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Inferring conduit process from population studies of cinder cone craters

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One of the most observable aspects of magma conduits is of course their exit to the Earth's surface: the volcanic crater. The craters resulting from small mostly-monogenetic volcanic eruptions vary in considerable in size and shape, even after accounting for variation in size. Presumably, these variations tell us something about the state of the conduit at least in the ending stages of eruption. But what? This work explores the statistical properties of crater populations in Guatemala and elsewhere and speculates on the conduit processes that may explain the complex behavior. Crater depths are strongly correlated with cone slopes even when normalized by cone diameter, which suggests the importance of the impact of the volatile content (which may influence slope through fragmentation and the resulting grain size) and the duration of eruption (which may influence whether the cone is built to its maximum slope) despite erosion acting to reduce observed crater depths (cone slopes are known to decrease with erosion but cone diameters increase).