

Elaboration of a velocity model of the Bogota basin (Colombia) based on microtremors array and gravity measurements, and strong motion records

*Nelson Pulido¹, Shigeki Senna¹, Hiroaki Yamanaka², Helber Garcia³, Leonardo Quiñones⁴, Chimoto Kosuke², Cristina Dimaté⁴, Mario Leal⁵

1. National Research Institute for Earth Science and Disaster Resilience, 2. Tokyo Institute of Technology, 3. Servicio Geológico Colombiano (Colombian Geological Survey), 4. Universidad Nacional de Colombia (National University of Colombia), 5. Instituto Distrital de Gestión de Riesgos y Cambio Climático (Bogota Agency for Risk Management and Climatic Change)

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 multi-sized microtremors arrays measurements (radius from 60 cm up to 1000 m) at 41 sites within the city. We calculated dispersion curves and inferred velocity profiles at all the sites. We combine these results with available gravity measurements within the city to obtain the initial velocity model of the basin. We also evaluated site effects in Bogota using records from the Strong Motion Network of Bogota.

Keywords: Site Effects, Strong motion, Bogota basin, microtremors array, gravity