Numerical Study of Volcanic Eruption Columns

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Numerical simulations are used to study the dynamics of volcanic eruption columns. Our simulations are based on numerical integration of axisymmetric, compressible Navier-Stokes equations. The results show that a part of the well-developed eruption columns may intermittently collapse and generate pyroclastic flows. Our simulations also reveal that the entrainment assumption used in one-dimensional steady models is not appropriate for volcanic eruptions because peculiar horizontal structure is generated within the eruption columns. We demonstrate the usefulness of Temperature versus Solid particle fraction (T-S) diagram for discussing the density distribution, which strongly affects the dynamics of eruption columns through buoyancy.