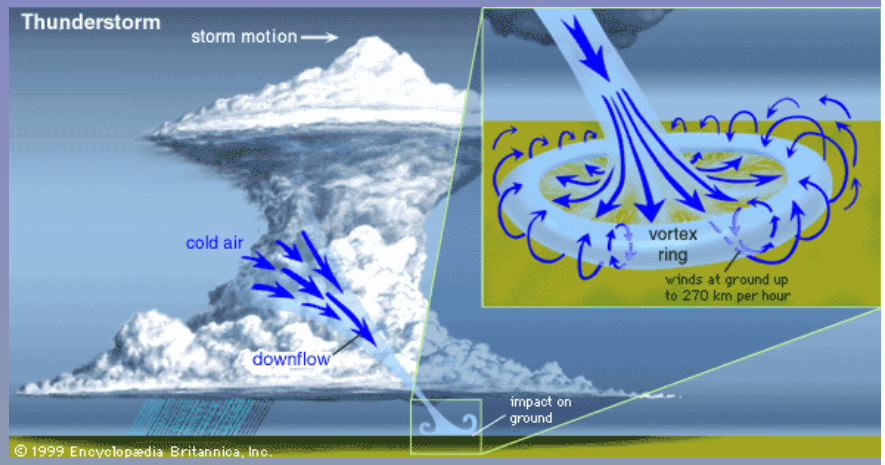
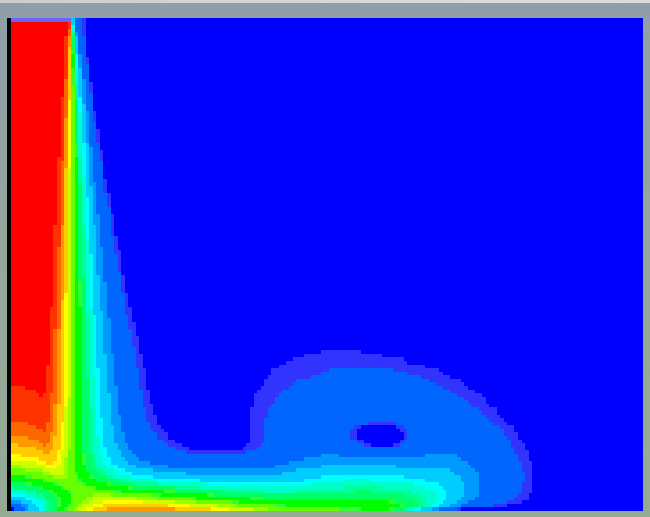
SIMULATION OF REALISTIC NEAR SURFACE DOWNBURST OUTFLOW

Background

A downburst is a strong downdraft inducing an outburst of damaging surface winds. It is caused by evaporative cooling and precipitation loading above the cloud base



Thunderstorm downburst



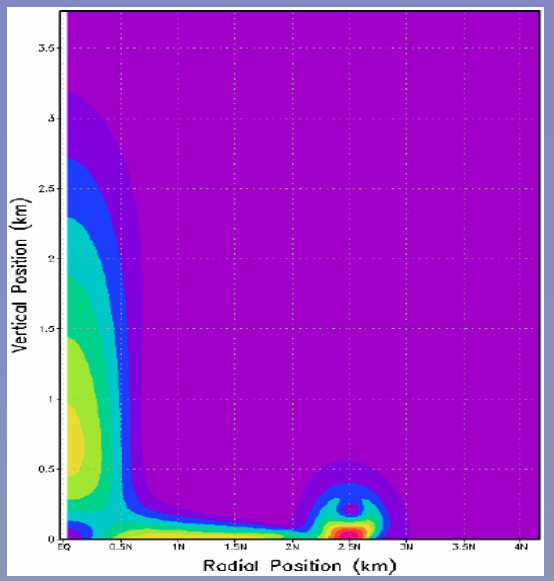
Contours of velocity in the impinging jet model

Objectives

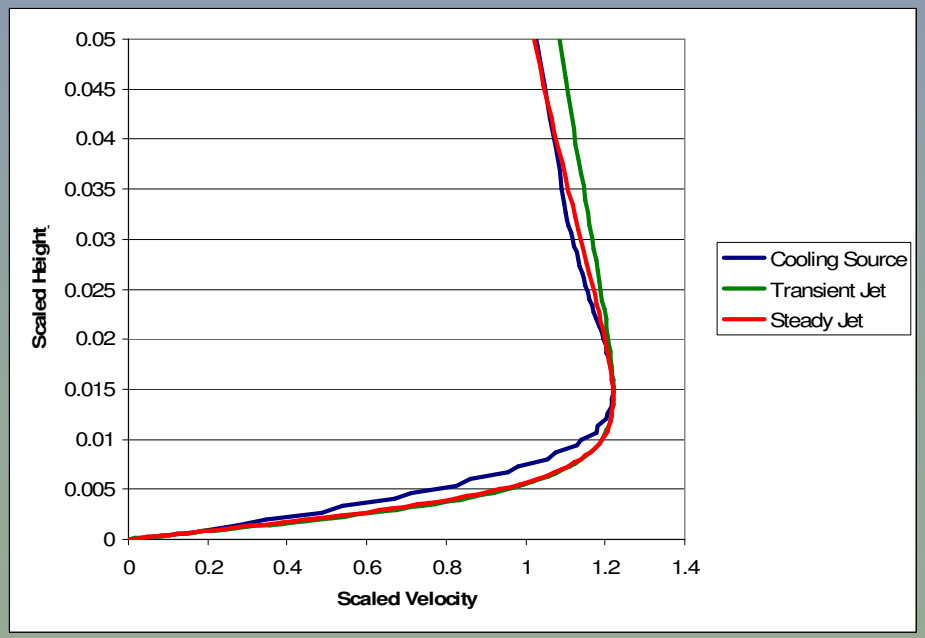
To determine the similarity of impinging jet and realistic cooling source models. To determine the near surface outflow of multiple simultaneous events (microburst line).

Research Carried Out

Both cooling source and impinging jet downburst models have been simulated. The near surface outflows have been compared to determine similar features, particularly the radial velocity component.



Contours of velocity in the cooling model



Scaled radial velocity profiles

Initial Findings

The physical processes are fundamentally different. Hence, the velocity profiles are not universally scaleable, although regions of similarity do exist. This has implications for lab-scale simulations.