GROUND MOTIONS PREDICTION FOR HAZARD ASSESSMENT IN THE VALLEY OF MEXICO ASSOCIATED WITH EARTHQUAKES IN THE TRANS-MEXICAN VOLCANIC BELT

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The Trans-Mexican Volcanic Belt (TMVB) is an active mountain chain being deformed by an extensional stress regime with numerous active faults. Although a few significant shallow earthquakes (M>=6.5) originated in the TMVB, the background seismicity is low. The available seismic hazard studies are mainly based in the instrumental seismicity catalog. One emblematic example of potentially risky events is the Acambay (Ms=6.9) normal-faulting earthquake in 1912, 100 km northwest from Mexico City. To improve the seismic hazard assessment for such rare events, we propose the simulation of several realistic scenario earthquakes in 3D, within the central part of Mexico by means of a hp-discontinuous Galerkin finite element method (DG-FEM) that handles both unstructured domain decomposition and different approximation orders per element in space (DGCrack, Tago et al., 2012). It solves the velocity-stress formulation of the visco-elastodynamic equations in 3D with rock quality factors, Qs and Qp, chosen to be nearly constant in the frequency range of interest. We present results of the tetrahedral meshing of the Central part of Mexico, incorporating the real topography, a 3D tomographic velocity model, a 2 km thick layer of low velocity associated to the TMVB, a 3D basin model for the Valley of Mexico (Cruz-Atienza et al., 2016) and both, planar and non-planar fault-system models of the Acambay-Tixmadejé graben. We build broadband kinematic rupture scenarios following Pulido et al. (2015) and Villafuerte et al. (2019). The simulations of the strong motions are generated in the reference hardrock station CU up to 1 Hz, then PGA, PGV and spectral responses throughout the Valley of Mexico are estimated using response spectral ratios (Rosenblueth and Arciniega, 1992; Reyes, 1999).