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A seismic waves velocity model for Gran Canaria Island from ambient noise correlations

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We have analysed continuous ambient seismic noise recorded by a temporary array in Gran Canaria (Canary Islands, Spain) in order to find a velocity model for the top few kilometers. The SISTEVOTENCAN-IGN seismic array consisted of five broadband stations surrounding a sixth central one placed close to Pico de las Nieves, at the center of the island. The array had a radius of 12-14 km, with interstation distances ranging from 10 to 27 km. This network was operative from December 2009 to November 2011. The Green's functions between the 15 pairs of stations have been estimated in the time domain by stacking cross-correlations of 60-s time windows for the whole recording period ($\sim$2 years). The effects of several processing adjustments such as 1-bit normalization and spectral whitening are discussed. We observe significant differences (mainly in amplitude) between causal and acausal parts of the estimated Green's functions, which can be associated to an uneven distribution of the seismic noise sources. The application of a phase-matched filter based on an average dispersion curve allowed the effective reduction of some spurious early arrivals and the selection of fundamental-mode Rayleigh wave pulses, making possible an automatic extraction of their group velocities. Then, Rayleigh-wave dispersion curves were retrieved for the set of paths by using frequency-time analysis (FTAN) as well as by following the procedure described by Herrin and Goforth (1977, BSSA) based on the iterative fitting of a phase-matched filter which optimally undisperses the signal. Reliable curves were obtained from 1 s to 6-7 s with group velocities ranging between 1.5 and 2.2 km/s. Some lateral variations in velocity have been detected in spite of the limited spatial coverage and path density, which substantially restricted the resolution. A mean S-wave velocity model has been inverted for this area down to $\sim$3 km.