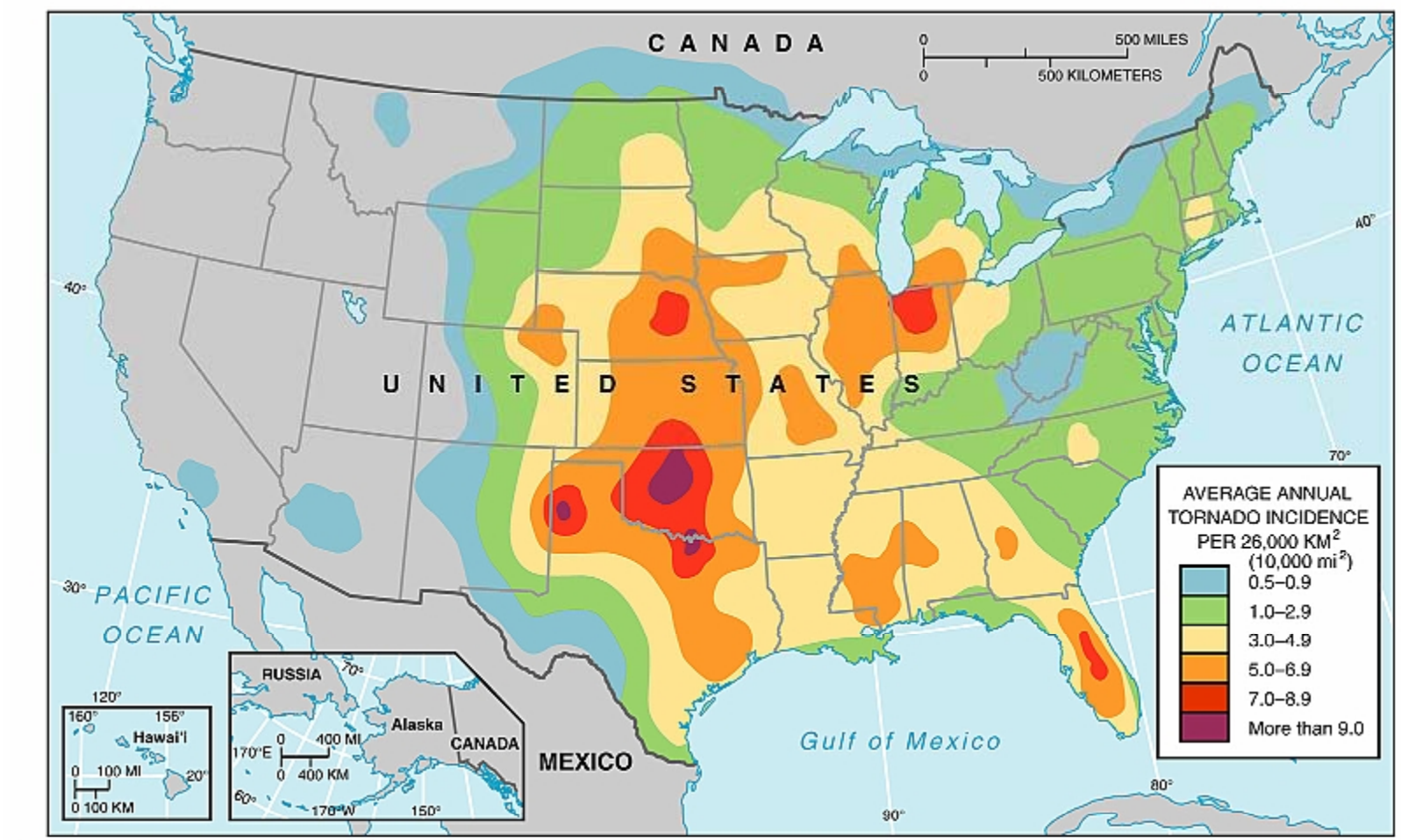
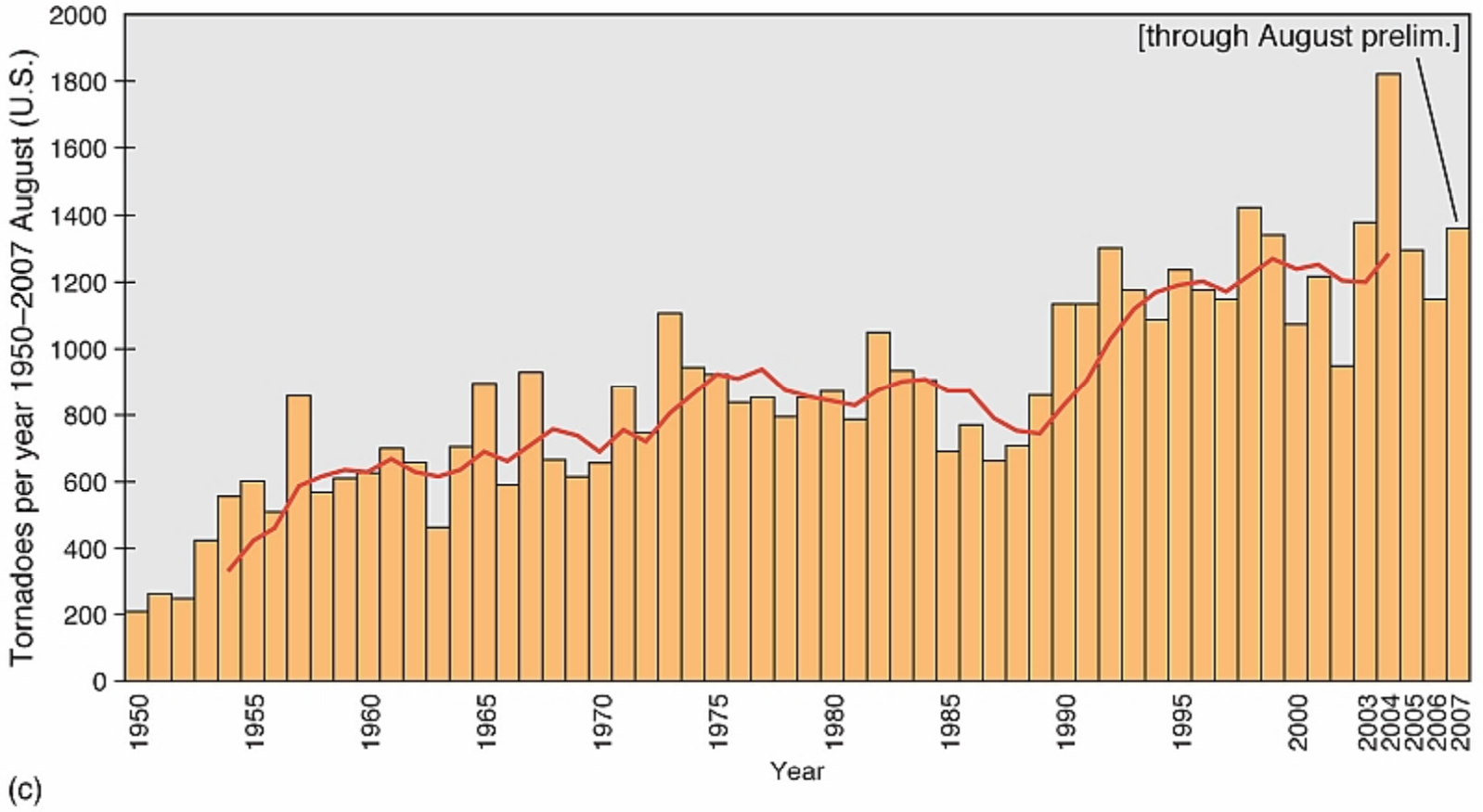
Tornado Alley Includes the Great Plains, Midwest and Parts of the South.

