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Determination of the shallow structure applying the spatial autocorrelation method (SPAC) to simultaneous measurements of microtremors.

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Several methodologies have been employed in order to obtain the shallower structure at the Campus of the Univerisity of Almeria (Spain) in terms of S-wave velocity. An array made up by eight strong motion sensors uniformly distributed on a circumference, surrounding a ninth central device was used for ambient noise recording. The autocorrelations of the vertical components among each external station and the central one were computed in the frequency domain and averaged for the pairs obtaining the SPAC coefficients. The analysis was performed for values of the radius of 18, 25 and 35 m. The Rayleigh phase velocities range between 200 m/s and 500 m/s for frequencies from 8Hz to 3Hz respectively. Last of all, the devices were closely placed and another simultaneous measurement was carried out in order to estimate the available spectral range, finding a significant lack of correlation below 2 Hz probably due to electronic noise. On the other hand, S-wave refraction measurements were obtained using an observational system made up of four seismometers. The waves were generated striking a side of a plank which was firmly contact with ground by placing a large weight on it and were registered by the devices. The first one was placed as close as possible to the plate and the other three in a linear array with distances to the source ranging from 2.5 to 55m.

The results obtained using both methods keep good agreement with the velocity profile derived from data of boreholes carried out at the investigation place by means of standard penetration tests (SPT) and using empirical relationships between the N value, the geological characteristics and the S-wave velocity. This profile roughly consists of a soft layer (250 m/s) with thickness 15m over a stiffer structure (800 m/s).