

# Preliminary Investigation of Supercell Storms in China : Characteristics of Environmental Conditions and Doppler Weather Radar Echoes

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November 2012

# Outline

- Spatial distribution
- Characteristics of environmental conditions
- Characteristics of radar echoes
- Summary

# Doppler Weather Radar Network in China

The planned network consists of 216 radar , and up to now 165 Doppler weather radar have been installed.



# Spatial Distribution



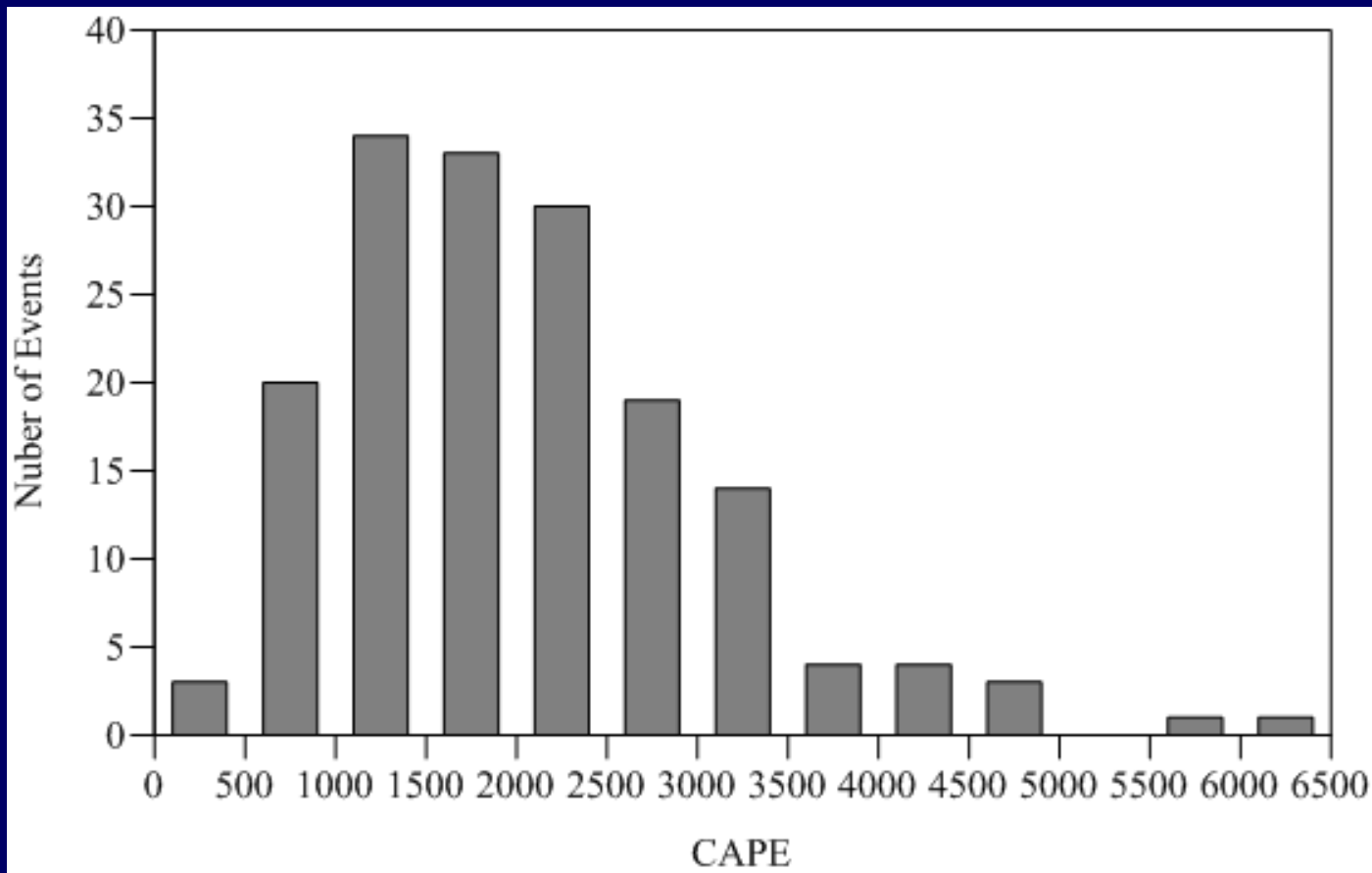
2002-2009 reported supercell storms in China  
(224 events: incomplete)

# Spatial Distribution

- Based on 2002-2009 incomplete statistics;
- A supercell event means that during a severe convection process at least one supercell is identified ;
- During a supercell event, one to ten supercell storms can occur;
- Most supercell storms occur in east, south east, central, south west and north east parts of China.