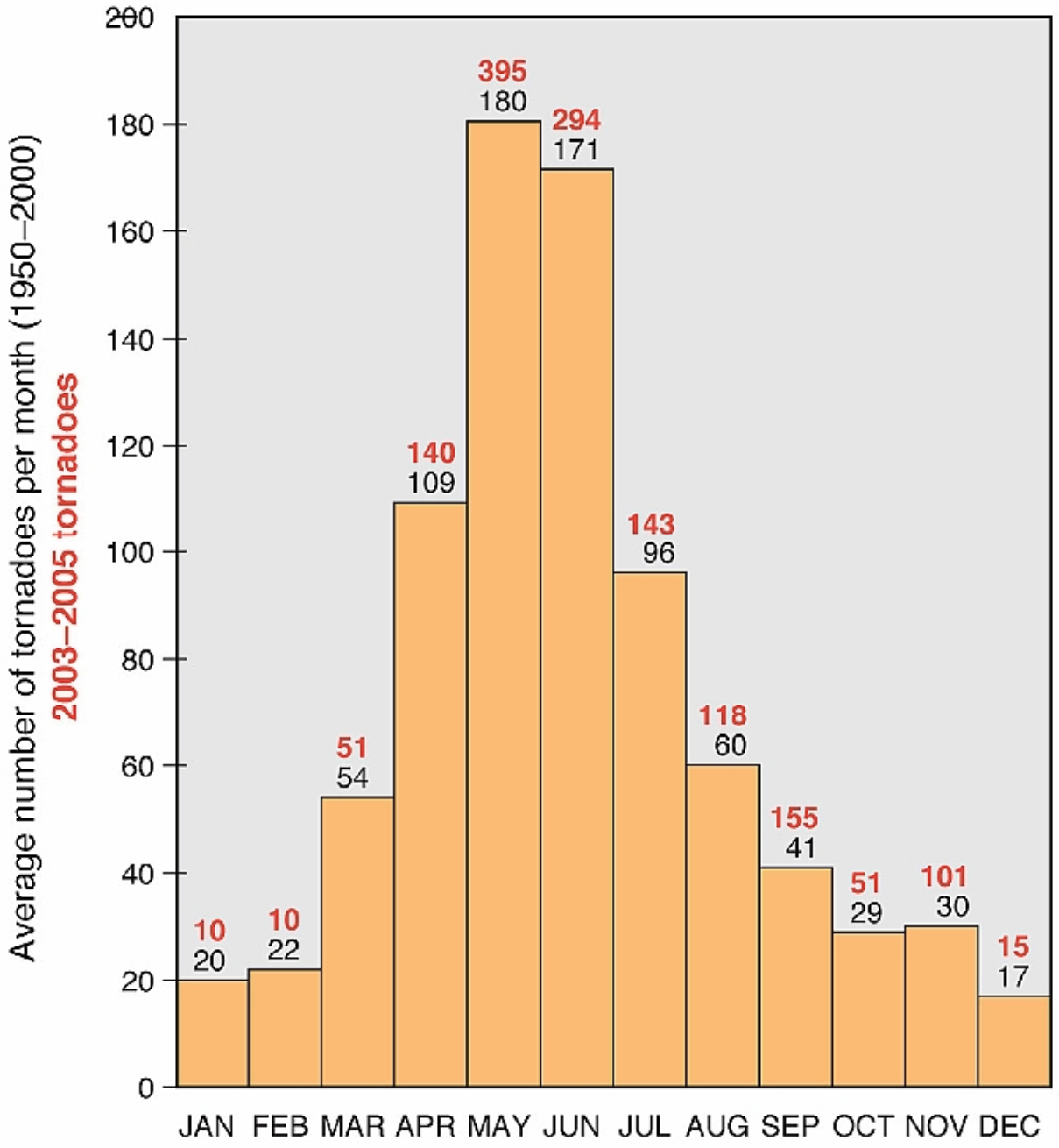


(a)

Has the Number of Tornadoes Really Increased from 200 per year to 1300 per year?



Most Tornadoes Occur from April to July

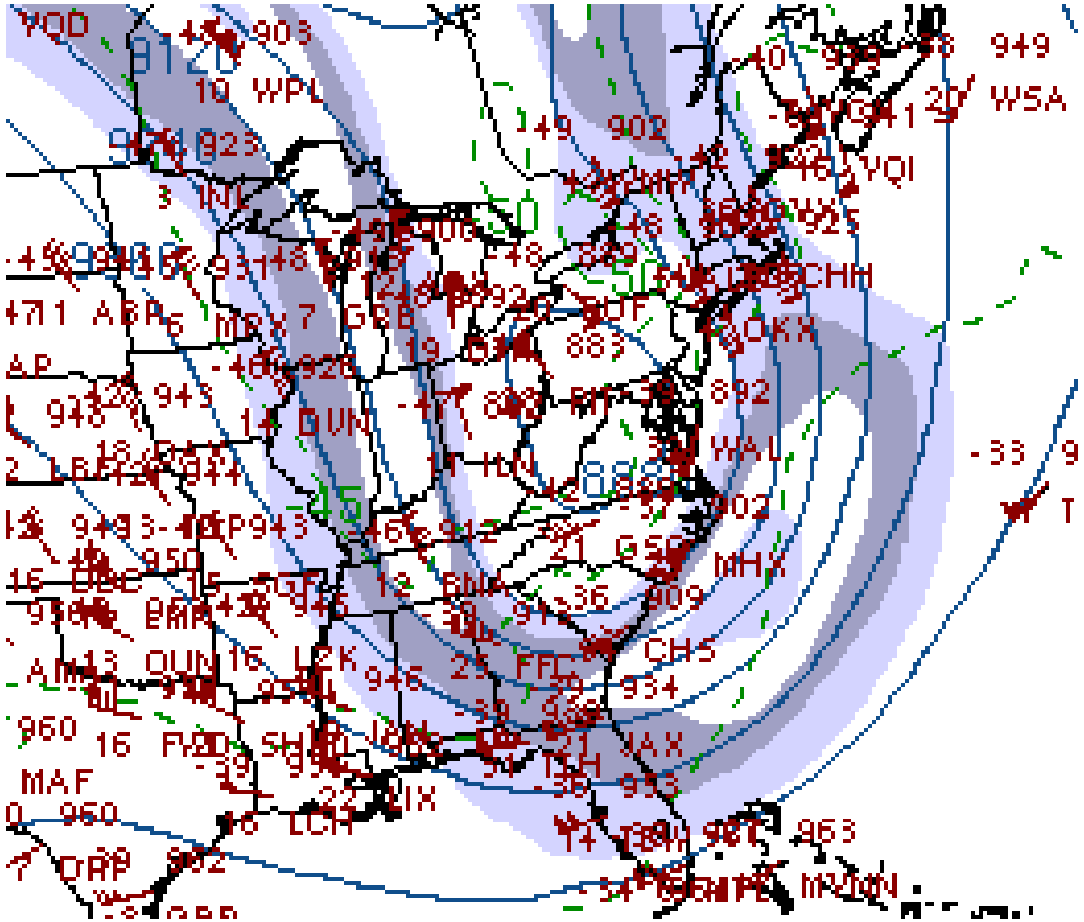


(b)

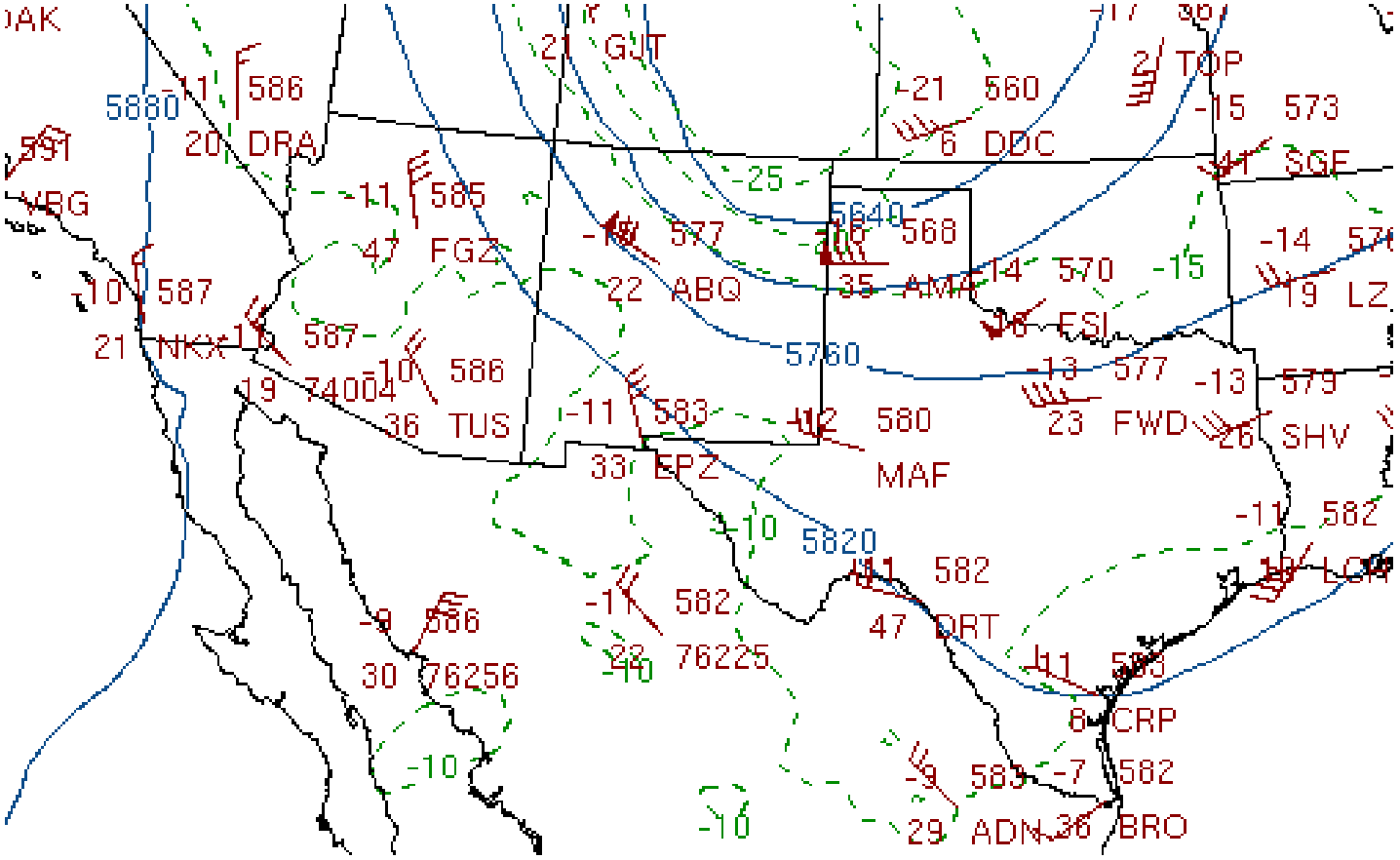
Formation Factors for Severe Thunderstorms

