Dynamics in cohesive granular flow\textsuperscript{1} JENNIFER RIESER, WENBIN LI, JU LI, University of Pennsylvania, JERRY GOLLUB, Haverford College, DOUGLAS DURIAN, University of Pennsylvania — Inter-particle interactions often have a dramatic effect on granular flow dynamics. Here, we explore the flow resulting from an applied compressive stress on a granular pillar composed of a single layer of particles. Grain-grain attractions within the pillar are governed by tunable capillary forces induced by an interstitial fluid. Both the applied stress and the grain positions are monitored as a function of time. We determine the probability distributions of particle translational and angular velocities, local packing fraction, and the number of nearest neighbors as a function of time. In addition, instantaneous velocities are used to characterize larger scale spatial structures that emerge in the flow from the collective motion of particles. We see a striking dependence on initial conditions, for instance in the development and in the behavior of slip planes, both of which are found to be qualitatively similar to molecular dynamics simulations.

\textsuperscript{1}This work is supported by MRSEC/DMR05-20020.