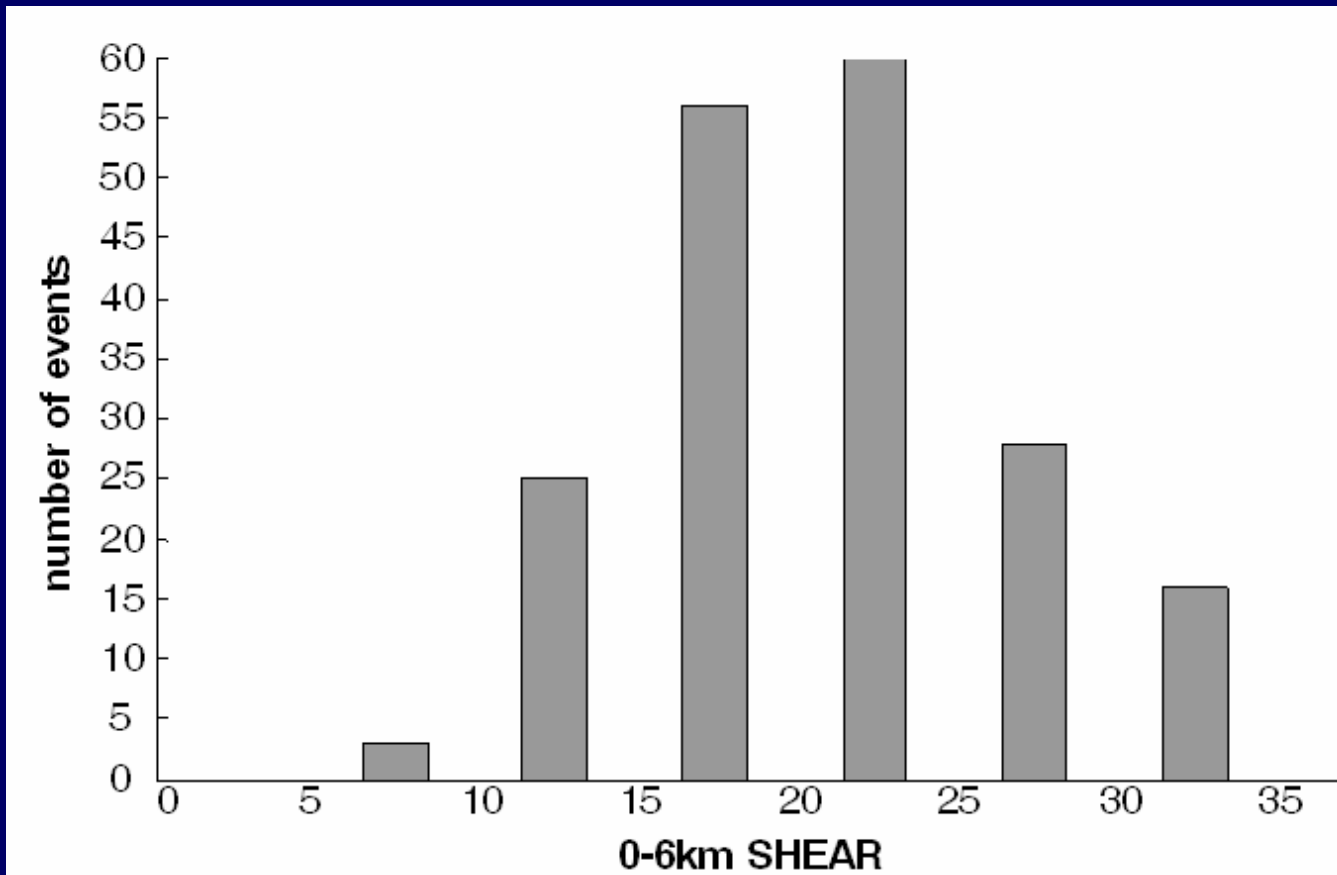
# Characteristics of Environmental Conditions

