Instability of the urbanized flank of El Peñón del Marques volcanic edifice and its relation to land subsidence in Mexico City

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Abstract We integrate the available information, field cartography, measurement of physical attributes of materials, and Ground Penetrating Radar (GPR) profiles, to obtain a high definition image of the sliding flanks of the Peñón del Marques volcanic edifice, fractures, and land subsidence. In particular, we present multi-frequency GPR profiles (using antennae of 100, 200, and 400 MHz) that allowed an accurate interpretation of the shallow fracture geometry in the upper 15 m and how they affect the civil infrastructure. The morphology of the unstable flanks is characterized from the upper to the lower part by two or three concentric major fracture zones, a steeped fractured flank, a concave-up depression embaying locally the volcanic edifice, and a frontal bench that reflects uplift and a small inverse displacement at the base of the edifice.

Key words fracturing; land subsidence; Ground Penetrating Radar; volcanic edifice