

Shear-wave velocity structure from MASW and SPAC methods: The case of Adra town, SE Spain

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The damage distribution in the town of Adra (south-eastern Spain) during the 1993 and 1994 Adra earthquakes of magnitude $M_w \sim 5.0$ and maximum intensity degree of VII (European Macroseismic Scale) was mainly concentrated in the southeast sector, where the low-diagenetic (soft) sediments outcrop. As new urbanizations are being planned in this sector, a soil classification based on the shallow shear-wave velocity (V_s) structure is needed. For the purpose of earthquake disaster mitigation, the Spatial Autocorrelation (SPAC) and the Multichannel Analysis of Surface Waves (MASW) methods were used to propose integrated 2D V_s models for the seismic response characterization of the shallow geology. Joint inversion of H/V spectral ratios of ambient noise, interpreted under the Diffuse Field Approach and the dispersion curves derived from the SPAC method allowed us to obtain more constrained models. Both SPAC and MASW methods provided similar results for the surveyed geological formations. From these models, a classification of the geological formations was carried out in terms of V_{s30} values and Eurocode 8 (European Committee for Standardization 1998) classes. Lower V_{s30} values in the 180-360 m/s range were found in the southeastern sector of the town, where soft sediments outcrop and some building damage was reported during the 1993-1994 earthquakes. The highest V_{s30} values exceeding 800 m/s appear in the northern sector, where the hardest rocks outcrop and no building damage was reported. The combination of the well-suited V_s database prepared for different geological formations with the 1:5,000 scale geological mapping was an important step to obtain the detailed

soil microzonation map of Adra. This approach offered a new predictive insight into the building damage distribution, which would contribute to the appropriate urban planning for the future growth of the town. © 2018 European Association of Geoscientists & Engineers.

Adra town

Geological mapping

Multichannel analysis of surface waves (MASW)

Site amplification

Spatial autocorrelation (SPAC) method

Vs30

ambient noise

autocorrelation

building code

concentration (composition)

earthquake damage

earthquake event

geological mapping

S-wave

seismic response

site characterization

soft soil

wave velocity

Adra

Almeria [Andalucia]

Andalucia

Spain