Abstract Submitted
for the DFD16 Meeting of
The American Physical Society

Dynamics of Downdrafts EMILY KRUGER, HENRY BURRIDGE, JAMIE PARTRIDGE, Univ of Cambridge, GABRIEL ROONEY, MET Office, PAUL LINDEN, Univ of Cambridge — Downward moving cold air witin thunderstorms, known as downdrafts, can be used to determine the severity of a storm. Therefore an understanding of them is useful for weather forecasting. Typically in weather forecasting these downdrafts are modelled using the theory of a plume from from Morton, Taylor and Turner (1956), which inherintly assumes that the plume is long and thin. Downdrafts are generally wider than they are high and hence deviate from the Morton, Taylor and Turner theory. We perform experiments using finite releases of dense fluid from large area sources, releasing a range of volumes of fluids from a cylinder, at a range of heights above the ground which encompasses the typical geometries of downdrafts. By tracking the edges of the release we compare the dynamics of both the fall and the resulting gravity currents of our experimental data to that of previous results. In doing so we find that the resulting gravity current behaves like an axi-symmeteric finite release gravity current, whereas the fall doesnt seem to resemble anything previously studied. We hope that these results and future work will allow us to better inform forecasting of weather arising from such downdrafts.

Emily Kruger
Univ of Cambridge

Date submitted: 31 Jul 2016 Electronic form version 1.4