

# **Estimation of strong ground motion of Bogotá basin (Colombia) from scenario earthquakes (Part I); Elaboration of a velocity model of the basin based on microtremors array measurements**

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Bogotá, a megacity with almost 8 million inhabitants is prone to a significant earthquake hazard due to nearby active faults as well as subduction megathrust earthquakes. The city has been severely affected by many historical earthquakes in the last 500 years, reaching MM intensities of 8 or more in Bogotá. The city is also located at a large lacustrine basin composed of extremely soft soils which may strongly amplify the ground shaking from earthquakes. The basin extends approximately 40 km from North to South, is bounded by the Andes range to the East and South, and sharply deepens towards the West of Bogotá. The city has been the subject of multiple microzonations studies which have contributed to gain a good knowledge on the geotechnical zonation of the city and tectonic setting of the region. To improve our knowledge on the seismic risk of the city as one of the topics, we started a 5 years project sponsored by SATREPS (a joint program of JICA and JST), entitled “Application of state of the art technologies to strengthen research and response to seismic, volcanic and tsunami events and enhance risk management in Colombia (2015-2019)”. In this paper we will show our preliminary results for the elaboration of a velocity model of the city. To construct a velocity model of the basin we conducted 70 multi-sized microtremors arrays measurements (radius from 60 cm up to 1000 m) at 27 sites within the city. We calculated dispersion curves and inferred velocity profiles at all the sites. Our velocity profiles for the shallower sediments are characterized by a wide variability in  $V_{s30}$  whose values range from 80 ~ 150 m/s in the northern and central part of the basin, and 120 ~ 390 m/s in the southern part. Our velocity models at the central part of the basin are characterized by a strong impedance at approximately 600m depth ( $V_s \sim 2000$  m/s), and reach the seismic bedrock ( $V_s \sim 3000$  m/s) at 3 km depth. However geological sections of the city suggest that the basin depth may significantly increase further west. Denser array measurement are required to investigate the detailed basin geometry.

## **References**

Pulido N., S. Senna, T. Sekiguchi, H. Yamanaka, J. Eraso, N. Perico, J. C. Reyes, H. Garcia, P. Pedraza, C. Dimaté, H. Nakagawa and K. Chimoto (2017), ESTIMATION OF VELOCITY MODEL OF BOGOTÁ BASIN (COLOMBIA) BASED ON MICROTREMORS ARRAY MEASUREMENTS, Proceeding of the 16<sup>th</sup> World Conference on Earthquake Engineering (16WCEE), Santiago, Chile.