

# *The TC Tornado Database at SPC*

**Background, Summary and Analyses**

**by Roger Edwards**

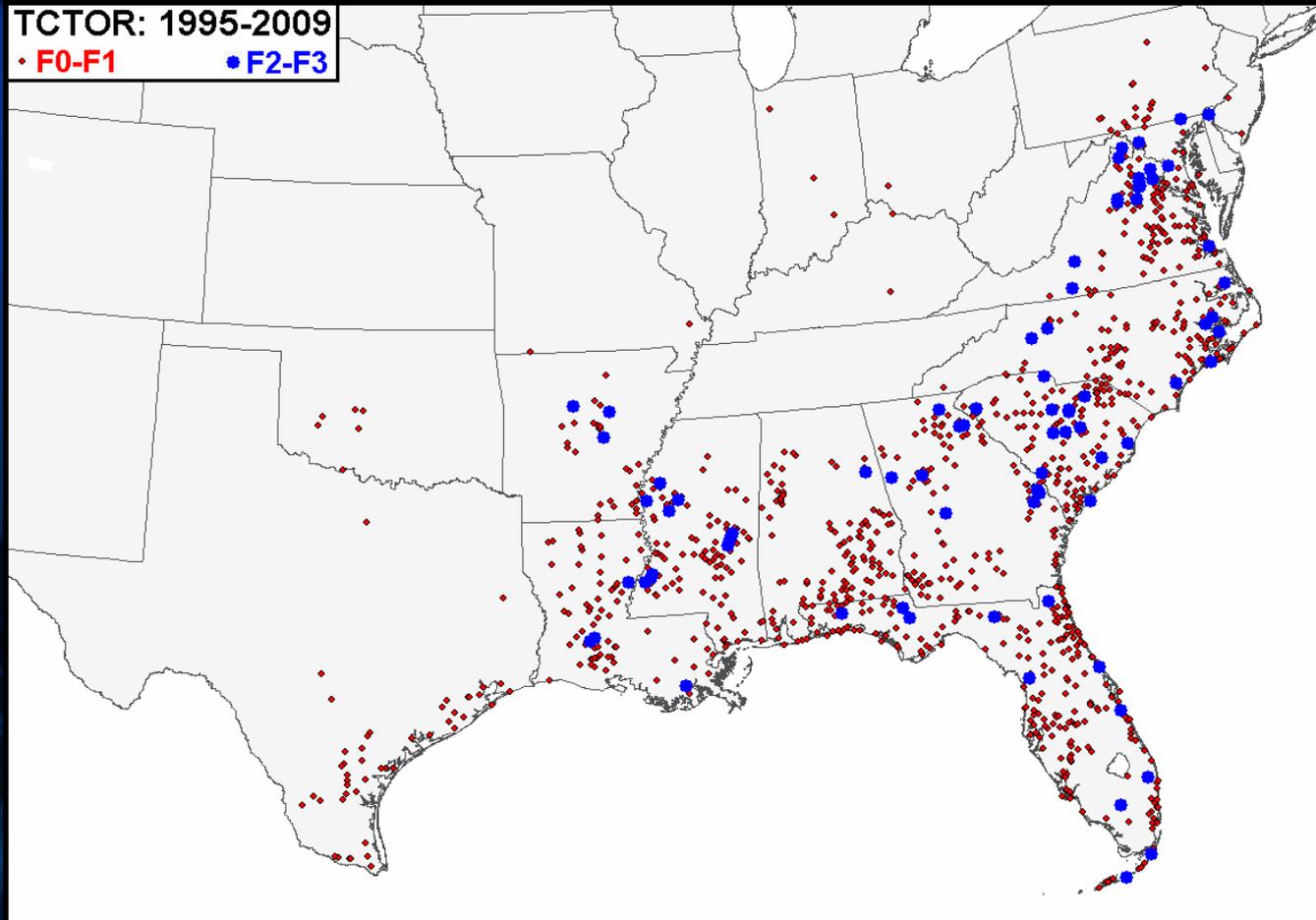
**Storm  
Prediction  
Center**

*Norman, Oklahoma*

# ***DATABASE SUMMARY***

- **TROPICAL CYCLONE TORNADOES (TCTOR)**
- **PULLED from SPC "ONETOR"**
- **1995-2009 (WSR-88D ERA) – 1139 for now**
- **Need for consistent data for scientific and risk analysis**
- **INCLUDES INTERPOLATED NHC POSITION/INTENSITY**
- **MANUAL ANALYSIS, ENTRY AND QC**
- **FLEXIBLE – Updated yearly, correctable**
- **DETAILS via SPC PUBLICATIONS PAGE (End of Talk)**