1. Jet Stream Aloft
2. Upper Air Divergence
3. Upper Air Inversion
4. Fronts within a Mid-latitude Cyclonic System
5. Proper Wind Shear Profile
6. Moisture Tongue
7. Negative Lifted Index
8. Development of Squall Lines
9. Large Steady State Thunderstorm

Purple Highlights Shows Location of Fastest Westerlies = the Jet Stream

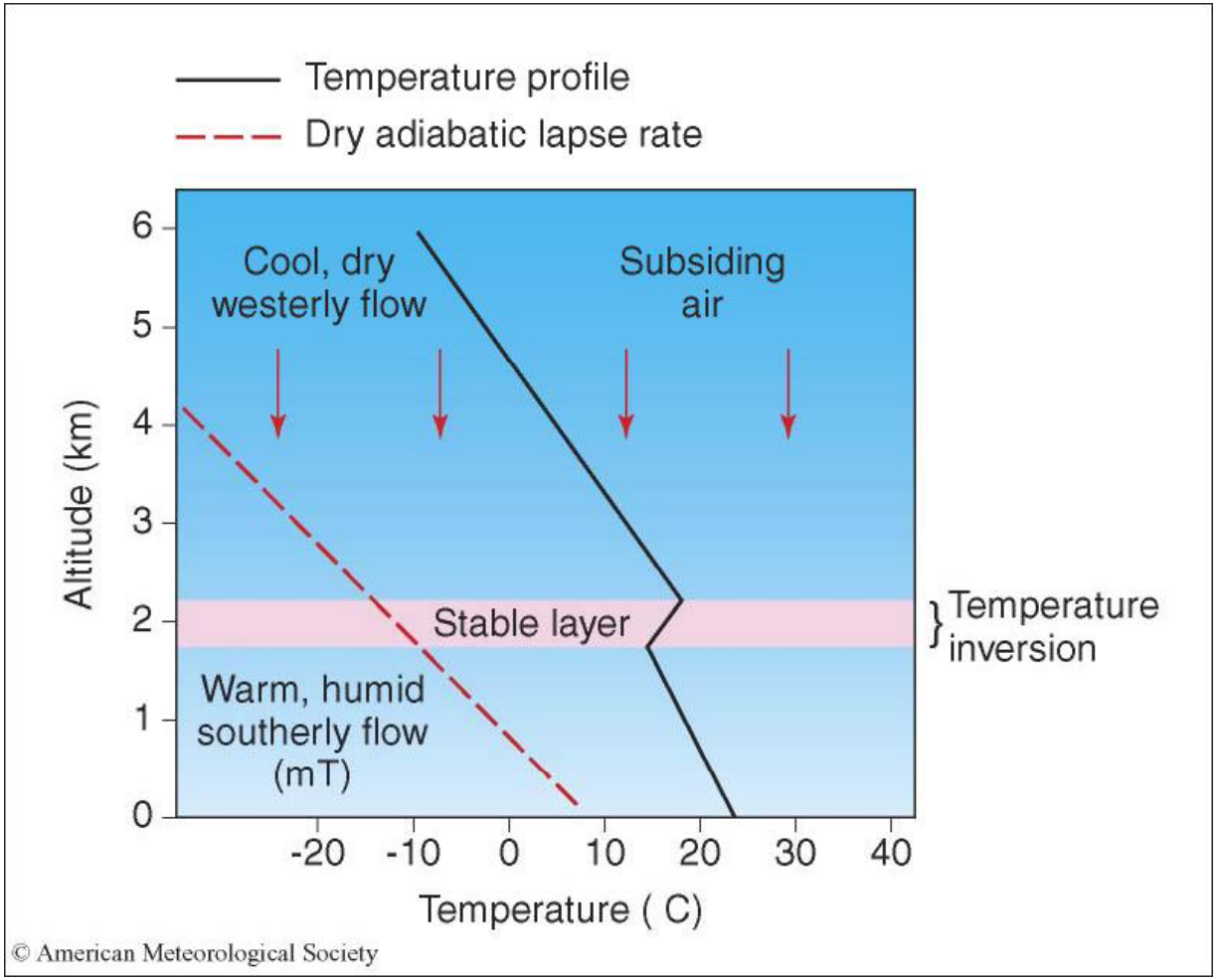


Strong Divergence Field from NM across TX and OK. Prime Ingredient for Severe Weather

