Flow-hazard scenarios at Ceboruco volcano (Nayarit, Mexico): Progressing towards a new hazard map

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Ceboruco is a young active stratovolcano in the western Trans-Mexican Volcanic Belt. After thousands of years of minor mostly effusive activity, around AD 1000, it experienced a major Plinian eruption (VEI=6) that produced the rhyodacitic Jala pumice fallout. This complex eruption included phases during which pyroclastic flows and surges (? 0.2 km3) were emitted. In addition, post-eruptive lahars rushed down the valleys mainly towards the S and SW. During the following 150 years, unrest continued and a total of 6 andesite lava flows were emplaced. Ceboruco's most recent activity (AD 1870-1875) included minor vulcanian explosions accompanied by the emplacement of pyroclastic surges towards the S, before thick dacite lava flowed down on its SW slope; intermittent ash emissions accompanied the entire eruption. Based on Ceboruco's known eruptive history, three different scenarios are being envisaged: 1) Effusive andesitic eruptions, 2) Dacitic summit dome emplacement accompanied by smaller vulcanian explosions, 3) high-magnitude Plinian eruptions. Spatial hazard evaluation was conducted through the simulation of the different volcanic phenomena expected to occur during possible future eruptions. Lahar simulations using Flo2D and LaharZ software for the 2nd and 3rd scenario show drainage towards the Ahuacatlán river to the S and major accumulations in the Jala valley, threatening villages near the base of the volcano. Possible future lava flow emissions from the central inner-crater and from the NW and SW upper flanks were simulated using the probabilistic software ELFM, calibrated by using parameters obtained from known Holocene and historic lava flows. Due to the present topographic configuration most ravines and surrounding plains could be inundated by lava flows. Spatio-temporal hazard evaluation is also being conducted by using the probabilistic event-tree methodology with the help of BET_VH software, which will allow us to calculate the probabilities of occurrence of each scenario within a selected time window.