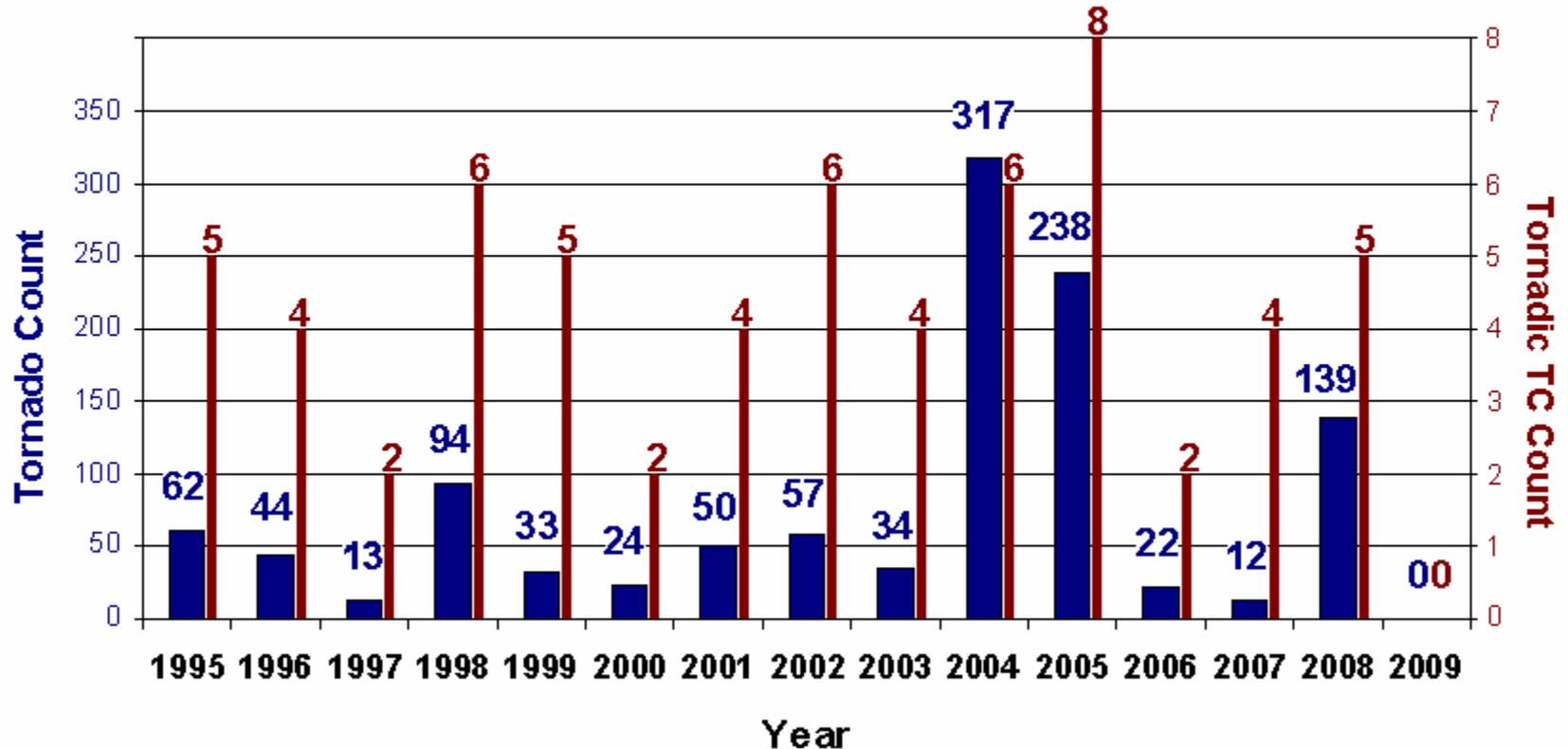
# MAPPING



Geography of TCTOR events

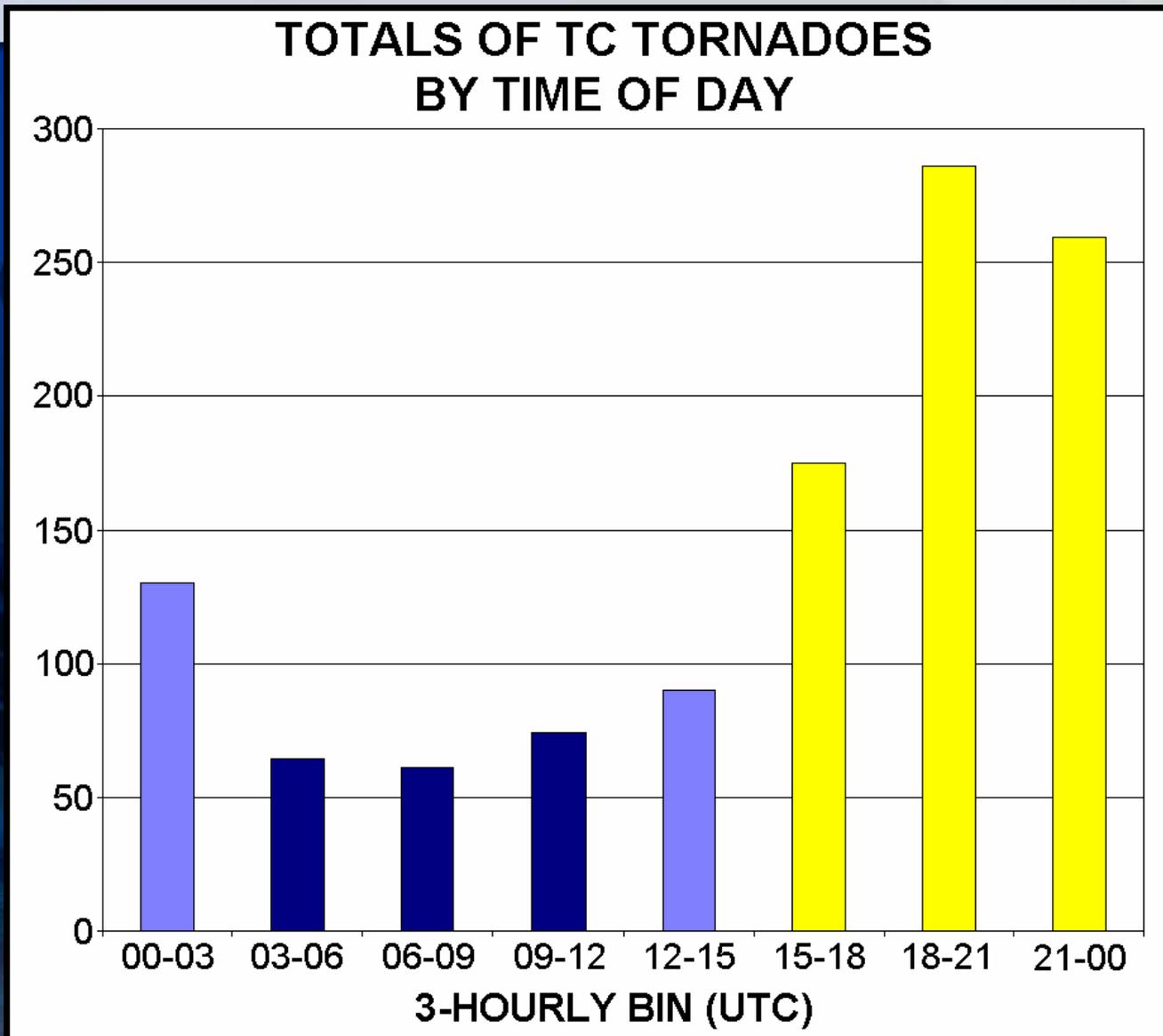
# YEAR BY YEAR

## TOTALS OF TC TORNADOES AND TORNADIC TCs BY YEAR

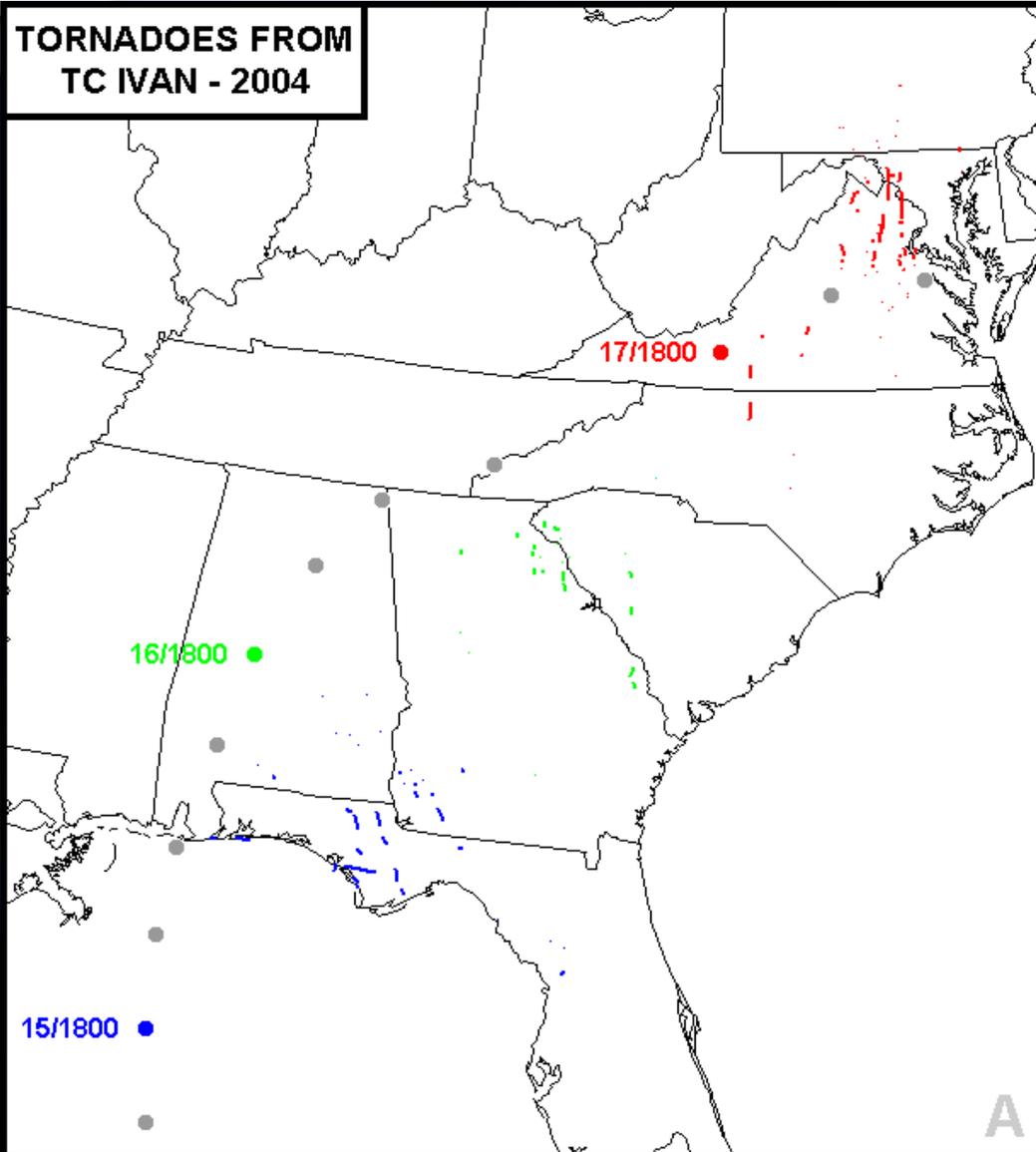


Tornado and TC numbers

# *TIME OF DAY or NIGHT*



*...and the winner is*



