



## **Site-conditions map for Portugal based on VS measurements: methodology and final model**

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In this paper we present a statistically significant site-condition model for Portugal based on shear-wave velocity (VS) data and surface geology. We also evaluate the performance of commonly used Vs30 proxies based on exogenous data and analyze the implications of using those proxies for calculating site amplification in seismic hazard assessment.

The dataset contains 161 Vs profiles acquired in Portugal in the context of research projects, technical reports, academic thesis and academic papers. The methodologies involved in characterizing the Vs structure at the sites in the database include seismic refraction, multichannel analysis of seismic waves and refraction microtremor. Invasive measurements were performed in selected locations in order to compare the Vs profiles obtained from both invasive and non-invasive techniques. In general there was good agreement in the subsurface structure of Vs30 obtained from the different methodologies.

The database flat-file includes information on Vs30, surface geology at 1:50.000 and 1:500.000 scales, elevation and topographic slope and based on SRTM30 topographic dataset.

The procedure used to develop the site-conditions map is based on a three-step process that includes defining a preliminary set of geological units based on the literature, performing statistical tests to assess whether or not the differences in the distributions of Vs30 are statistically significant, and merging of the geological units accordingly. The dataset was, to some extent, affected by clustering and/or preferential sampling and therefore a declustering algorithm was applied. The final model includes three geological units: 1) Igneous, metamorphic and old (Paleogene and Mesozoic) sedimentary rocks; 2) Neogene and Pleistocene formations, and 3) Holocene formations.

The evaluation of proxies indicates that although geological analogues and topographic slope are in general unbiased, the latter shows significant bias for particular geological units and subsequently for some geographical regions.