



3D model of Campo de Dalías basement from H/V spectral ratio of ambient seismic noise

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Campo de Dalías is a large coastal plain in the southeastern mountain front of the Betic Cordillera (SE of the Iberian Peninsula), being one of the most seismically active regions of Spain. This area has a population of about 213.000 inhabitants, with a high growth rate during the last decades due to the development of intensive agricultural activities. Seismic risk assessment and hydrogeological issues are major topics of interest for this area, relying on the knowledge of the geophysical properties of the basin.

A passive seismic survey has been conducted throughout the basin. We have recorded ambient noise at 340 sites located approximately on the vertexes of a 1000 x 1000 m square grid, as well as around a set of deep boreholes reaching the Triassic basement. These broad-band records, of at least 45 minutes long each, have been analyzed by using the horizontal-to-vertical spectral ratio method (H/V).

The spectral analysis shows clear H/V peaks with periods ranging from 0.3 s to 4 s, approximately, associated to relevant contrasts in S-wave velocity (V_s) at depth. Simulations based on the diffuse field approach (Sánchez-Sesma et al. 2011) show that long periods are explained by the effect of several hundred meters of soft sedimentary rocks (mainly Miocene marls). Well-developed high-frequency secondary peaks have been found in some specific zones (e.g. N of Roquetas de Mar town).

Then, fundamental frequencies and basement depths at borehole sites have been fitted by means of a power law, which can be applied down to 900 - 970m. Larger depths are estimated by extrapolation. This relationship has been used to map the basement (main V_s contrast) throughout the plain. The prospected basement model describes well the main structural features of this smoothly folded region, namely, the El Ejido Synform and the Guardias Viejas Antiform, with ENE–WSW-trend. These features are shifted toward the south in comparison with Pedrera et al. (2015). The homogeneous resolution provides new insights which cannot be reached from analysis of deep boreholes, due to their very irregular distribution and it complements 2D V_p models derived from seismic reflection surveys.

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