Phenomenology of Colorado Tornadoes:

Morris Weisman  NCAR/MMM   08/21/14
…near Burlington, CO
May 30, 1996…near Elba, CO
June 6, 1990...near Limon Colorado
May 22, 2008  Windsor, CO
Severe Storm Climatology

May 6

June 3

July 1

July 29
Severe Weather Types

Tornadoes

F2 > Tornadoes

2 in Hail

65 kt Winds

Tornado Days Per Year (1980–1999)

Significant (F2 or greater) Tornado Days Per Century (1921–1995)

Hail (2 inch or more) Days Per Year (1980–1994)

Wind (65 kt or more) Days Per Year (1980–1994)
Denver Area Tornado Statistics (SPC):
Ordinary Cell Evolution:
Multicell:
Supercell:
Observed Supercell Along Front Range:
Supercell Surface Features

- Light rain
- Forward-flank downdraft
- Rear-flank downdraft
- Hook echo
- Velocity couplet associated with mesocyclone
- Heavy rain and hail
- Updraft

0 10 20 km
Development of Supercell Rotation:

*need strong variation of winds with height: e.g., environmental vertical wind shear…
05/21/14
June 6, 1990...near Limon Colorado
June 6, 1990...near Limon Colorado
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June 6, 1990…near Limon Colorado
June 6, 1990...near Limon Colorado
June 6, 1990…near Limon Colorado
June 6, 1990...near Limon Colorado
…near Watkins, CO
Landspout Mechanisms:
Landspout Mechanisms:

Conservation of angular momentum
Example of the Denver Cyclone:

Fig. 1. Elevation contours (meters) of northeastern Colorado, shaded above 3000 m, with the NOAA/FSL measurement stations (open circles), SAO stations (closed circles), schematic flow for the DCVZ (with “mean” location shown by the dashed line), analysis areas for Figures 10a-10f (two solid boxes), and area in Figure 4 (dashed box).
July 2, 1987 Tornado

1524:22 MDT

Hook Echo

Rotational Couplet
Denver Area Tornado Statistics (SPC):