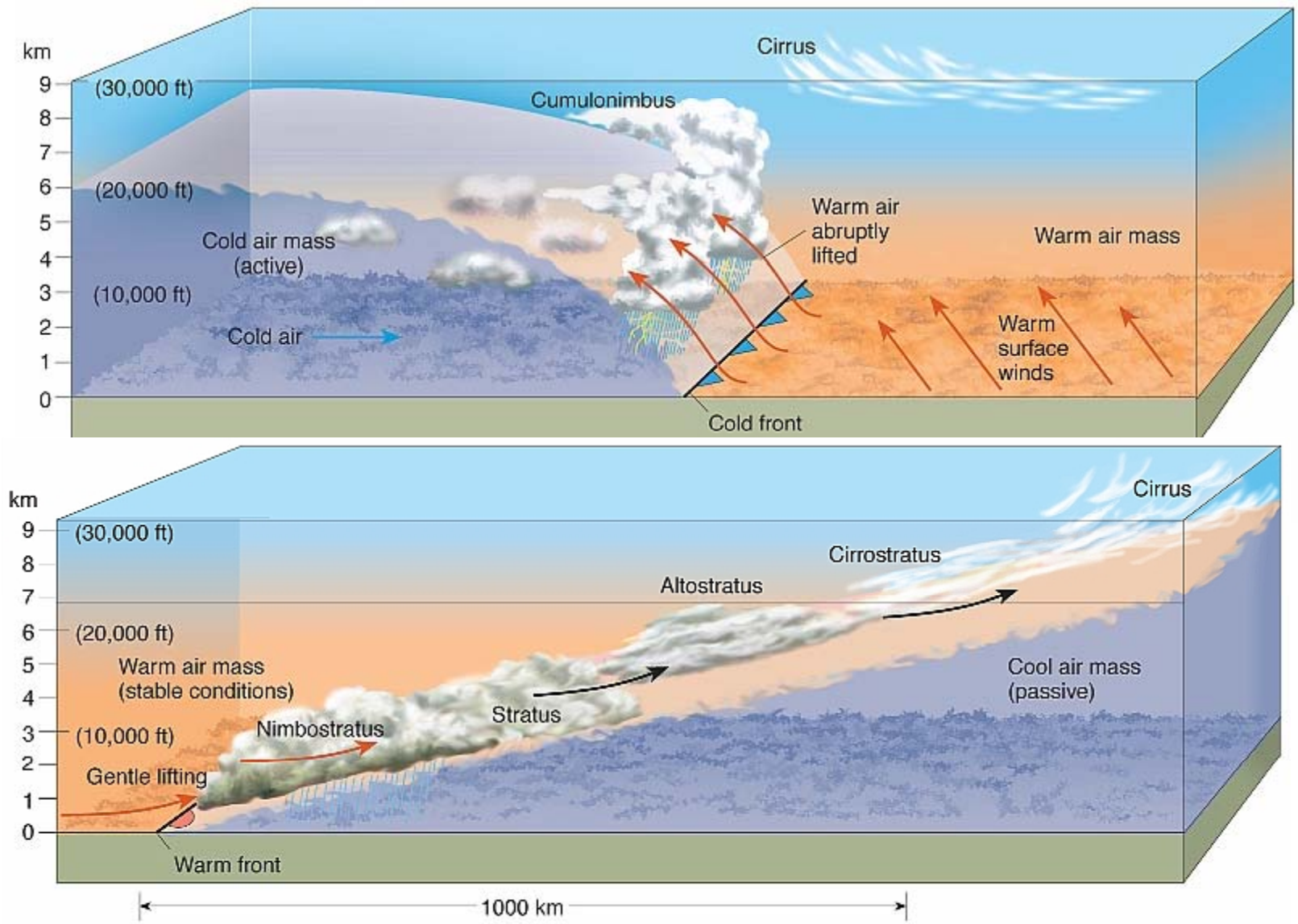


Curiously, An Inversion Aids Development of Severe T-storms

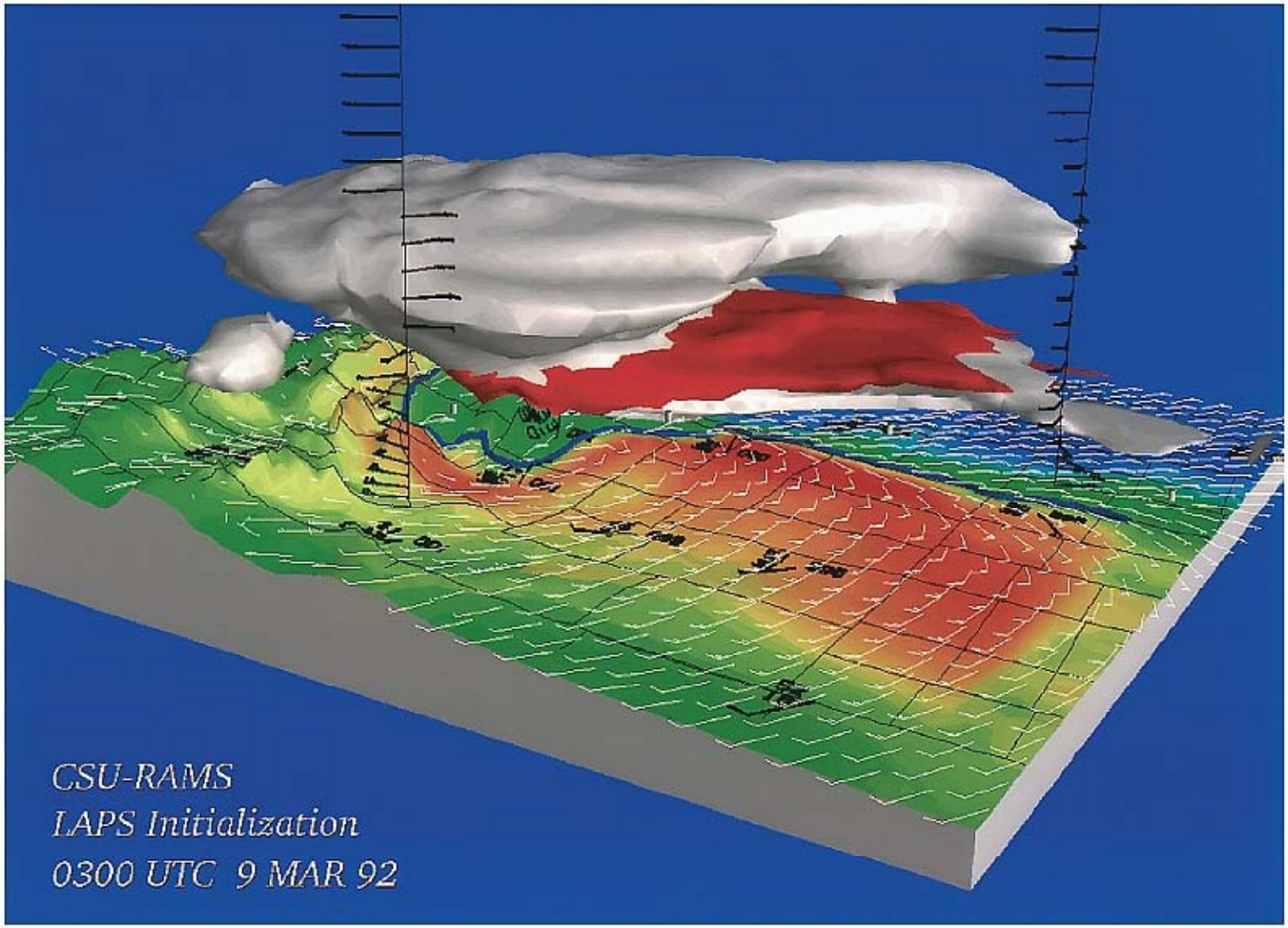
This is often associated with a flow of dry warm air from the southwest and is called the cap. Storm chasers employ black magic to determine where the cap will break.



Lifting Along Cold Front is Under Running
Lifting Along Warm Front is Over Running

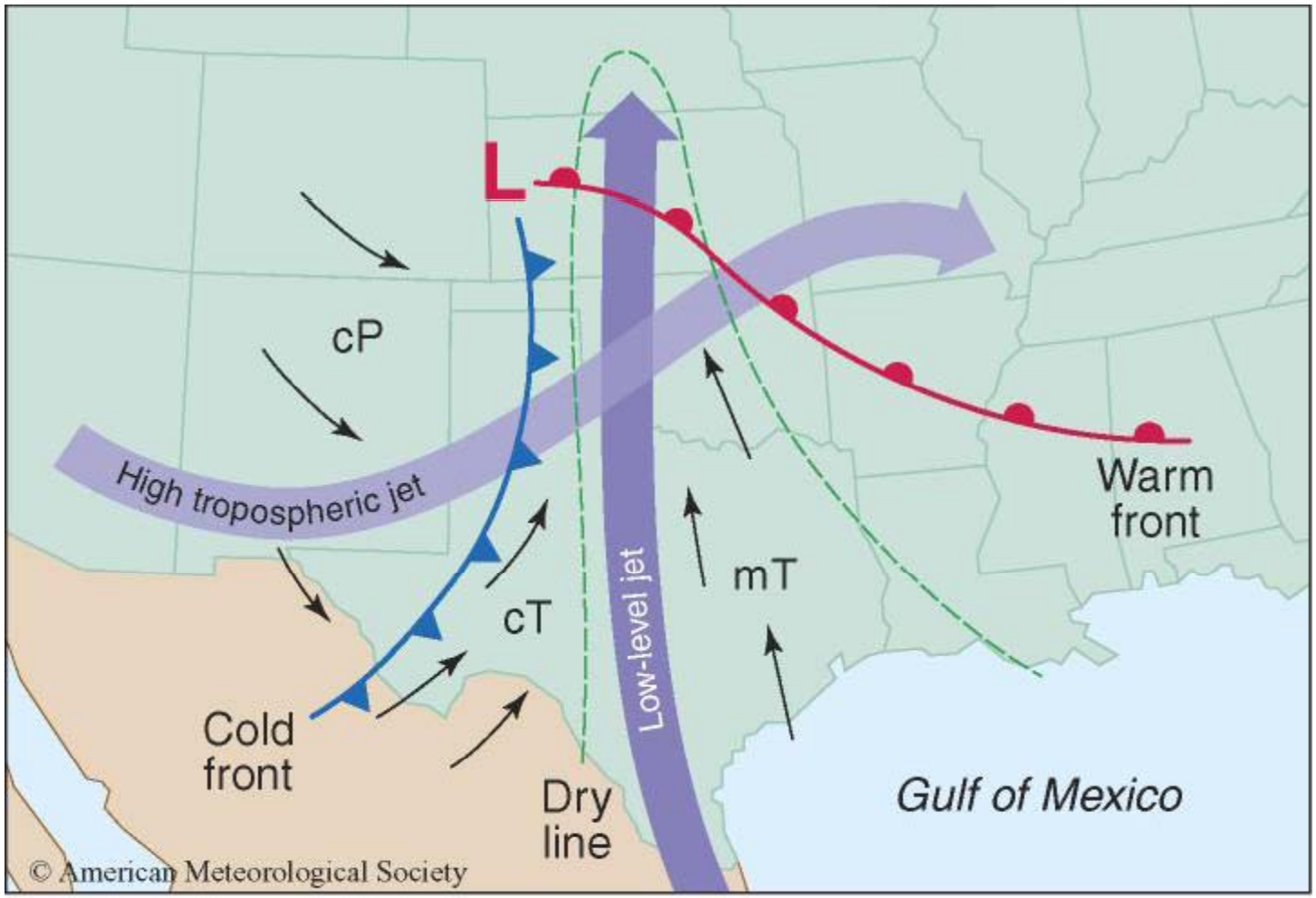


Significant Wind Shear in Severe Thunderstorm Shown by Black Spiral Ladders

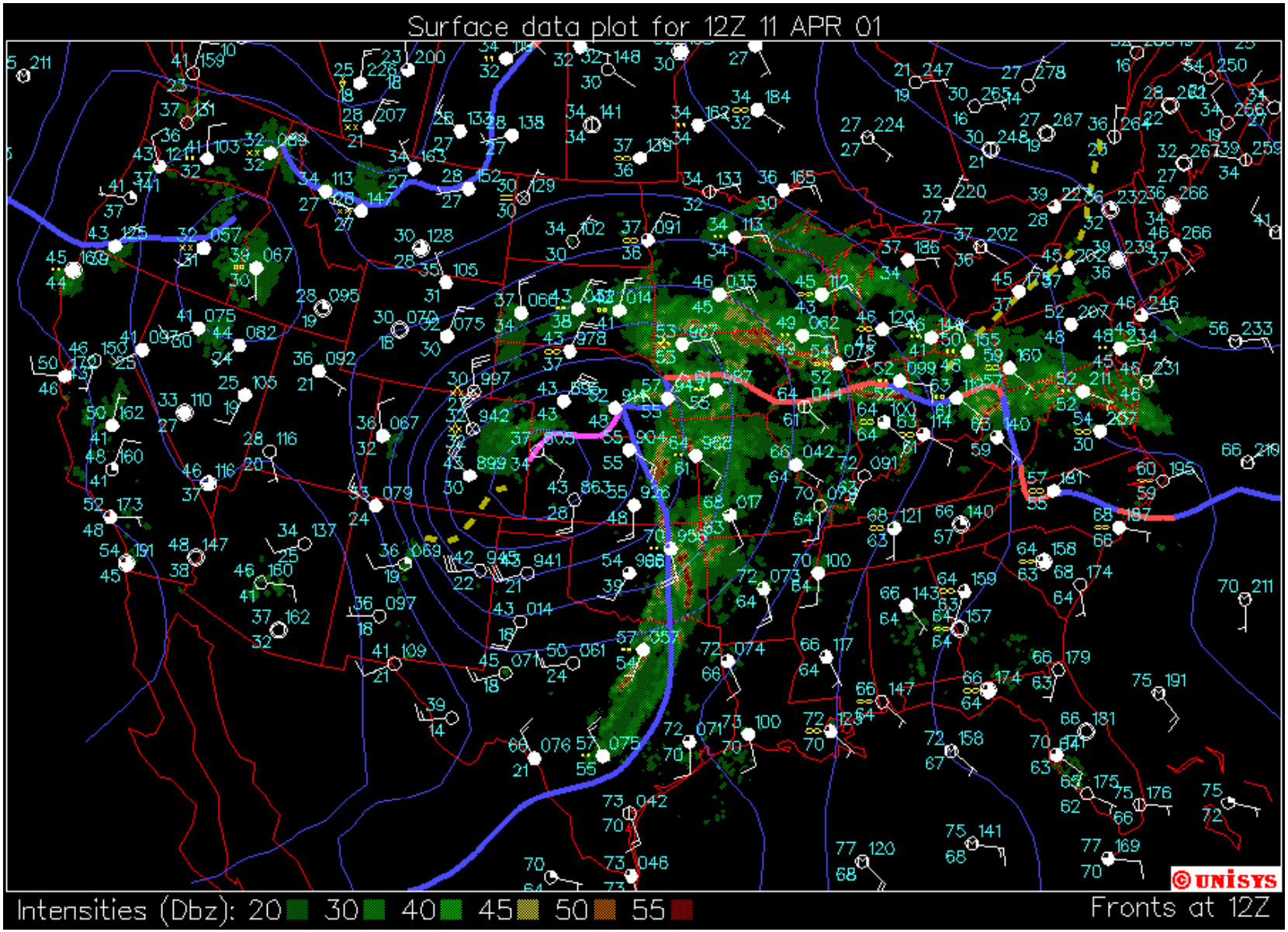


(b)