**118**

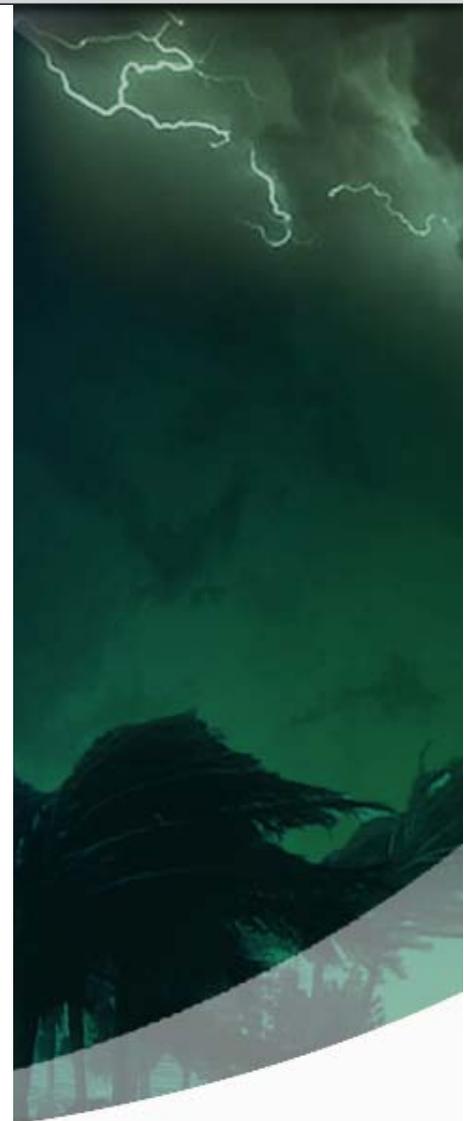
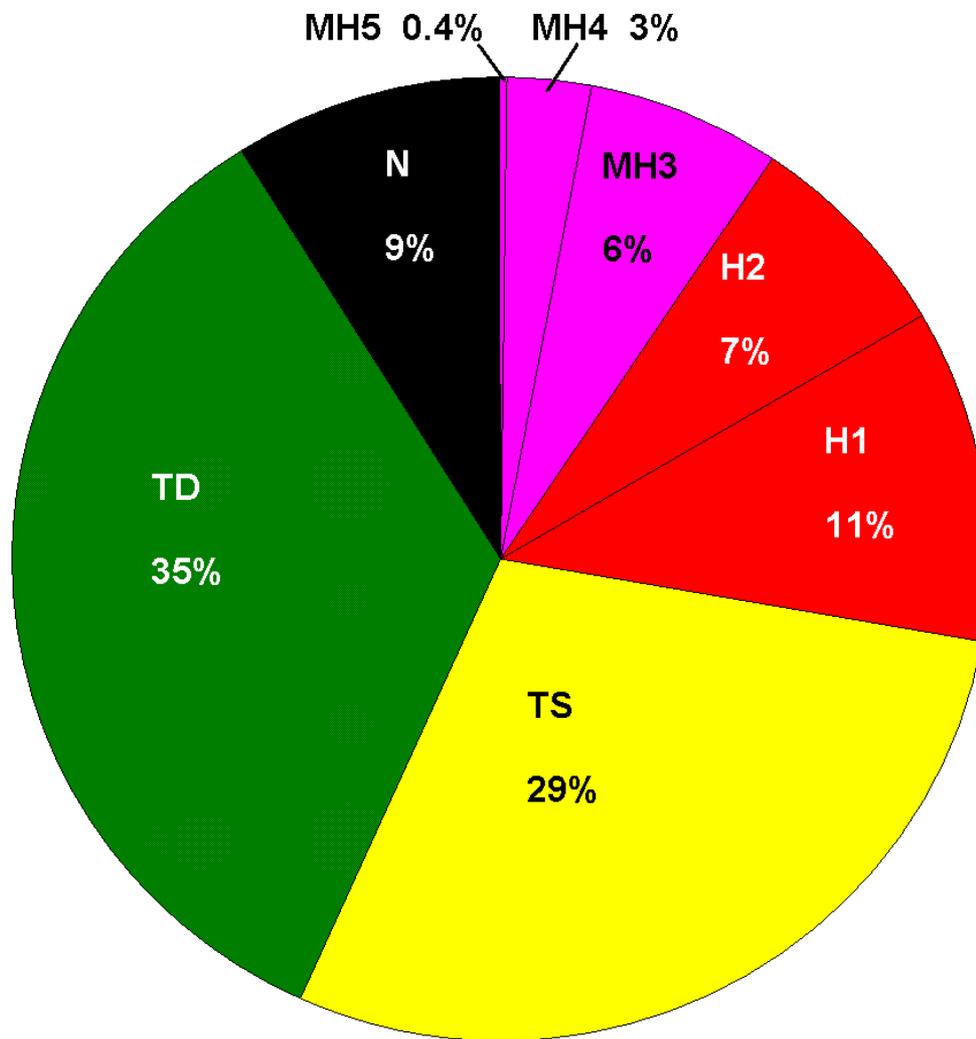
**3-DAY CYCLE**

**MAY HAVE SET ALL-  
TIME RECORD**

**(115 – BEULAH 1967)**

# ***TC STRENGTH AT TORNADO TIME***

## **TORNADOES BY TC CATEGORY**

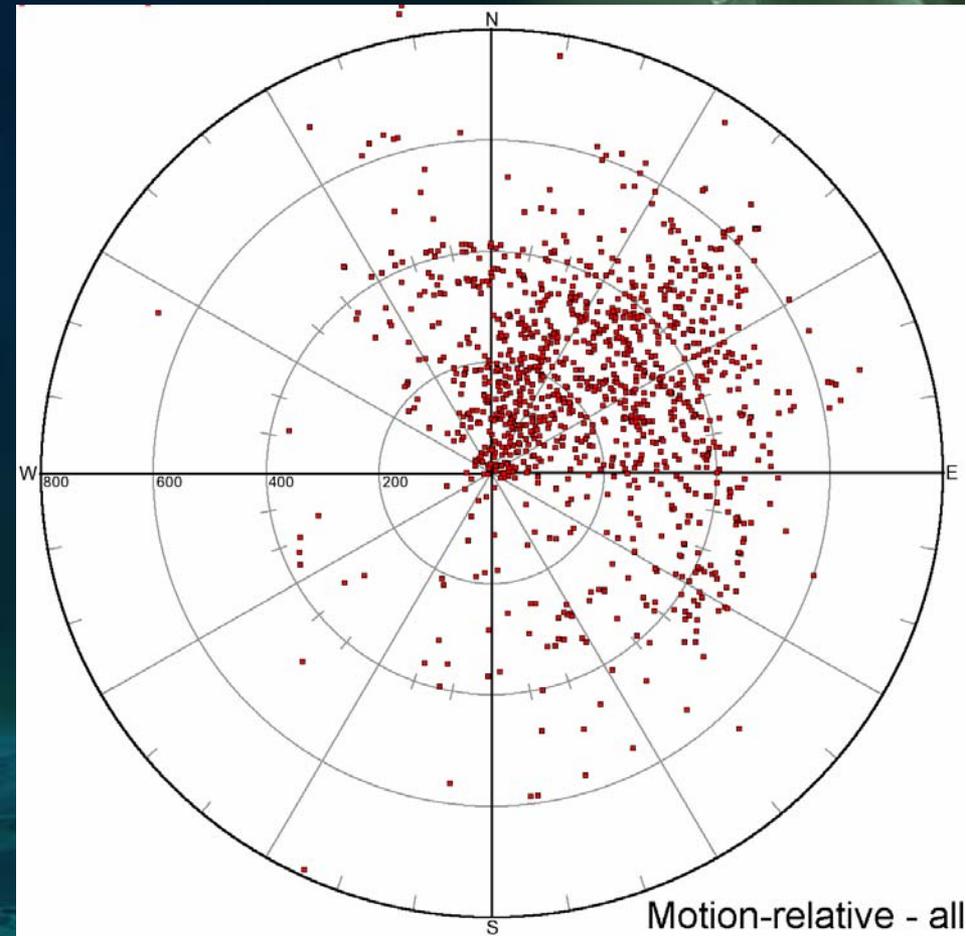
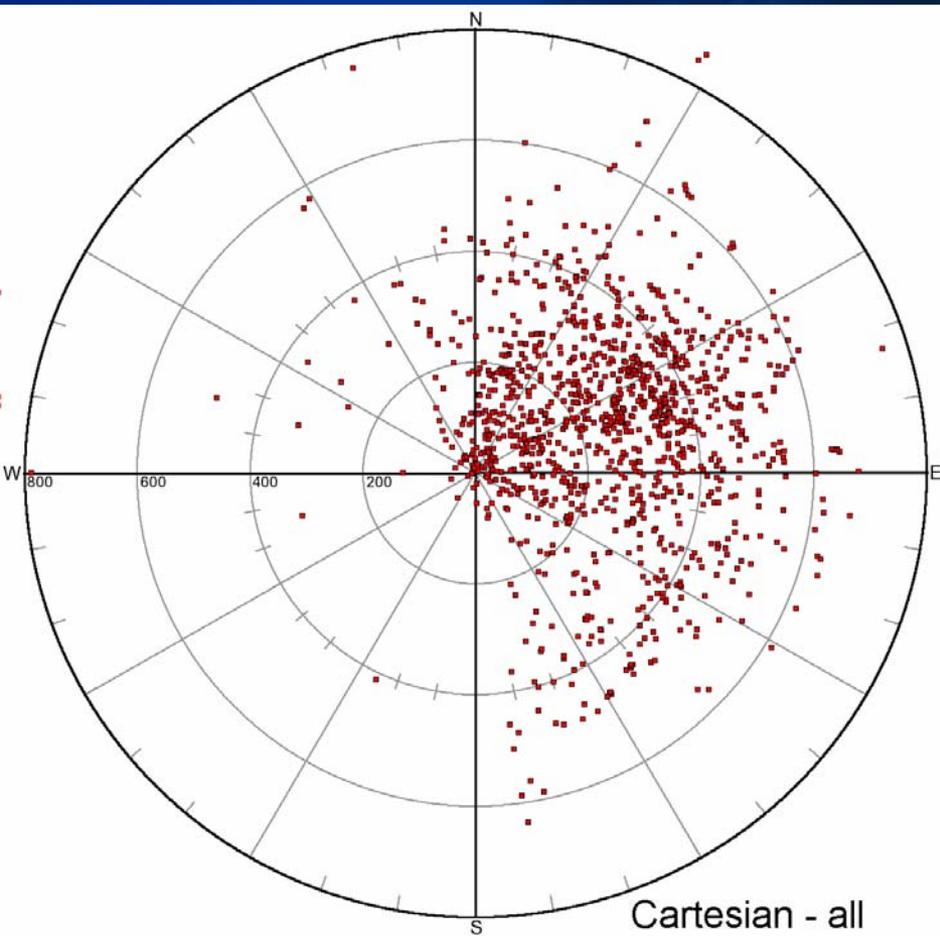


