

# SEISMIC AMPLIFICATION MAP FOR METROPOLITAN LIMA BASED ON THE CORRELATION OF MULTIPLE SOIL PARAMETERS

Kevin Huerta<sup>1</sup>, Diana Calderon<sup>1</sup>, Carlos Gonzales<sup>1</sup>

<sup>1</sup>Japan-Peru Center for Earthquake Engineering Research and Disaster Mitigation, Lima, Peru

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## ABSTRACT

In seismic response analyses, the correct estimation of shear-wave velocity ( $V_s$ ) profiles is crucial for an adequate representation of the near-surface geologic materials that can significantly alter the upcoming wavefield. In this regard, a parameter such as the time-averaged  $V_s$  in the upper 30 m is one of the most often used for site characterization, as it is adopted in many seismic design codes worldwide, including the Peruvian seismic regulation.

During the last ten years, and within the framework of seismic microzonation studies, an important database of geophysical tests has been generated for Metropolitan Lima. Part of this database comprises approximately 800  $V_s$  profiles obtained by surface-waves methods. This information allowed to evaluate the correlation between the average  $V_s$  for different depths,  $AV_{sz}$ , and their corresponding amplification factors, in the form of average transfer functions with respect to two  $V_s$  reference values (500 m/s and 750 m/s). From the considered data,  $AV_{s20}$  appears to better represent near-surface amplification in Lima.

However, and for the purpose of developing the  $AV_{s20}$  distribution map for the entire urban areas, the number of data was not sufficient and additional parameters of easier availability were considered. Hence, categoric indexes, such as geological and soil types, and quantitative parameters, such as fundamental period of vibration and topographic slope, were evaluated and assigned to the elements of a discretized mesh for Lima city. Finally, by means of interpolation schemes based on geostatistics, the  $AV_{s20}$  and soil amplification factors map were developed for Metropolitan Lima.

*Keywords: Soil amplification factors; average shear-wave velocity; transfer function; correlation; Lima city*