## CAPE distribution among 224 supercell events



**High frequency range of CAPE distribution is between 1000 to 2500 J/kg, the extreme value is greater than 6000 J/kg.**

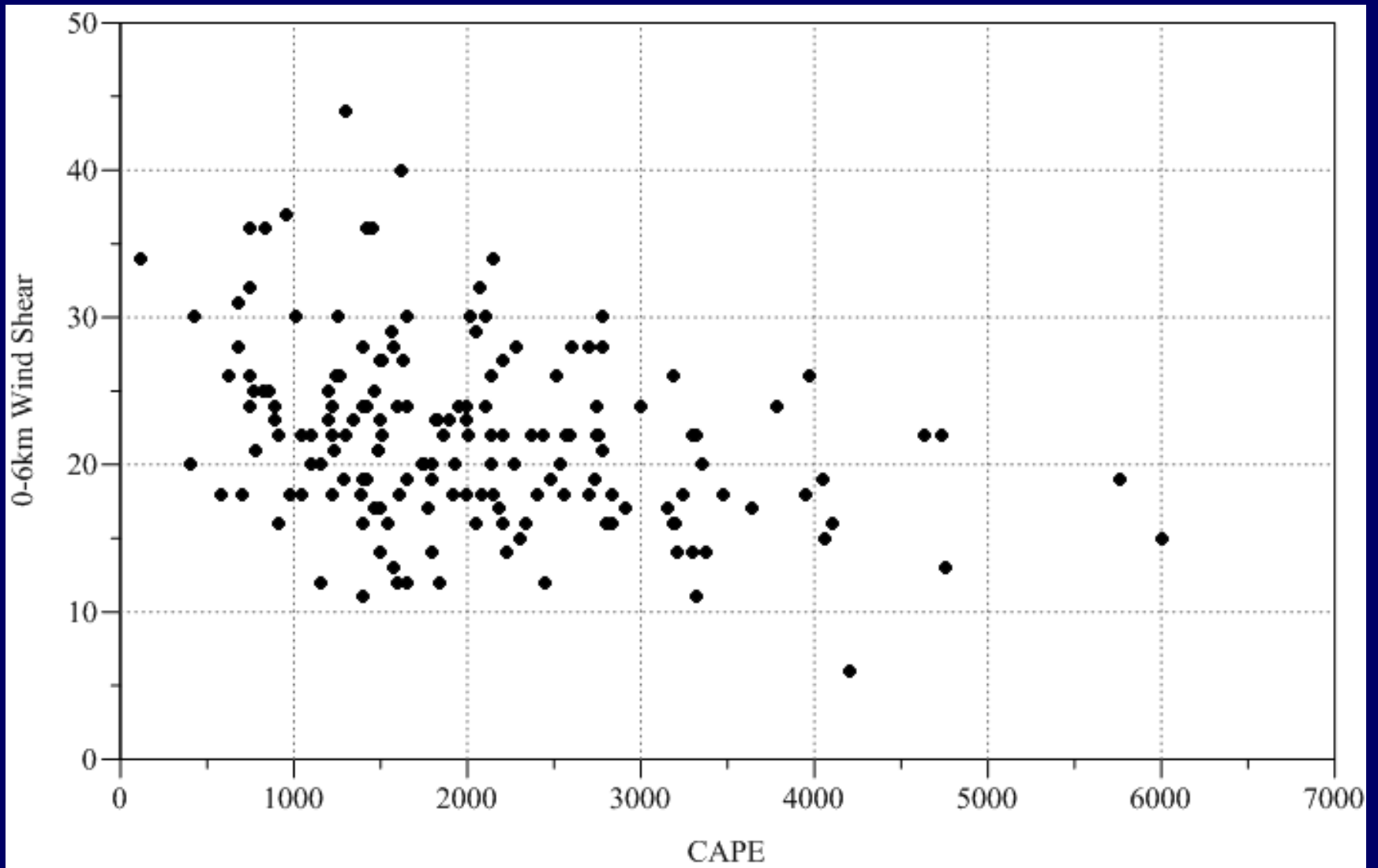
## Distribution of 0-6km vertical wind shear



High frequency range is between 15 to 25 m/s, the extreme value is 34 m/s.