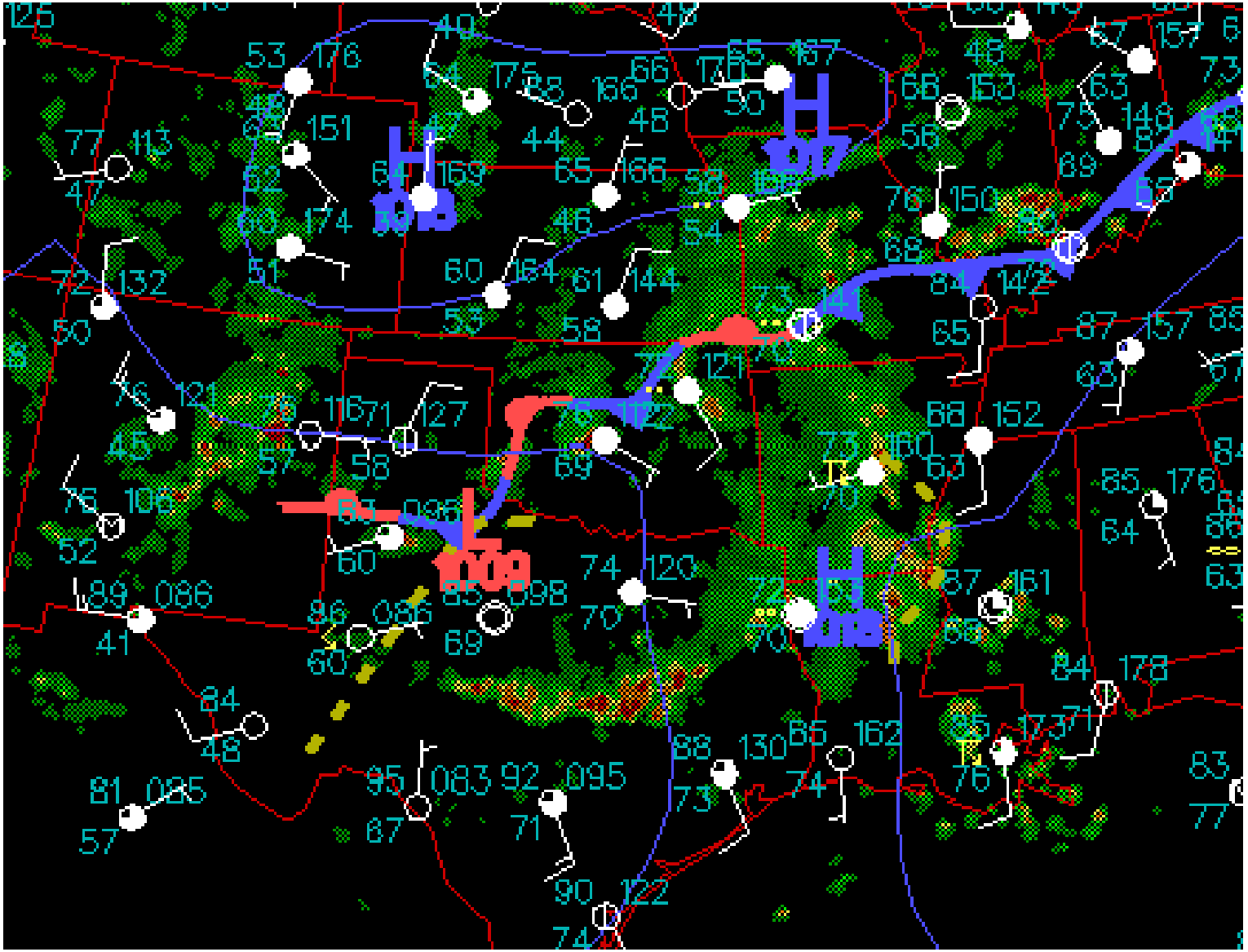
The Moisture Tongue is the Maritime Tropical Air Flowing into the Open Sector of a Cyclone. Note Dryline is Boundary between Mt and Ct Air



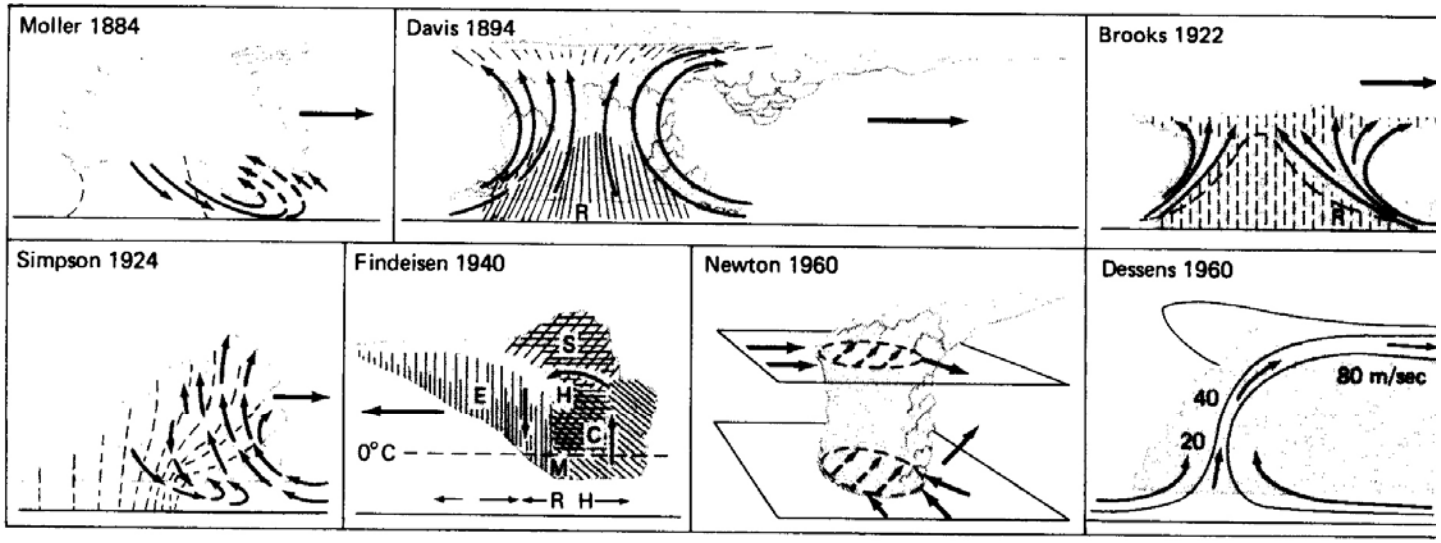
Strong Squall Line of T-Storms Across OK



A Series of Connected Gust Fronts Forms an Outflow Boundary Often a Crescent Shaped Arc



