

Modeling potential hazard zones of El Reventador volcano (Ecuador): cone- and fountain-collapse pyroclastic flows vs. cone landslide

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El Reventador is an active volcano located (77.658W, 0.080S) in the Eastern cordillera of Ecuador. The still ongoing eruptive period began on November 3th 2002 with a VEI 4 eruption which produced numerous pyroclastic flows descending the NE and SE flanks of the active cone (255.106 m³ bulk volume) and a tephra column rising about 16-17 km above the crater. This paroxysmal phase destroyed the top of the cone incorporating approximately 24.106 to 49.106 m³ of material into the pyroclastic flows. Previous work estimated a total erupted volume of about 0.355 km³ ranking that eruption as the largest registered since historical times (1534) in Ecuador. Infrastructure of national importance is located nearby the volcano as the Ecuadorian pipelines and a hydroelectric Power Plant. At least 40 different lava flows and an almost continuous Strombolian to Vulcanian activity have been identified since 2002. These products have contributed to rebuild the active cone. Nowadays, the current cone elevation is higher than the one existing in 2002, representing a major threat in case of a new paroxysm. In order to better estimate this potential hazard we used the numerical VolcFlow code to model pyroclastic flows and evaluate the associated impacted area. Three scenarios were tested considering the recent topography of the active cone: 1) a paroxysmal eruption with cone destruction, "El Reventador 2002-type", 2) a paroxysmal eruption with fountain collapse only, "Tungurahua 2006-type" and 3) a non-eruptive cone collapse (landslide). Scenarios 1 and 2 will bury even more the Ecuadorian pipelines. Besides, the pyroclastic deposits would dam the Quijos River, potentially generating secondary lahars directly affecting part of the infrastructure of the "Coca Codo Sinclair" hydroelectric Power Plant. On the contrary, scenario 3 affection area is limited within the older edifice.