
H33M-2254: Analysis of Physical Vulnerability to Land Subsidence and Ground Fracturing in Mexico City

Wednesday, 12 December 2018

13:40 - 18:00

📍 *Walter E Washington Convention Center - Hall A-C (Poster Hall)*

The phenomenon of subsidence in Mexico City and risks it implies for the inhabitants have been studied since more than five decades. The persistent subsidence of the land cause damage to buildings and urban infrastructure. Damages in the short, medium and long term implies maintenance and important mitigation costs. Furthermore, a complex pattern of ground fractures dissects the lacustrine plain of Mexico City; since their apparition threatened the urban infrastructure, deformation and brittle fracturing of the near surface clayey sediments of the Mexico lake have been widely studied phenomena (Carreon-Freyre et al., 2006; Ovando-Shelley et al., 2012). Some of these fractures were developed after the extensive groundwater extraction localized in the center of Mexico City since de beginning of the last century and their apparition was reported as early as 1925 in the downtown Mexico City (Carrillo, 1947). A total subsidence of 12 m has been reported at the center of the lacustrine plain in Mexico City (Cabral-Cano et al., 2008; López Quiroz et al., 2009). In this work, the susceptibility of the subsoil to fracture si analyzed with a deterministic approach. Fracturing is a multifactorial phenomenon conditioned by physical variables that can be mapped, measured and integrated into a database allowing an adequate correlation of the parameters conditioning their spatial distribution. They main studied variables are: the fracture type, lithological variations, slope, gradient of subsidence and piezometric descent. We propose a methodology for the estimation of a Vulnerability Index to Fracturing (VIF), easy to use for decision making and helpful for the determination of risk areas. Additionally, VIF can be used for the design of adequate monitoring systems, aimed at the optimization of mitigation measures in the damaged sites. The obtained results are part of the National Atlas of Risks developed by the National Center of Disaster Prevention (CENAPRED) in Mexico and of the activities supported by the UNESCO IGCP 641 Project.

Authors

Dora Carreon-Freyre
National University of Mexico

Mariano Cerca
*Centro de Geociencias,
UNAM*

Raul Gutierrez-Calderon
CERG

Carlos Alcantara-Duran
CERG

Pietro Teatini
University of Padova