# TOP-10 LIST for 1995-2009

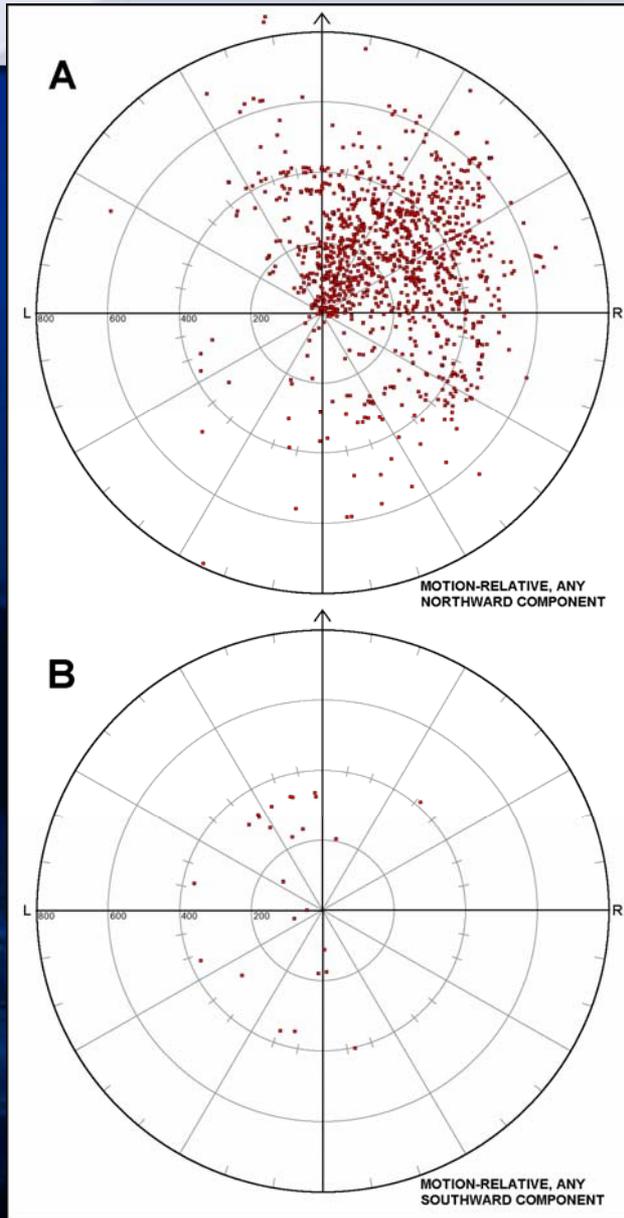
TC NAME	# TORS	Cat Land	Cat Max
MH IVAN	118	3	5
H FRANCES	103	2	4
MH RITA	98	3	5
MH KATRINA	59	3	5
TS FAY	50	0	0
H GUSTAV	49	2	4
H CINDY	48	1	1
H GEORGES	48	2	4
MH JEANNE	42	3	3
MH OPAL	35	3	4

# *WHERE FROM CENTER?*

## AZRAN of TCTOR events from center



# ***HOW MOTION-RELATIVE MAY FAIL***

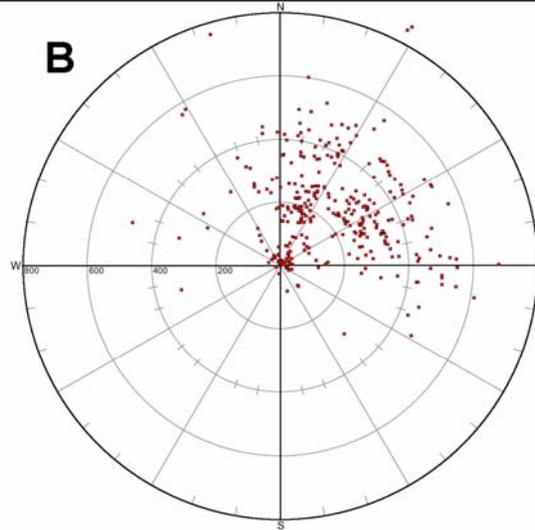
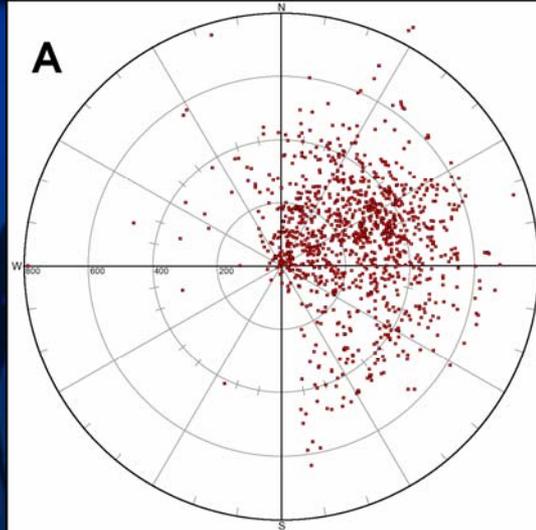


**Motion-relative AZRAN of TCTOR events from center: Northward translation component**

**Motion-relative AZRAN of TCTOR events from center: Southward translation component**

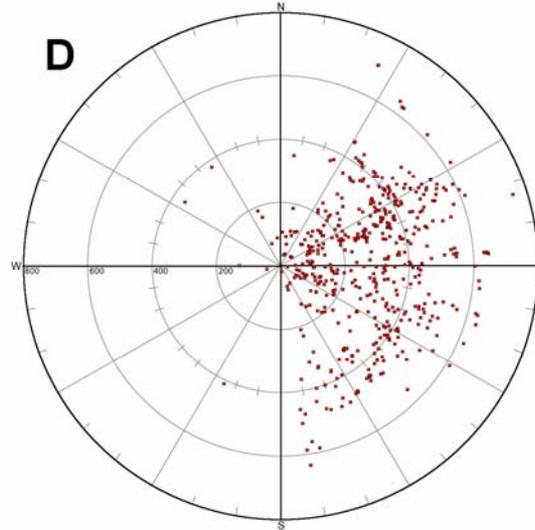
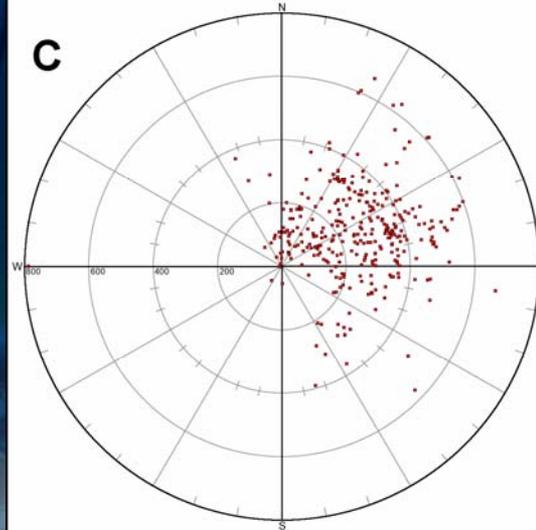
# ***WHY WEAKER = MORE SOUTHEAST?***

