realize the ANT, we deployed 28 temporary broadband seismic stations in two phases. Each campaign lasted at least one month. We also exploited data recorded by the permanent seismic network Red Sísmica Canaria (C7) operated by INVOLCAN. After applying standard data processing to retrieve Green's functions from ambient noise cross-correlations, we retrieved the dispersion curves using the FTAN (Frequency Time ANalysis) technique. The inversion of dispersion curves to obtain group velocity maps was realized using a novel non-linear multiscale tomographic approach (MAnGOSTA, Multiscale Ambient NOiSe TomogrAphy). The forward modelling of surface waves traveltimes was implemented using a shortest-path algorithm that allows the topography to be taken into account. The MANgOSTA method consists of successive non-linear inversion steps on progressively finer grids. This technique allows retrieving 2-D group velocity models in the presence of substantial velocity contrasts with up to 100% of the relative variation. Then, we performed a depth inversion of the Rayleigh wave dispersion curves using a transdimensional Bayesian formulation. The final result is a 3-D model of P- and S-wave velocities of the island. The preliminary results show the presence of a low-velocity zone in the eastern part of the island that coincides spatially with anomalies observed in previous geophysical and geochemical studies and which could be related to actual or fossil geothermal reservoirs. Furthermore, the model shows

the presence of high-velocity anomalies that are associated with the mafic core of the island.