Historical Models of Severe T-Storm Formation



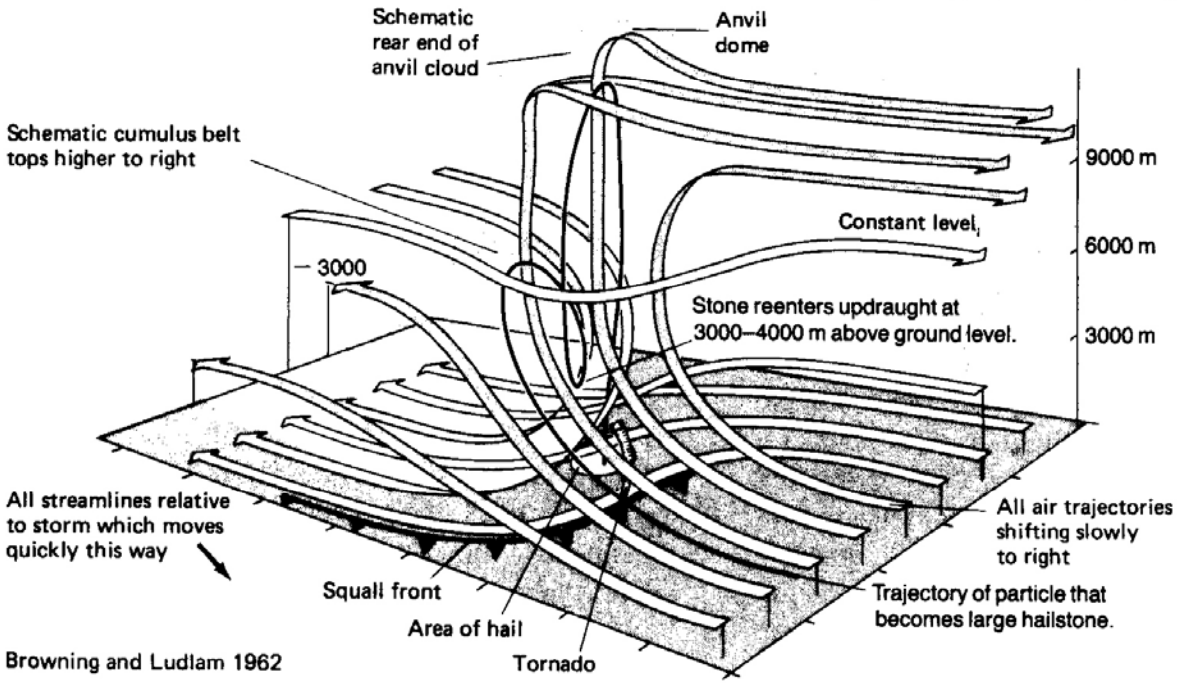
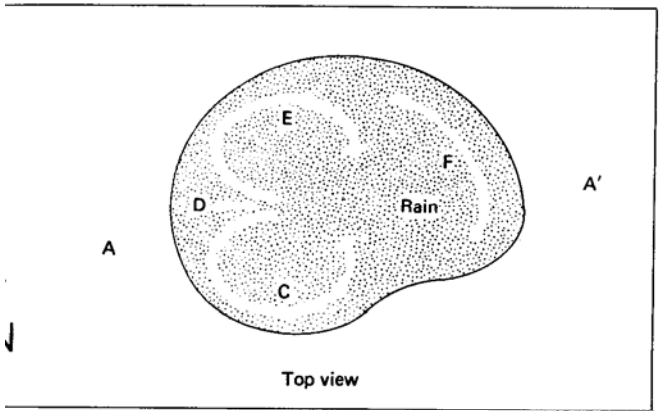


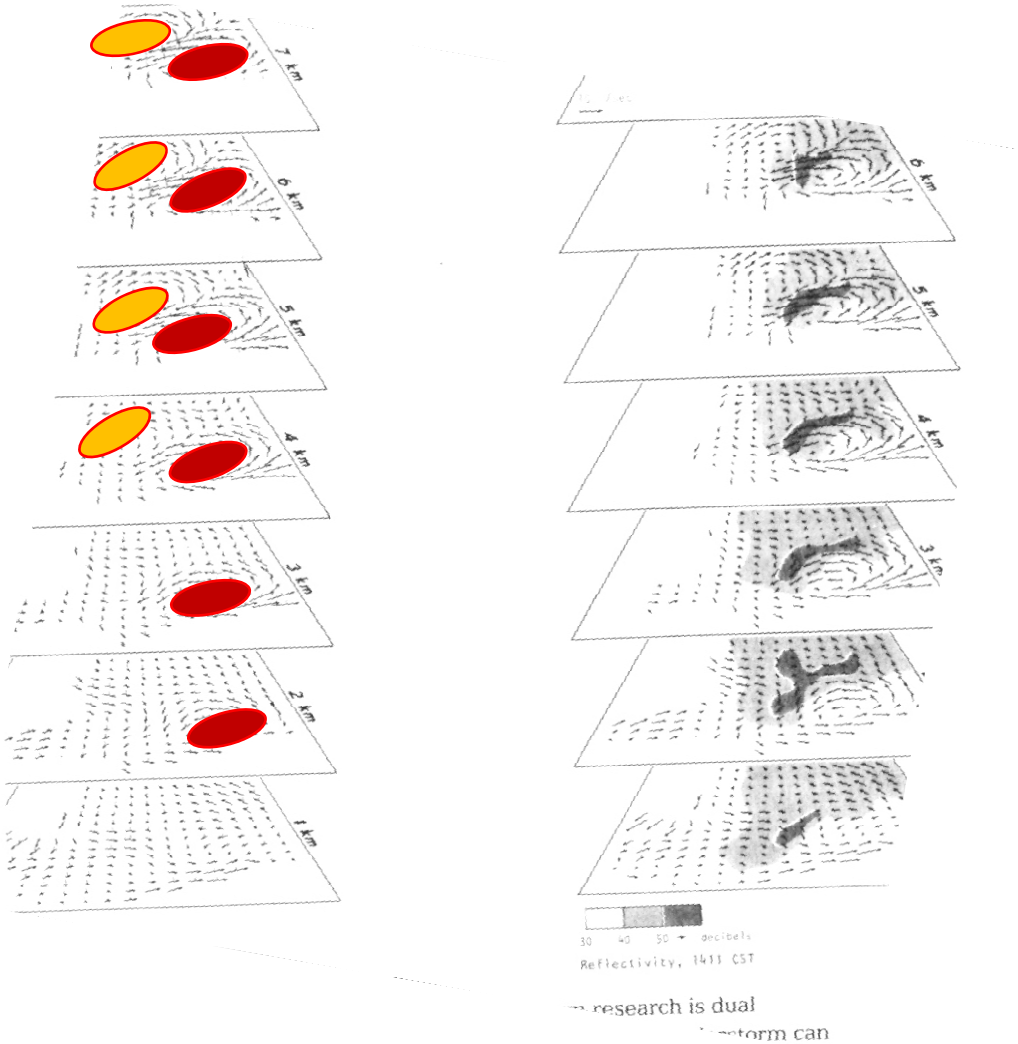
Diagram of Double Vortex Model



A = Jet Stream
B = Rear Flank Downdraft (RFD)
C, D, E, F = Thermal Updraft
Gust Front

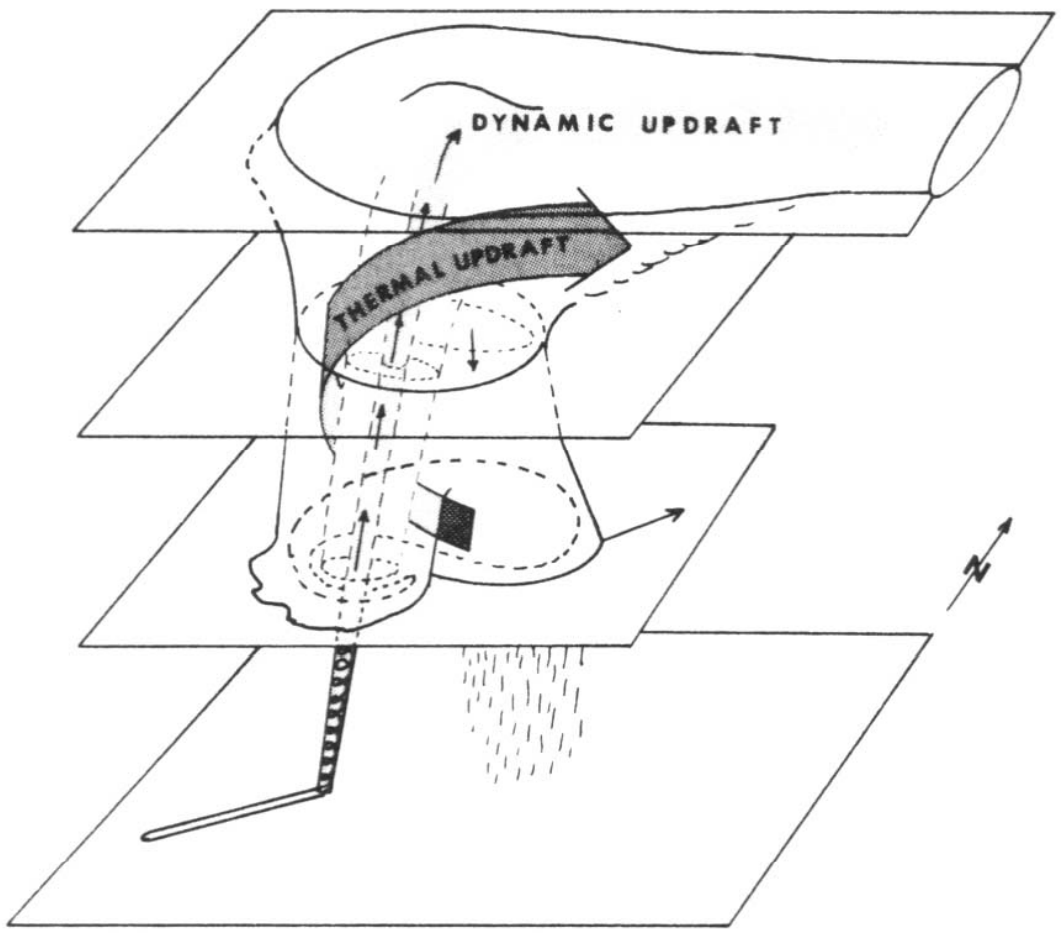
Slot Created by Rear Flank Downdraft. Descending Air Warms and RH Falls Below 100%, So Cloud Dissipates

Doppler Radar Revealed that the Mesocyclone (in red) Extended Nearly to the Ground. The Mesoanticyclone Did Not.