**Cartesian:  
ALL**



**Cartesian:  
Hurricanes**

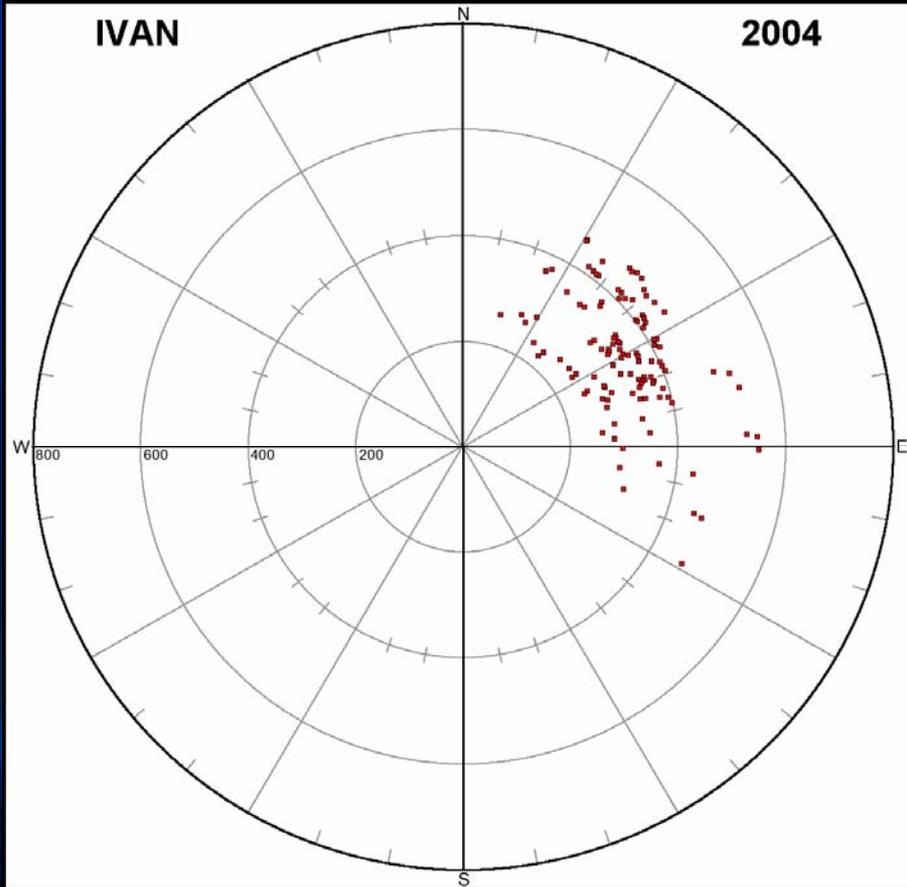
**Cartesian:  
TS**



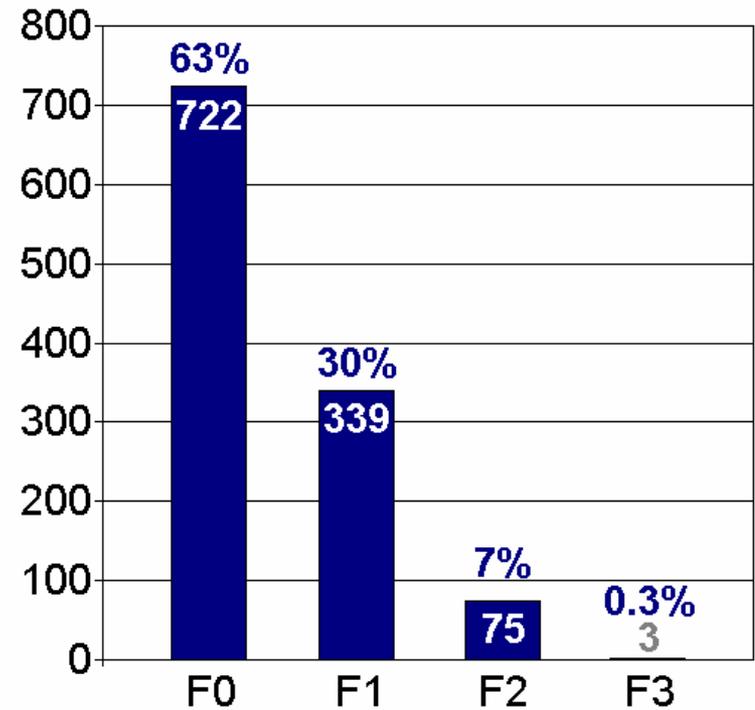
**Cartesian:  
≤ TD**

# MORE ANALYTIC RESULTS

## AZRANs for IVAN



## TOTALS OF TC TORNADOES BY DAMAGE RATING



Distribution by  
damage rating

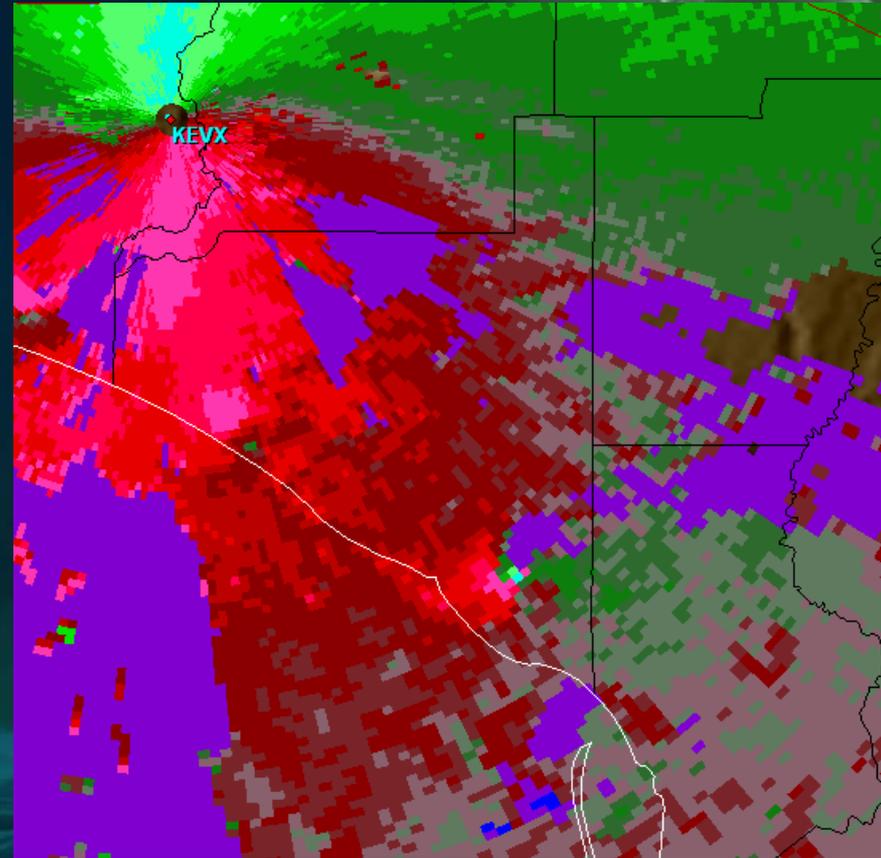
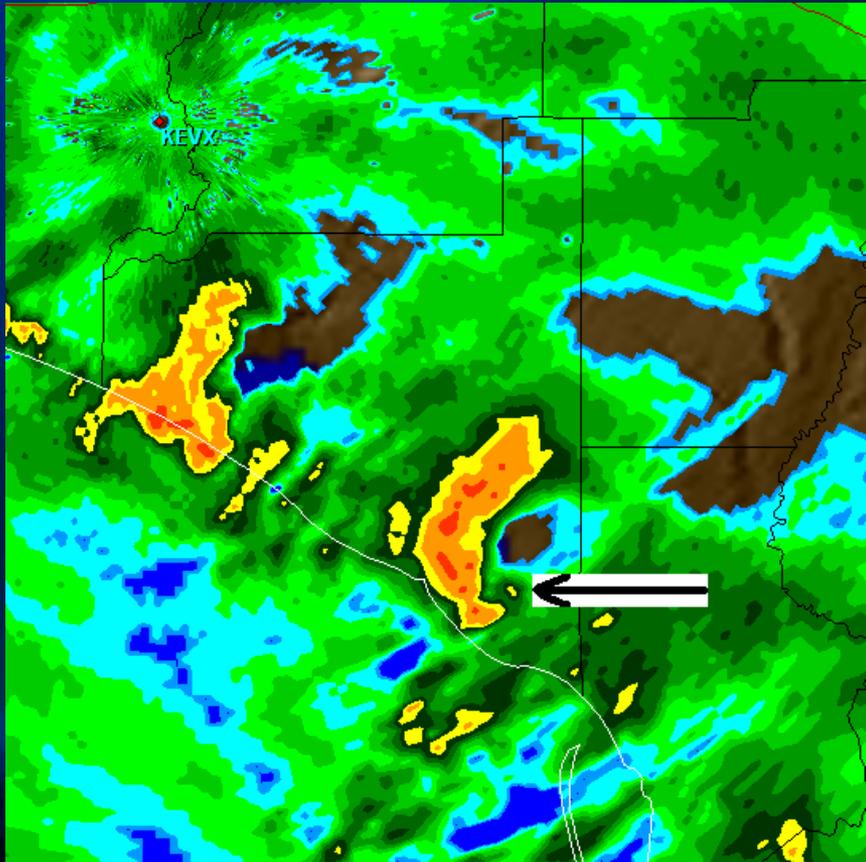
# ***APPLIED ANALYSES***