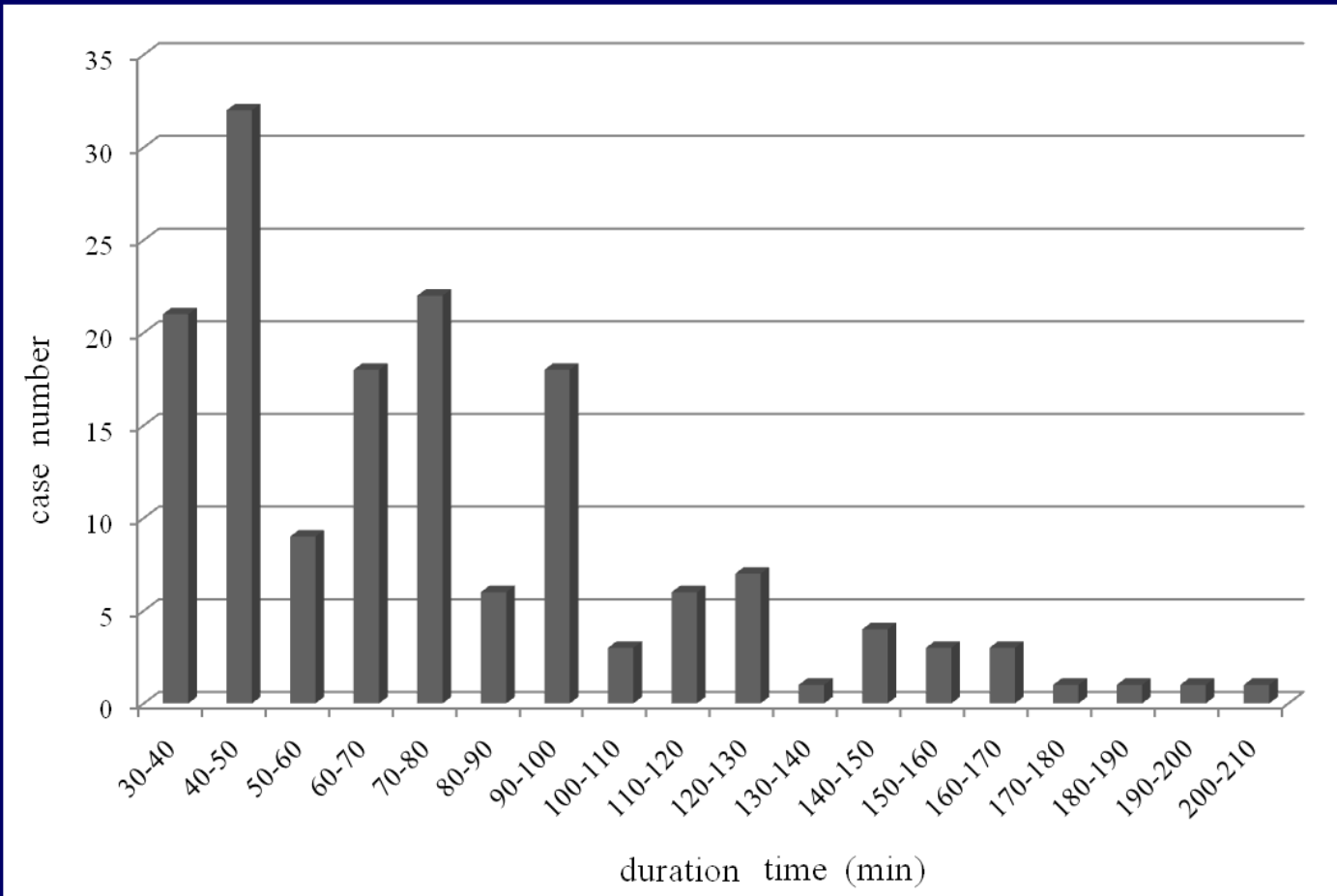


# Scattering diagram between CAPE and 0-6km shear



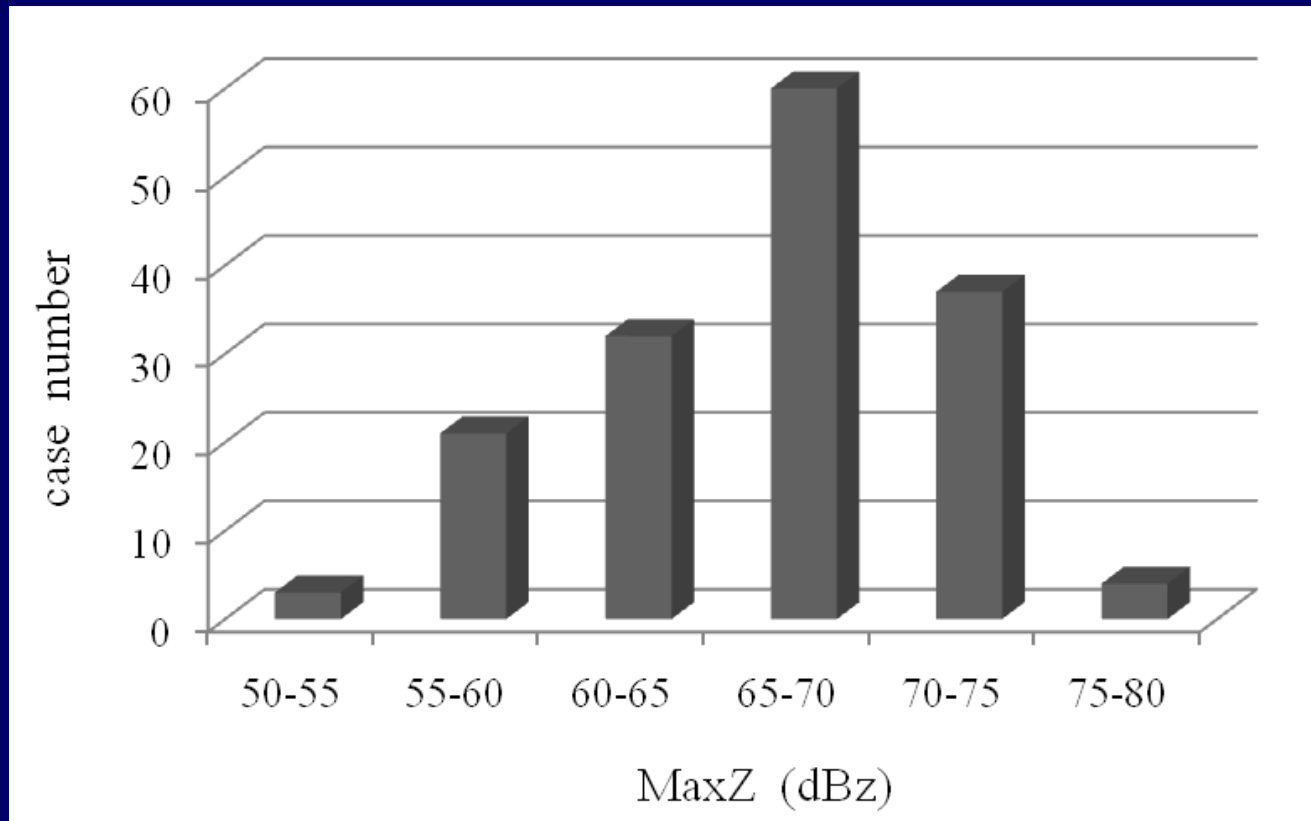
# Characteristics of Radar Echoes

