

Tisdale, C.M., Houghton, B.F. and Patrick, M.R., 2023, December. Video analysis reveals complex, diverse explosive processes during initial phases of a fissure eruption: Fissure 17 of the 2018 lower East Rift Zone eruption of Kīlauea. In *AGU Fall Meeting Abstracts* (Vol. 2023, pp. V32A-06).

ABSTRACT

Analysis of high-resolution videography of Fissure 17, from the 2018 lower East Rift Zone eruption of Kīlauea, reveals diverse explosive styles of activity occurring simultaneously at adjacent vents during the initial phase of the eruption. Fissure 17 began erupting on 13 May, offset from the linear trend of the rest of the 2018 fissure system by ~200 meters. Activity started on the western end with vents displaying discrete Strombolian explosions and then propagated eastward with activity generally, with a few exceptions, becoming more sustained further to the east. By 14 May, there were ~30 active vents that stretched over ~500 meters of the Fissure 17 segment. Activity at the fissure was captured through ground and aerial-based videography. Using image analysis techniques, we were able to measure initial pyroclast velocities and sizes, maximum heights for pyroclasts and fountains, distances traveled from the vent, and duration and frequency of pulses and events. Combining these measurements and qualitative analysis, we identified 4 styles of explosive behavior during the initial phase (13-15 May): 1. Normal Strombolian; 2. Discrete spattering; 3. Continuous spattering; 4. Unsteady Hawaiian fountaining. A fundamental question is why was there such diverse styles of activity over short spatial and temporal scales? We attribute this to variable magma compositions, ranging from basalt to andesite/basaltic andesite, on length scales of 100s of meters. On scales of 1-10 meters, the types of explosive style is determined by the behavior of the gas in the shallow conduit. Our study shows video analysis to be an effective technique in gaining new insight into fissure eruption dynamics, thereby enhancing our ability to characterize hazards.

Link: <https://ui.adsabs.harvard.edu/abs/2023AGUFM.V32A..06T/abstract>