## **Convective modes for tornado cases 2003-2008**

- ◆ **Assessed case-by-case for 664 GRIDDED and FILTERED tornadoes**
- ◆ **238 DISCRETE SUPERCELLS (36%)**
- ◆ **232 SUPERCELLS-IN-CLUSTERS (35%)**
- ◆ **64 SUPERCELLS-IN-LINES (10%)**
- ◆ **53 MARGINAL "PSEUDOCELLS" (8%)**
- ◆ **77 NONSUPERCELLS OF ALL MODES (12%)**  
(These were broken down by mode...small samples)

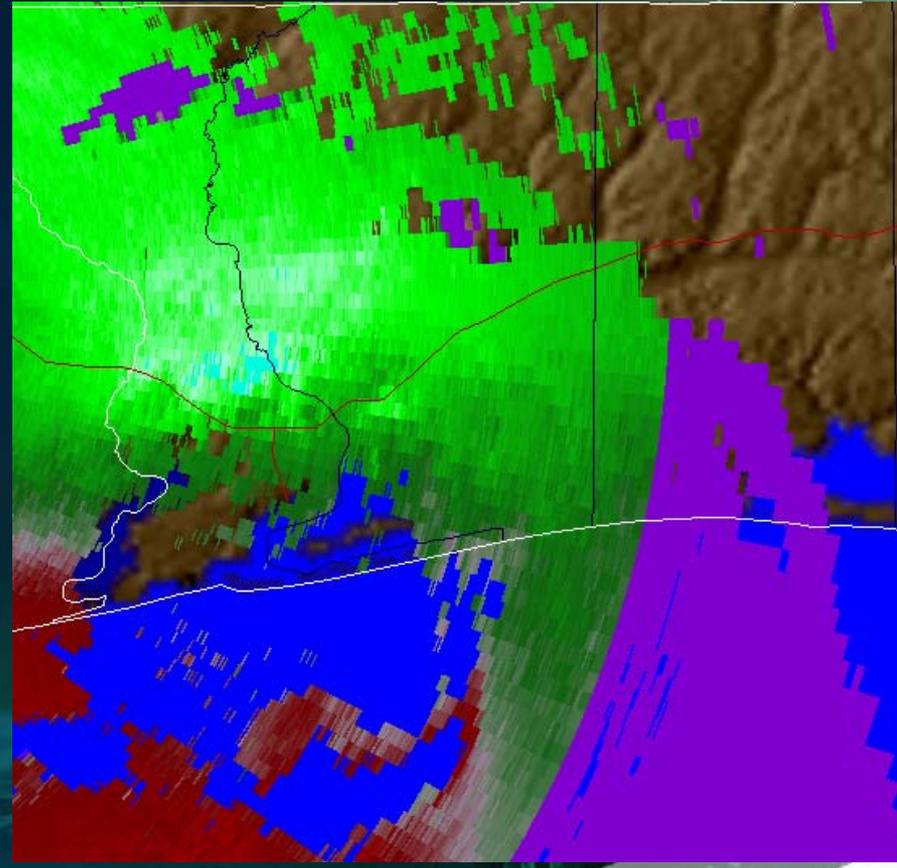
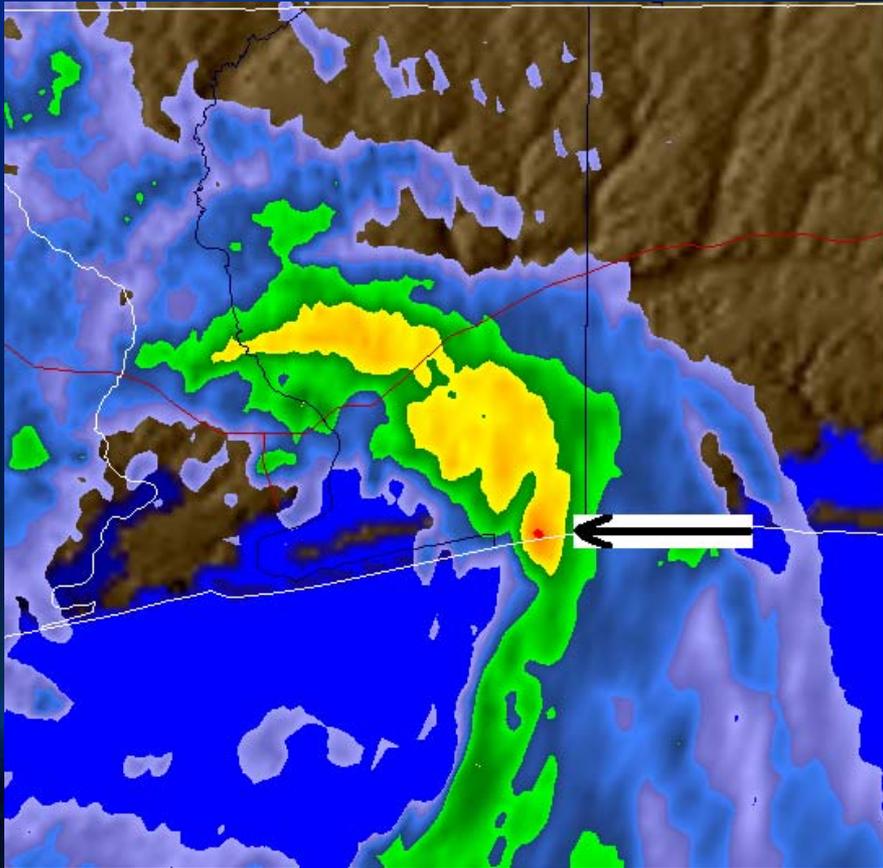
# APPLIED ANALYSES

## MODE EXAMPLE: Discrete Supercell (Ivan-04)



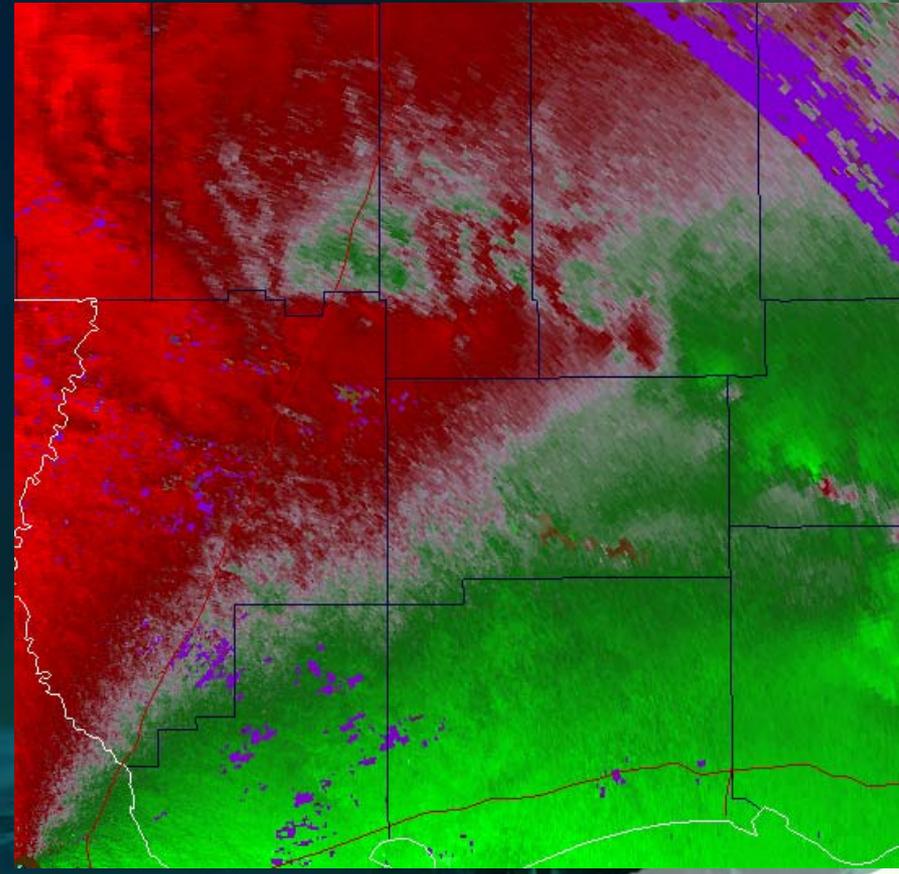
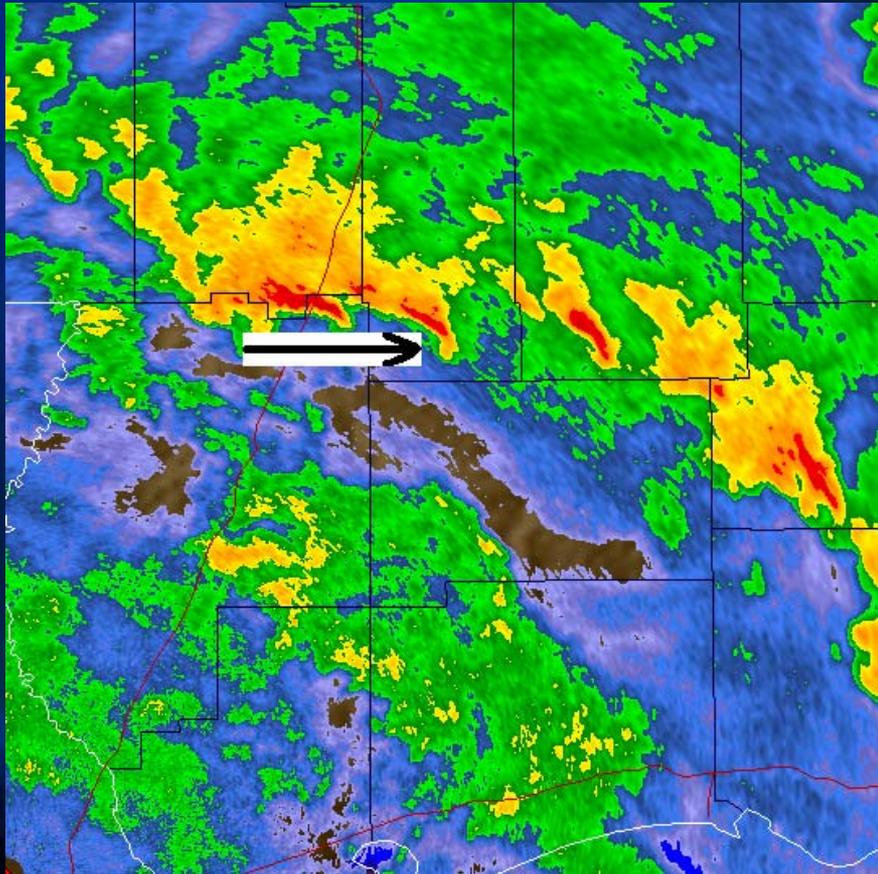
# *APPLIED ANALYSES*