# Supercell duration distribution



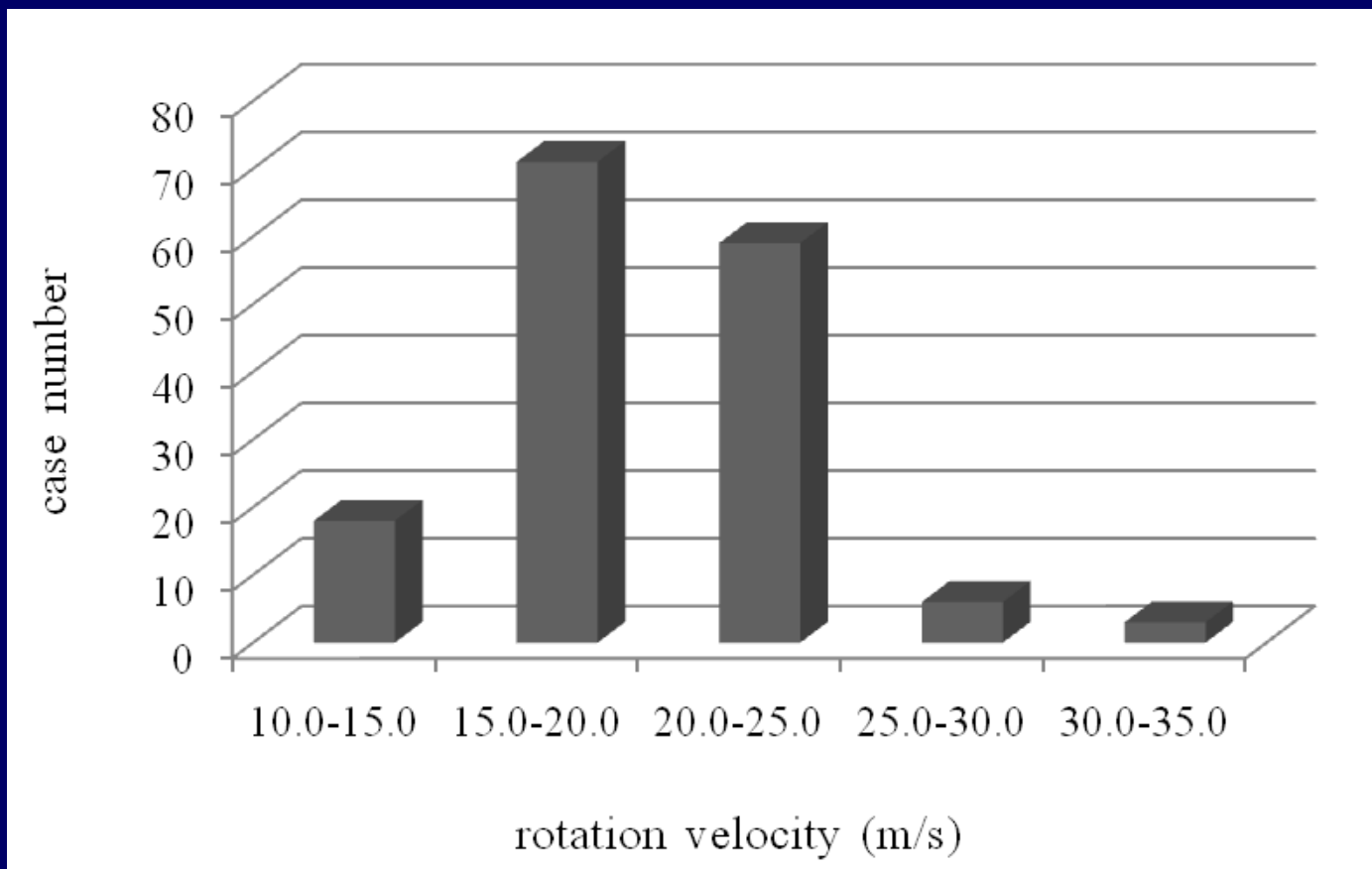
Several high frequency peaks: 40-50 min, 70-80min and 90-100 min, with longest duration over 200 min.

