Cities on Volcanoes 9
November 20-25, 2016
Puerto Varas, Chile
'Understanding volcanoes and society: the key for risk mitigation'

Volcano-distribution and spatial parameter dependence in the Tuxtlas Volcanic Field – implications for hazard assessment

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Key words: Los Tuxtlas Volcanic Field, monogenetic volcanoes, spatial analysis, hazard, statistics

The Los Tuxtlas Volcanic Field (LTVF) is located in southern Veracruz State at the Coast of the Gulf of Mexico, almost 200 km to the South of the easternmost limit of the Trans-Mexican Volcanic Belt (TMVB). Although the LTVF includes several polygenetic volcanoes, active volcanism is not only focused to the central vent of the shield-like San Martín volcano, but also to monogenetic volcanism, expressed in more than 350 monogenetic vents; mainly scoria cones and maars of late Quaternary and Holocene ages. The volcanic field shows the second highest cone-density (up to 6/km2), after Michoacan-Guanajuato Volcanic Field, in Mexico. It also represents the field with highest maar-volcano abundance in Mexico with more than 41 young maar craters. In order to effectively protect the surrounding population, spatial modeling represents the first step towards hazard assessment of monogentic fields. Results of spatial kernel density analysis show the densest parts of the volcanic field in the central part of the regional fault system, and a highest maar density shifted towards the S. Furthermore, certain parameter-dependence across the volcanic field can be noticed in terms of crater-openings, associated lavas flows among others. Related hazards to monogenetic volcanism in the LTVF are manifold. Strombolian eruptions related to scoria cone construction can produce extensive ash and lapilli fallout; maar volcano eruptions are generally associated to pyroclastic surge emissions representing considerable threat to the surrounding population. About 15% of the scoria cones have associated lava flows, some of which have considerable volumes and travel distances of >10 km from the source. Our findings which also include first risk evaluations by questionnaires, although representing a first approximation, need to be reinforced especially by obtaining more radiometric ages of the individual eruptions (today, max. 10 ages available), in order to provide comprehensive spatio-temporal models of the populated volcanic field.