



Use of soil CO₂ flux for the recognition of the most active zones in the Xalapa Monogenetic Volcanic Field

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Measuring gas emissions from central volcanoes has long been recognized and used as an efficient monitoring methodology for evaluating volcanic activity. Since no active vents exist in a monogenetic field until a new volcano erupts, no methods are presently used to monitor the gas emissions of such a field.

A problem in monogenetic volcanic fields is recognizing the most active tectonic zones and therefore the most probable sites for the birthplace of a new monogenetic volcano, particularly in tropical settings where rapid soil development and intensive erosional processes, together with the young age of the volcanic products, act together to hide traces of active faults and fractures.

Through the use of a portable West Systems® soil CO₂ flux meter (accumulation chamber method) we propose to measure the base level CO₂ flux from soils in the Xalapa monogenetic volcanic field in the Eastern Trans-Mexican Volcanic Belt, an area where over 50 small monogenetic volcanoes have erupted during the Pleistocene and Holocene, the most recent of which, El Volcancillo, erupted about 800 years BP. This region is heavily populated, and location of important infrastructure, so birth of a new volcano could seriously disrupt human activities.

Geological, structural and pedological mapping are important in the determination of variations in the expected CO₂ flux caused by the differences in soil types and/or human activities. This allows the determination of anomalous areas of enhanced CO₂ flux, which could possibly represent faults and fractures that might be used for the emplacement of magmas.

Routinely measurement of these anomalies would allow to discriminate those areas that present noticeable variations in CO₂ flux, which could be considered for the installation of permanent flux meters in order to correlate the gas measurements with possible seismic and/or volcanic activity. Installation of permanent monitoring systems in a heavily populated area is a problem because locals might accidentally or purposely destroy the equipment. Since many of the lava flows in the region were emplaced through lava tubes, caves are considered as possible sites for the installation of permanent monitoring equipment.