Geophysical Research Abstracts, Vol. 7, 08939, 2005
SRef-ID: 1607-7962/gra/EGU05-A-08939

Geophysical investigations and modeling of seismic response for a seismic microzoning study in Caracas, Venezuela

M. Schmitz (1), V. Rocabado (1), J.-P. Ampuero (2), H. Rendón (1), J.-P. Vilotte (2), J.J. Hernández (1), C. Cornou (3), J. Alvarellos (4), F.A. Audemard (1)

(1) FUNVISIS, Caracas, Venezuela, www.funvisis.org.ve, (2) IPG, Paris, France, (3) LGIT, Grenoble, France, (4) PDVSA-INTEVEP, Los Teques, Venezuela.

One of the most important natural hazards that threatens Caracas, the capital city of Venezuela, is the seismic hazard, due to its location in the plate boundary zone between the South America and the Caribbean plates. There is historic evidence for several destructive earthquakes in Caracas since 1641, being the most recent one the 1967 Caracas earthquake. This magnitude 6.5 earthquake which occurred some 25 km northwest of Caracas generated heavy damage in distinct zones of the city, thus being the most intensely studied earthquake in Venezuela. Damage investigations of buildings, including soil and building dynamical characteristics, and the earthquake engineering characteristics of the deposits were performed in detail following the earthquake. Sediment thickness in excess of 300 m and related soil-structure interactions were identified as the principal factors for the damage distribution. Recent research projects reveal details of the geological and geophysical characteristics of the valley fill. In that respect, H/V ratios from microtremor measurements show values between 1 and 2 s for the deep sedimentary basins, whereas rock sites from outside the basin show a predominant period down to 0.2 s. The bedrock topography as well as seismic velocities and densities of the sediments are used as input information for the numerical modeling of the seismic response, which was done so far on detailed 2-D profiles across the valley. The results indicate that the depth of the distinct sedimentary layers is not the only crucial parameter for high amplification factors, but a combination of the characteristics of the sedimentary fill, the shape of the bedrock and resonance effects between adjacent sub-basins to the amplification of seismic waves. In addi-

tion, a seismic microzoning project started in 2004 aiming at the integration of the existing subsurface data with new information from deep geotechnical drillings and seismic evaluations in order to discriminate zones of distinct ground motion within the valley and the surrounding hilly areas of Caracas. The new derived S-wave velocity structure using different approaches will be the base for the 3-D simulation model for the seismic response. The results will be compared to experimentally derived transfer functions from earthquake recording and discussed together with the results from dynamic soil response analysis. Thus, a better understanding of relevant parameters to earthquake engineering is envisioned (Contribution to projects PI 2004000347 and FONACIT 200400738).