

Video Analysis of Small Vulcanian Explosions at Santiaguito, Guatemala

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During two extended periods (July-September, 2007 and January-March, 2008) we recorded and analyzed 31 small explosions at Santiaguito Volcano, Guatemala, including time-height relations and cloud dimensions. Volcanic plumes at Santiaguito result from the unsteady emissions of ash and gas through concentric ring fractures and a series of smaller fractures within the rings in the dome.

Observations from the summit of Santa Maria reveal three principle components to the resulting explosion clouds; steady explosions of gas with variable amounts of ash, passive emissions of gas, and brief (<10 seconds) bursts of ash-rich jets which collapse upon themselves.

Explosions lasted 30-300 seconds and occurred every 15-150 minutes. They consisted of 1-8 pulses and typically reached heights of 800-1500m above the vent. The first 1 or 2 observable pulses in each explosion typically had the lowest near-vent velocities (4-16m at <100m above vent) and higher velocities were measured in later pulses higher above the vent. At low heights above the vent later pulses were masked by previous pulses, but their higher velocities at higher elevations, where they were visible, suggest they had higher initial velocities than earlier pulses.

Explosions end with a degassing stem that slowly wanes. This suggests that the vent system opens gradually in increments before it closes and reseals. Typical eruption rate for the analyzed explosions was on the order of 130-3500kg sand the gas mass fraction is large, about 0.19 for average explosions. The explosion clouds we observed are similar to those described at other volcanoes with distinct eruption mechanisms. Through this reasoning, explosions at Santiaguito can be classified as low-intensity vulcanian.