## MODE EXAMPLE: Nonsupercell in Cluster (Arlene-05)

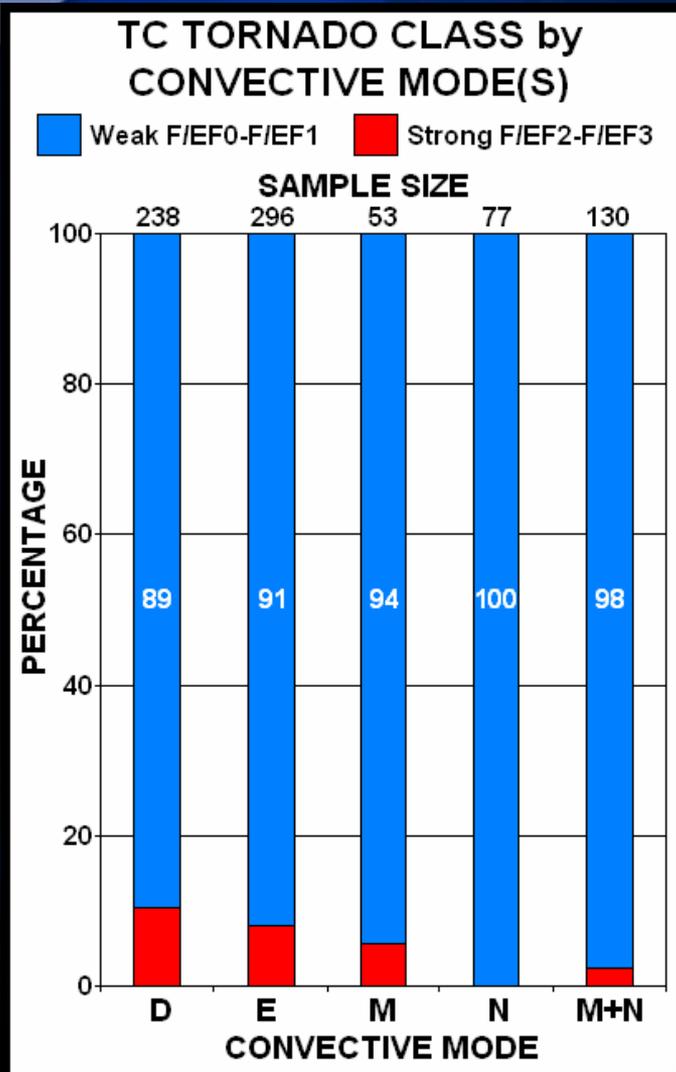


# *APPLIED ANALYSES*

## MODE EXAMPLE: MRGL in Line (Gustav-08)



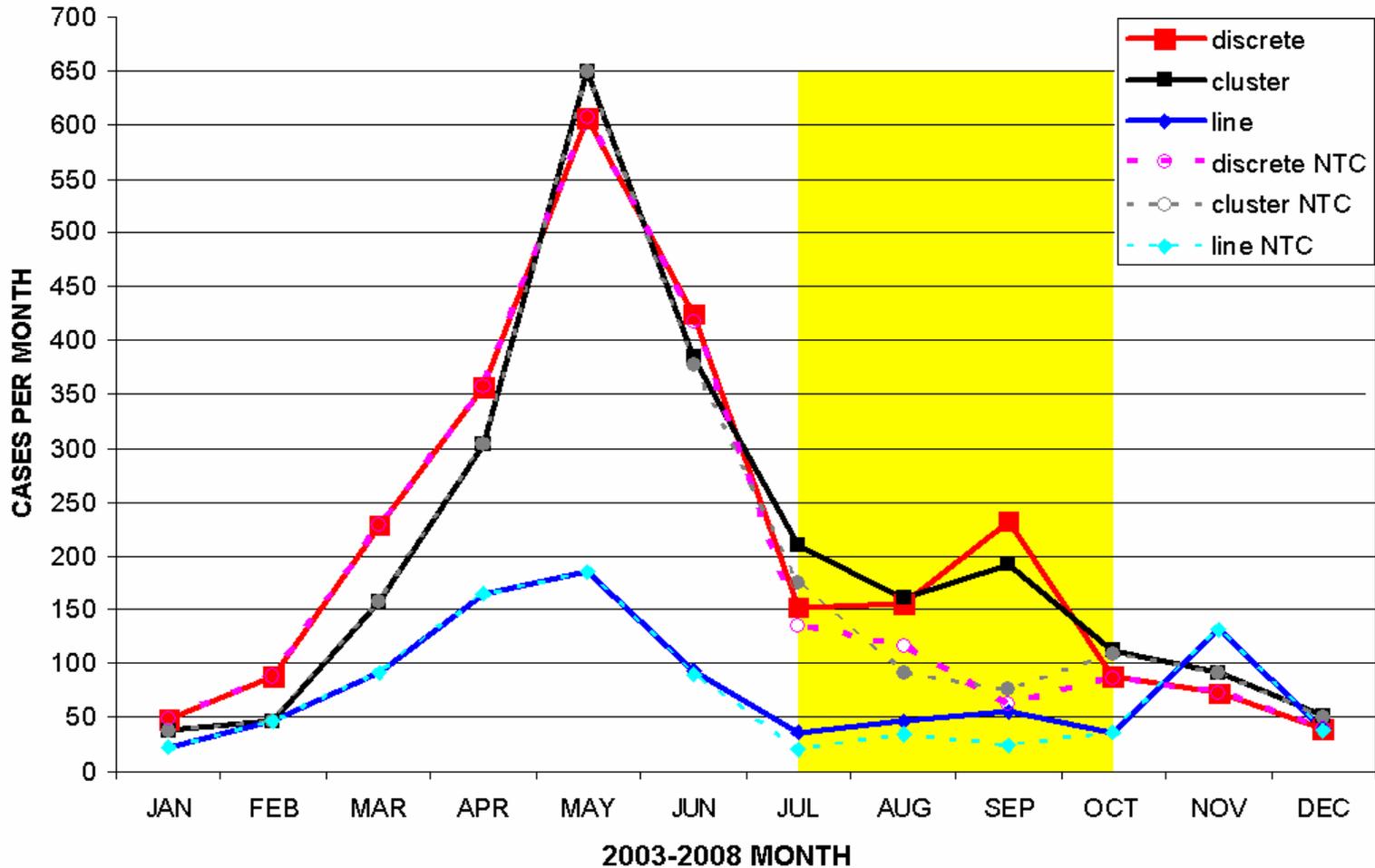
# APPLIED ANALYSES



Supercells in general, discrete ones in particular, represent greatest risk for **SIGNIFICANT** TC tornadoes.