# Distribution of Maximum Reflectivity



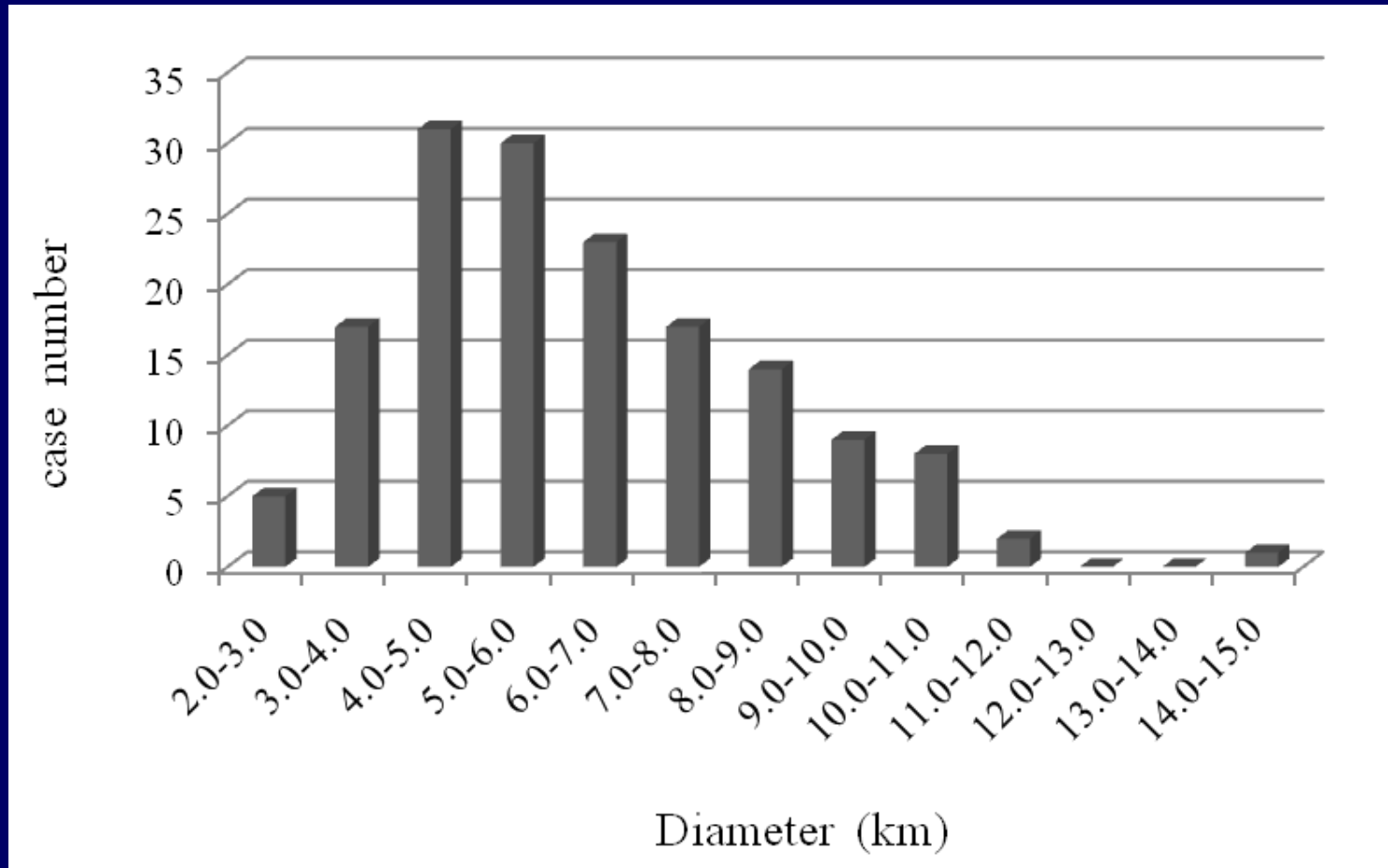
The high frequency range is between 60 to 75 dBz, with extreme value greater than 75 dBz.

