Abstract Submitted
for the DFD15 Meeting of
The American Physical Society

Entrainment of Vertical Jets in Turbulent Cross Flow GRAHAM FREEDLAND, Portland State Univ, KAREN ROBERTS, Washington State Univ, LARRY MASTIN, U.S. Geological Survey, STEPHEN SOLOVITZ, Washington State Univ, RAUL CAL, Portland State Univ — Volcanic eruptions produce high concentrations of ash that produce clouds in the atmosphere that are hazardous for private and commercial aviation. Without accurate models to predict ash concentrations, air traffic is unable to safely navigate ash clouds downwind of an eruption as critical concentrations are difficult to identify visually. Current models rely on inputs such as plume height, eruptive dissipation and cross-flow wind speeds as well as empirical parameters such as the entrainment ratio between the cross-flow and the plume velocity. A wind tunnel experiment has been designed to investigate these models by injecting air orthogonally into a cross-flow. The ratio of the cross-flow and jet velocities is varied to simulate a weak plume and flow response is measured using particle image velocimetry. Grids upstream of the plume create different turbulence intensities, which, combined with different jet geometries, allow us to study the flow field, mean and second order moments and thereby obtain information to accurately model volcanic ash concentrations in the atmosphere.

Graham Freedland
Portland State Univ

Date submitted: 31 Jul 2015 Electronic form version 1.4