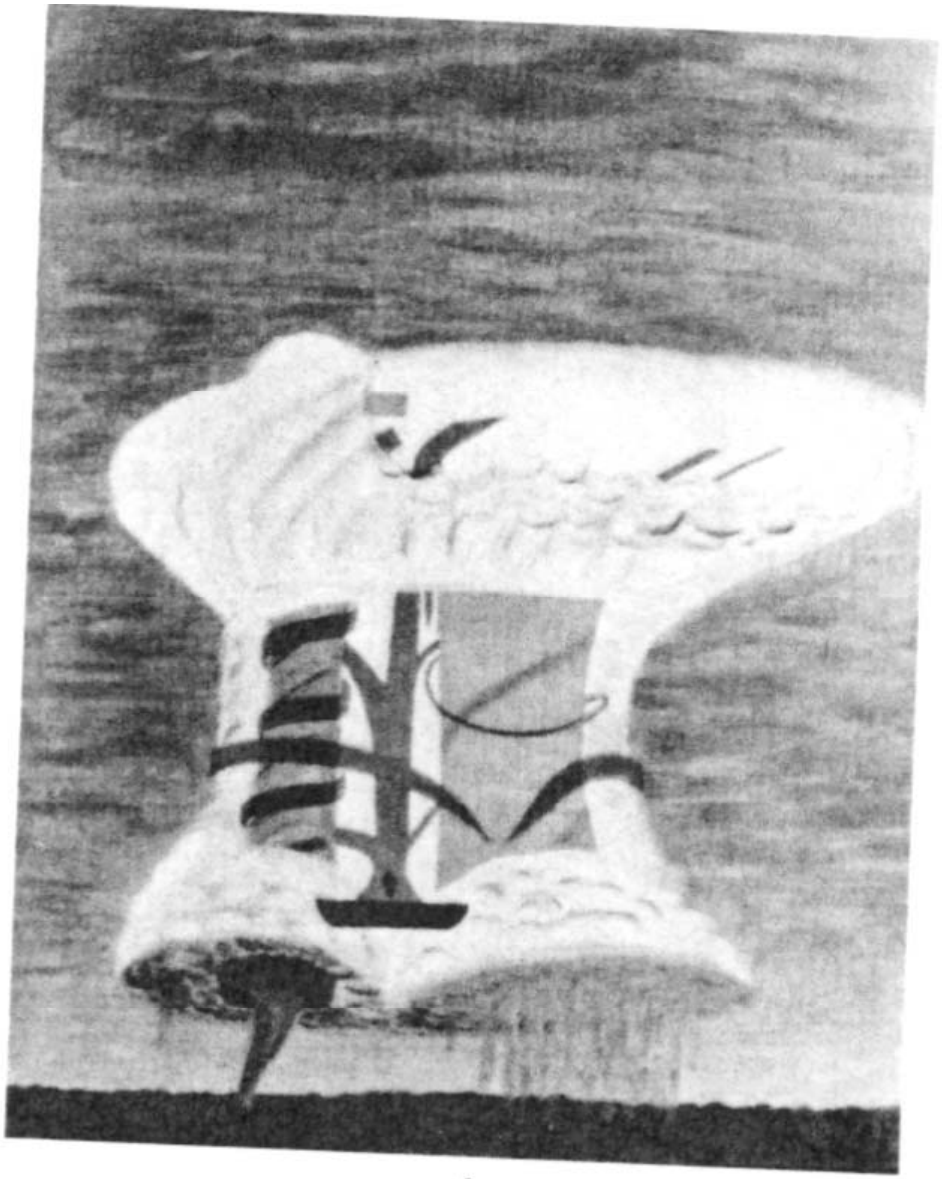
Thermal Updraft is the Maritime Tropical Air Pulled into the T-Storm and Provides Fuel for the Fire.

Dynamic Updraft is Tornado Funnel

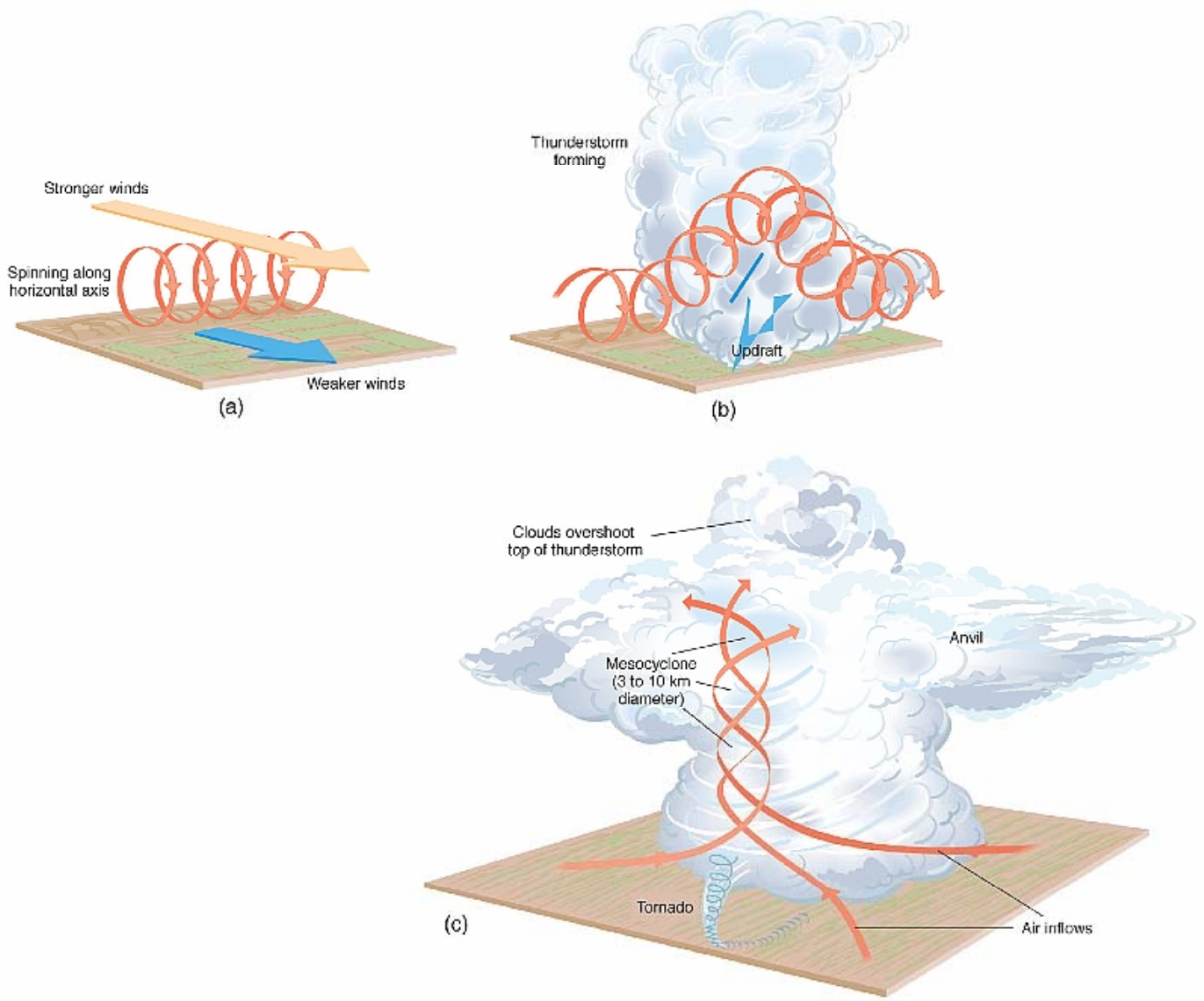


igure 4-5. Cyclonic Vortex Showing the Distinction Between the Thermal and Dynamic Updrafts. The other major portion of the thermal updraft that rises between the double vortex and around the anticyclonic vortex is not shown.

