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Modeling the dynamics of turbulent multiphase gravity currents: the importance of geologically diverse boundary conditions in volcanic flows[1] JOSEF DUFEK, MICHAEL MANGA, University of California, Berkeley, GEORGE BERGANTZ, University of Washington — Pyroclastic flows produced during explosive volcanic eruptions represent a high-energy end-member for granular flows, and permit exploration of a vast parameter space of particle-particle and particle-gas interactions. The inherent difficulty of observing volcanic events as well as the scarcity of on-going eruptions has resulted in a continuing discussion about the internal particle concentration of pyroclastic flows from dilute to dense end-members. For instance, it remains unclear to what degree basally concentrated bed-load regions of the flow are responsible for mass and momentum transfer. In order to probe the internal structure of these flows an Eulerian-Eulerian-Lagrangian (*EEL*) computational approach was coupled with an examination of deposits of flows that have traversed a body of water (and thereby filtering out their bed-load) versus flow that have traveled over-land. We integrate the EEL model with laboratory experiments to better understand momentum and heat transfer at multiple length and timescales. This investigation reveals that energy-dissipation at the basal boundary is one of the primary factors determining the run-out distance of pyroclastic flows and determines the emergence of concentrated and poorly-sorted bed-load regions.

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