Mesoscale Organization of Convection
Squall Line

- Is a set of individual intense thunderstorm cells arranged in a line.
- They occur along a boundary of unstable air – e.g. a cold front.
- Strong environmental wind shear causes the updraft to be tilted and separated from the downdraft.
- The dense cold air of the downdraft forms a ‘gust front’.
Squall line from Space

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Mesoscale Convective Complex

- A Mesoscale Convective Complex is composed of multiple single-cell storms in different stages of development.
- The individual thunderstorms must support the formation of other convective cells.
- In order to last a long time, a good supply of moisture is required at low levels in the atmosphere.
Infrared image of a mesoscale convective complex over Kansas, July 8 1997.

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TYPES OF THUNDERSTORM

• SINGLE-CELL THUNDERSTORM

• MULTICELL THUNDERSTORM

• MESOSCALE CONVECTIVE COMPLEX

• SUPERCELL THUNDERSTORM
Non-equilibrium Convection
SUPERCELL THUNDERSTORMS

• SINGLE CELL THUNDERSTORM THAT PRODUCES DANGEROUS WEATHER

• REQUIRES A VERY UNSTABLE ATMOSPHERE AND STRONG VERTICAL WIND SHEAR - BOTH SPEED AND DIRECTION

• UNDER THE INFLUENCE OF THE STRONG WIND SHEAR MUCH OF THE THUNDERSTORM ROTATES

• FAVORED IN THE SOUTHERN GREAT PLAINS IN THE SPRING
Wind Shear

Shear Vector

Hodograph
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Visible image of a supercell thunderstorm

Image courtesy of NASA.
Infra-red image of a supercell thunderstorm

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