Eagleman's Painting Showing Airflow in Double Vortex T-Storm



Current Theory on Formation of Rotating Mesocyclone

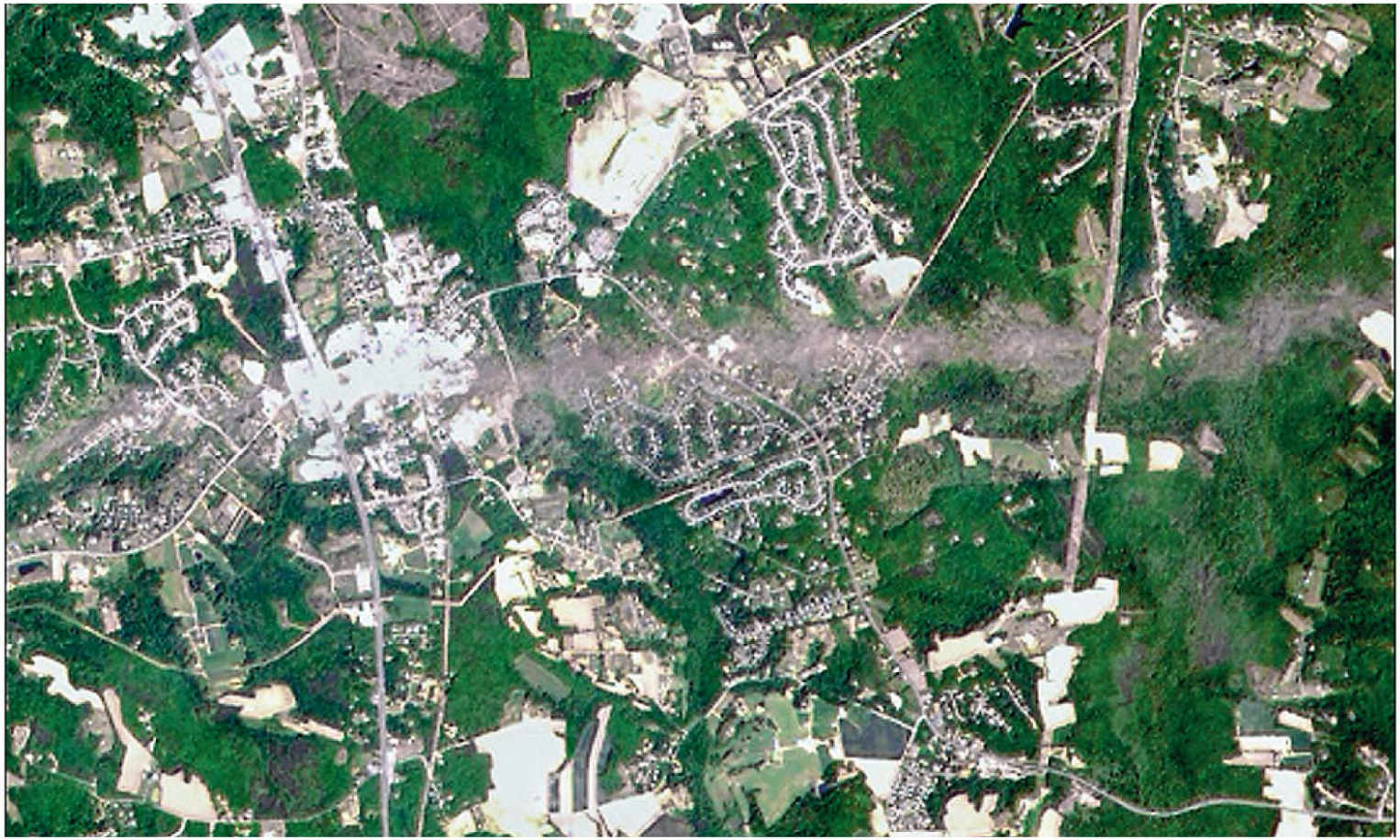


Tornado Extending to Ground from Wall or Collar Cloud. Note blue-green color of cloud.

(g)

Tornadoes take on the color of the soil they pick up.

Tornado Damage Path



(d)

I Made this Map for a Ph.D. Student

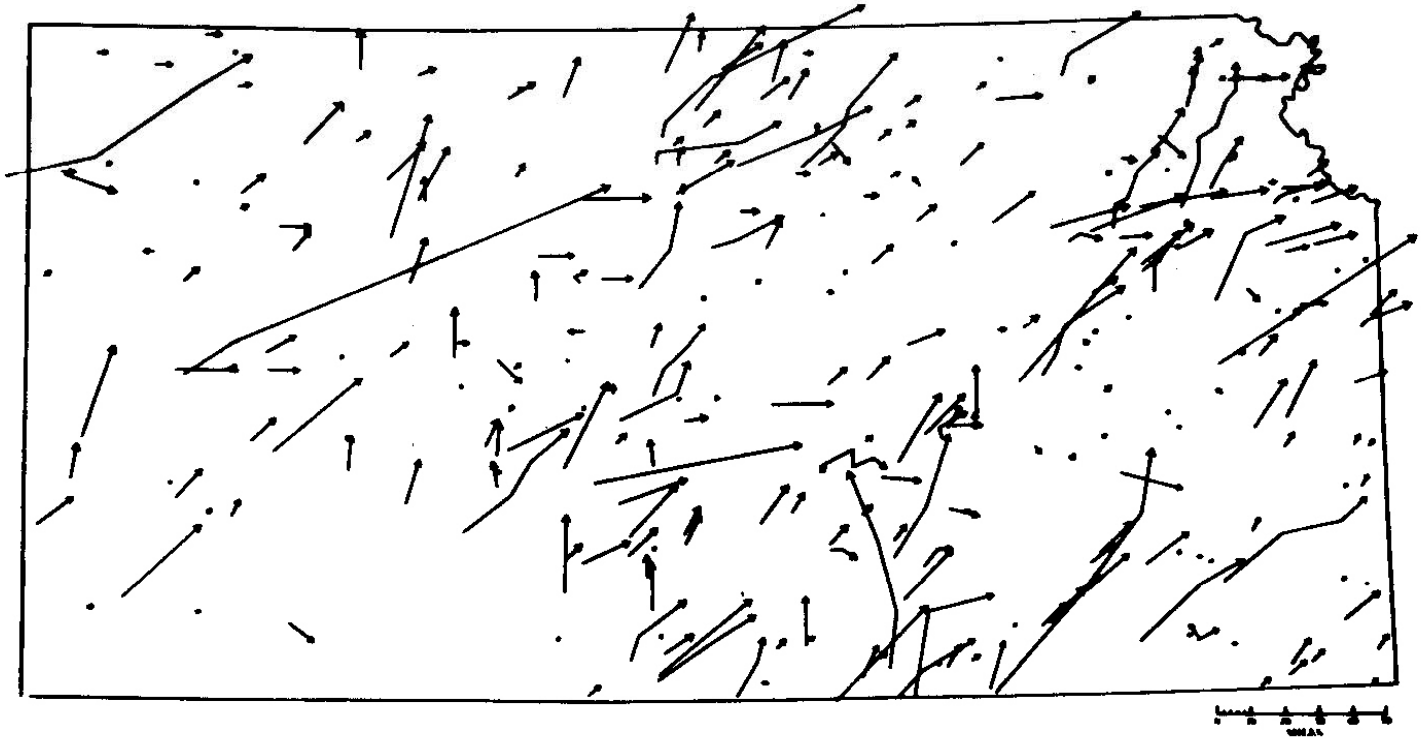


Figure 3-12. Direction and Paths of Tornadoes Occurring in Kansas from 1950-70.

Diagram Showing Most Dangerous Locations in Topeka Tornado

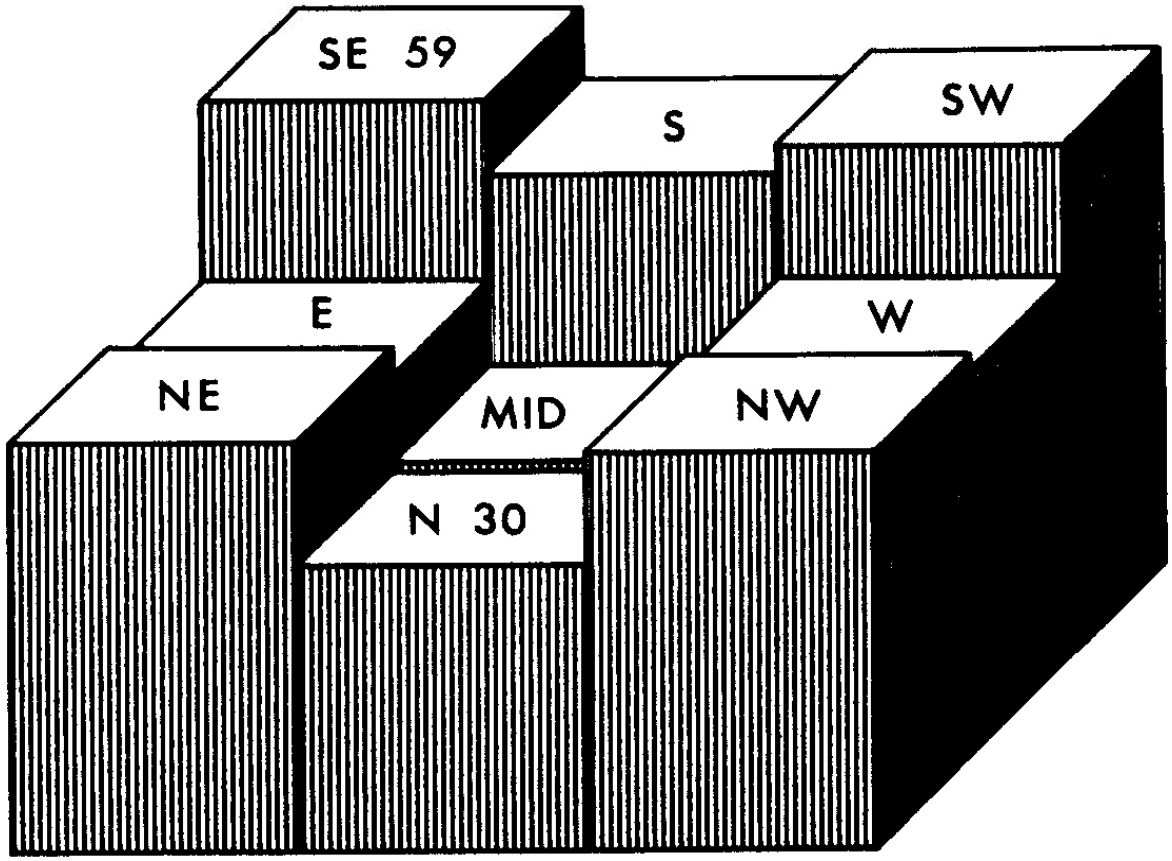


Figure 2-13. The Distribution of Unsafe Locations on the First Floor of Houses in Topeka

High Tension Electrical Transmission Towers Bent Over by Ice

(b)

Tennis Ball Size Hail
Back Window Completely Pulverized

(b)