# APPLIED ANALYSES

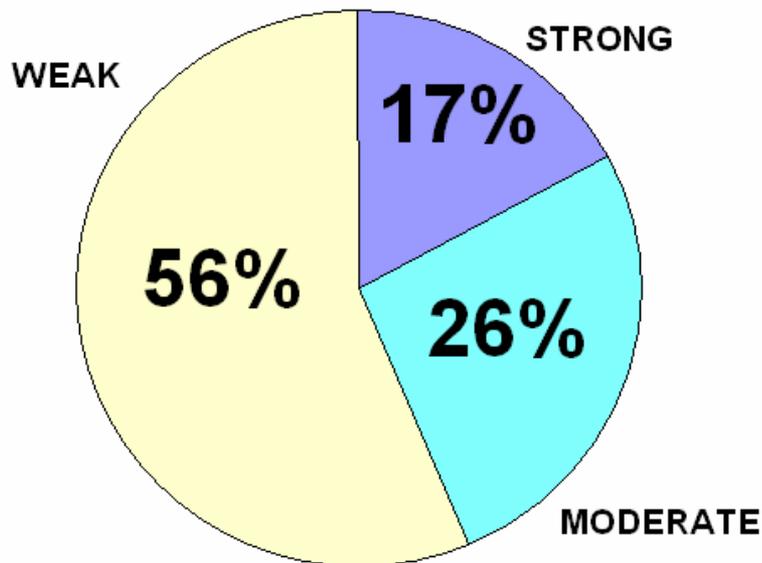
## RIGHT-MOVING SUPERCELL TORNADOES: TOTAL and WITHOUT TCS



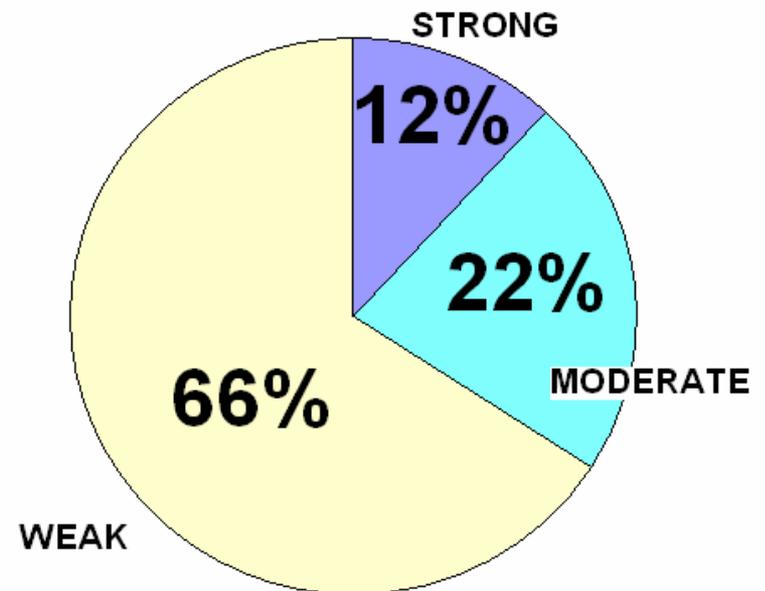
# APPLIED ANALYSES

## MESOCYCLONE CLASSES by MODE

Mesocyclone Strength Classes in Discrete TC Tornadic Supercells



Mesocyclone Strength Classes in Embedded TC Tornadic Supercells



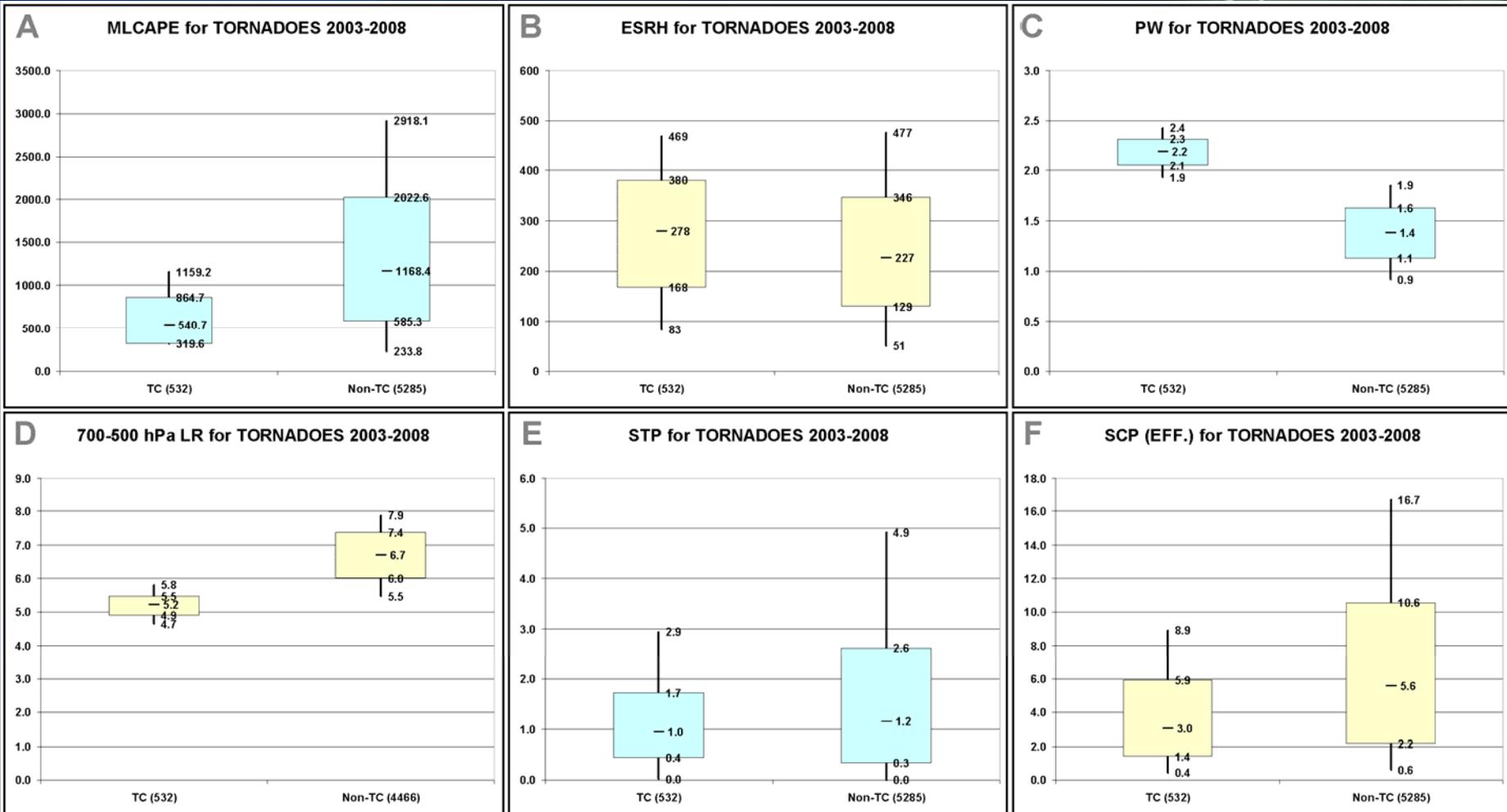
# ***APPLIED ANALYSES***

## **Environments of tornadic TC cells 2003-2008**

- ◆ **BASED ON 2003-2008 SPC GRIDDED RUC-"SFCOA" DATASET**
- ◆ **NUMEROUS PARAMETERS DERIVED FROM RECONSTITUTED GRIDPOINT SOUNDINGS**
- ◆ **TC TORNADO ENVIRONMENTS ANALYZED IN BULK**
- ◆ **TC TORNADO ENVIRONMENTS ANALYZED BY CONVECTIVE MODE**
- ◆ **TC AND NON-TC TORNADO ENVIRONMENTS COMPARED TO EACH OTHER**
- ◆ **MESOCYCLONE STRENGTH FOR SUPERCELLS**

# APPLIED ANALYSES

## ENVIRONMENTAL ANALYSIS



# **DATABASE ONLINE:**

[www.spc.noaa.gov/](http://www.spc.noaa.gov/)

[misc / edwards / TCTOR / TCTOR.xls](#)

[misc / edwards / TCTOR / readme.txt](#)

# **DOCUMENTATION:**

[www.spc.noaa.gov/publications](http://www.spc.noaa.gov/publications)

**Contact: [Roger.Edwards@noaa.gov](mailto:Roger.Edwards@noaa.gov)**