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Tectonic control on monogenetic volcanism in the Michoacán-Guanajuato Volcanic Field, México

Martha Gabriela Gómez Vasconcelos¹, José Luis Macías², Denis Ramón Avellán³, Giovanni Sosa-Ceballos², and Víctor Hugo Garduño-Monroy⁴

¹CONACYT-Instituto de Investigaciones en Ciencias de la Tierra, Universidad Michoacana de San Nicolás de Hidalgo, Morelia, México (ga8ygomez@yahoo.com)

²Instituto de Geofísica, Universidad Nacional Autónoma de México, Morelia, México

³CONACYT-Instituto de Geofísica, Universidad Nacional Autónoma de México, Morelia, México

⁴Instituto de Investigaciones en Ciencias de la Tierra, Universidad Michoacana de San Nicolás de Hidalgo, Morelia, México

Aligned volcanism is very common in many monogenetic volcanic fields around the world, which can reveal volcano-tectonic interactions at different scales. For instance, volcanic distribution discloses the tectonic stress orientation on regional scales. On more local scales, preexisting faults or fractures may control magma intrusions and their propagation through the upper crust, as faults are zones of crustal weakness that magma intrusions can intercept during its ascent, partly controlling the volcanic vent spatial distribution. But it is not quite understood how do these alignments occur; if they erupted at the same time (within a few dozens of years), if they erupted during a short time interval (hundreds of years) or during a long time interval (thousands of years); if the eruptive style and magma volumes are controlled by these faults and the regional tectonic stress regime, etc.

This study aims to understand the magmatic and structural conditions that favored the emission of a lava plateau followed by Strombolian explosions that built 13 aligned and six dispersed scoria cones through preexisting E-W- to ENE-striking faults in the Queréndaro area. Our results indicate that volcanism in the Michoacán-Guanajuato Volcanic Field occurs as intermittent magma fluxes, sometimes represented by independent volcanic vents and sometimes by clustered or aligned volcanoes. Moreover, preexisting faults exert a strong influence on volcanic spatial and temporal distribution, volcanic morphology, magma volume, and eruptive dynamics in this area.