# Distribution of supercell mesocyclone rotation velocity



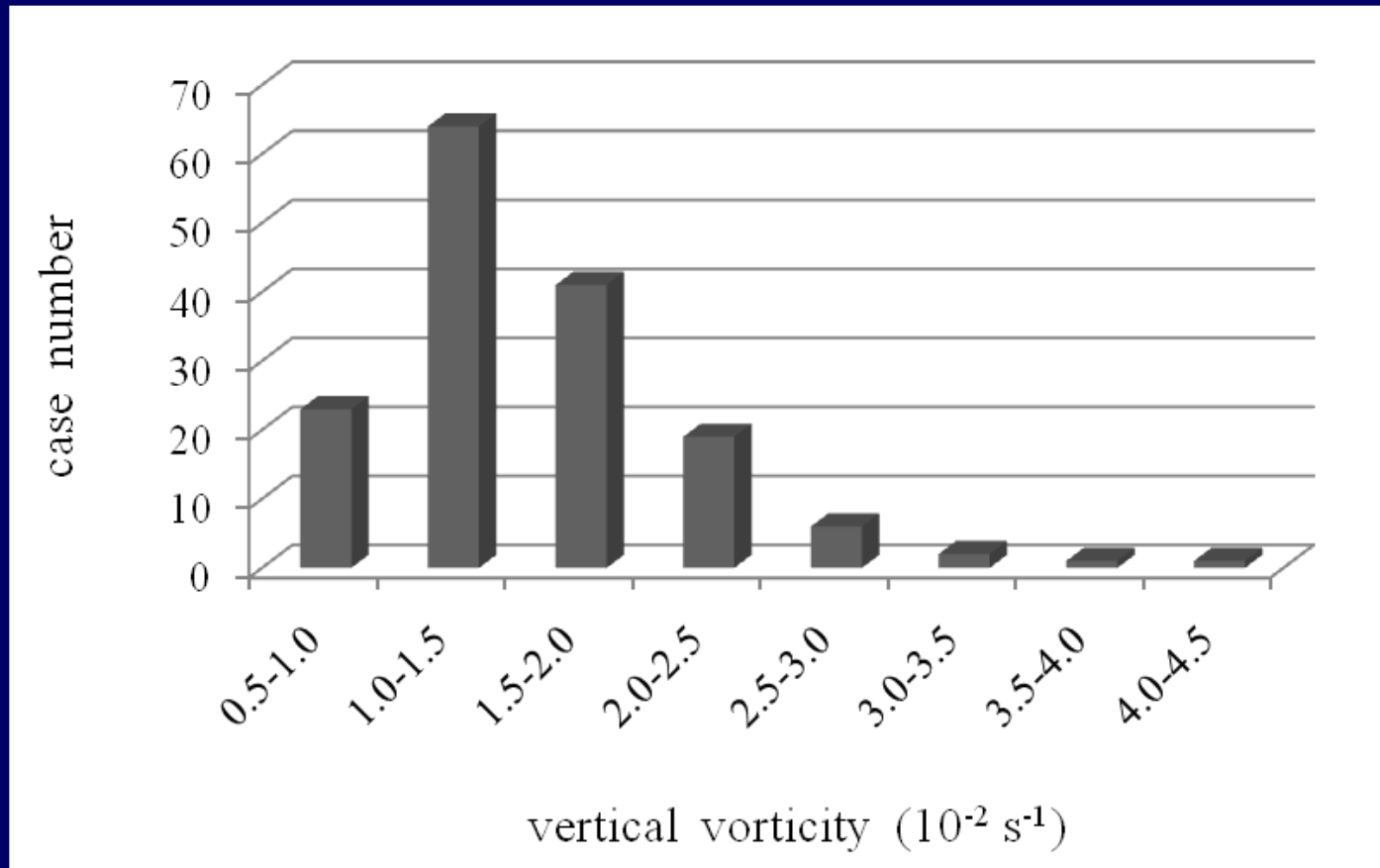
High frequency range is from 15 to 25 m/s, with extreme value of 35m/s.

## Distribution of mesocyclone diameter



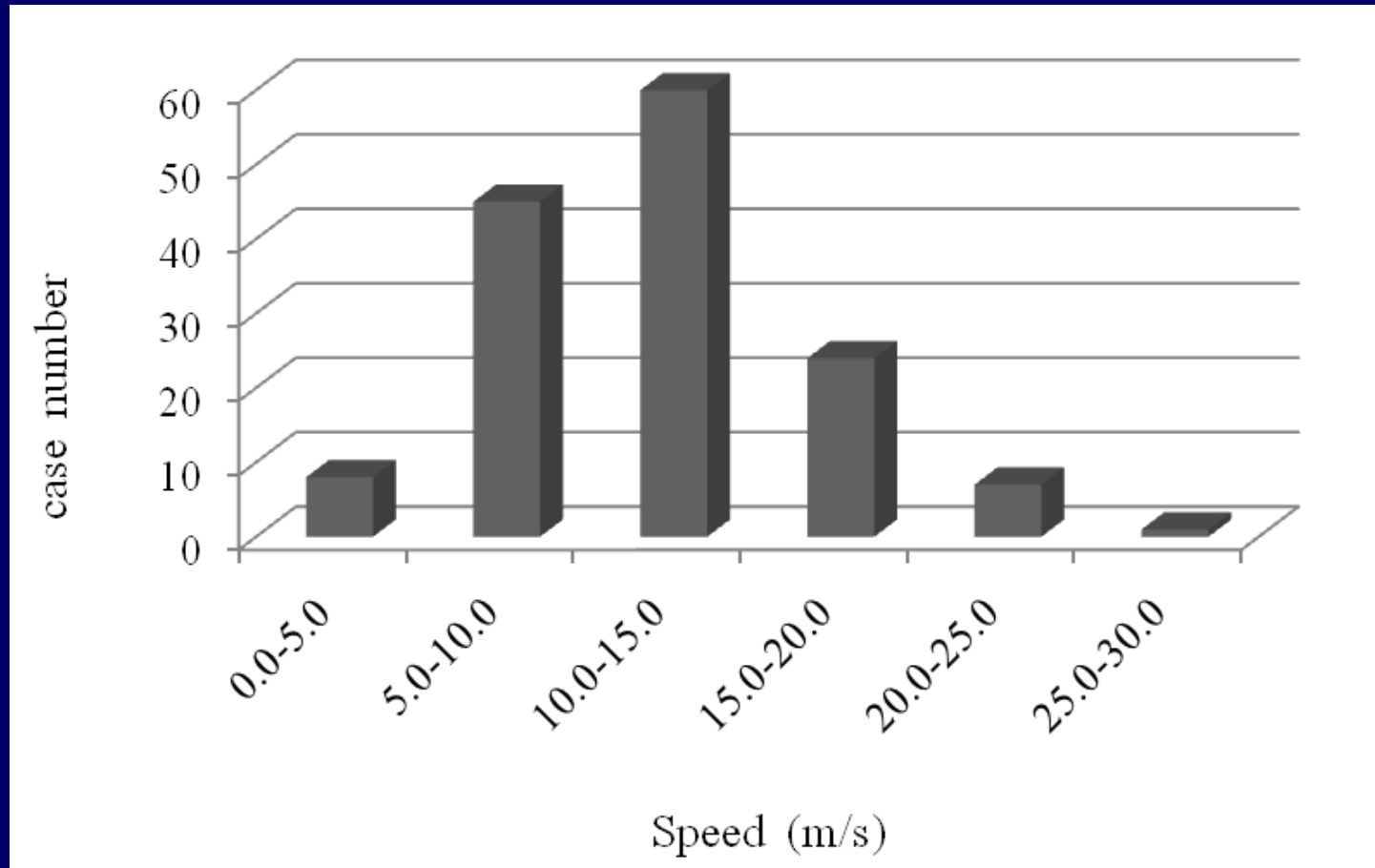
The high frequency range is from 4.0 to 7.0 km, with minimum, average, and maximum value being 2.0 km, 6.1km and 14.5 km, respectively.

# Distribution of vertical vorticity associated with mesocyclone



The high frequency range is from 1.0 to 1.5  $10^{-2} \text{ s}^{-1}$ , with maximum value greater than 4.0  $10^{-2} \text{ s}^{-1}$

## Moving speed of supercell



The high frequency range is from 10.0 to 15.0 m/s, with minimum value less than 5.0 m/s, and maximum value greater than 25 m/s.



# Summary

- 224 supercell events have been identified from 2002 to 2009, most of them occurred over east, south east, central, south west and north east parts of China;
- The environment of supercell storms is characterized by relative high value of 0-6km shear and moderate to significant value of CAPE, their high frequency ranges are 15 to 25 m/s and 1000 to 2500 J/kg, respectively;
- The high frequency range of maximum reflectivity is between 60 to 75 dBz, with extreme value greater than 75 dBz;

# Summary ( continue)

- High frequency range of mesocyclone rotation speed is from 15 to 25 m/s, with extreme value of 35m/s;
- The high frequency range of mesocyclone diameter is from 4.0 to 7.0 km, with minimum, average, and maximum value being 2.0 km, 6.1km and 14.5 km, respectively.
- Over 90% of supercell storms produced large hail, damage wind, tornadoes, or heavy rain, less than 15% of supercells produced tornadoes.