

Increased variability of tornado occurrence in the US in recent years



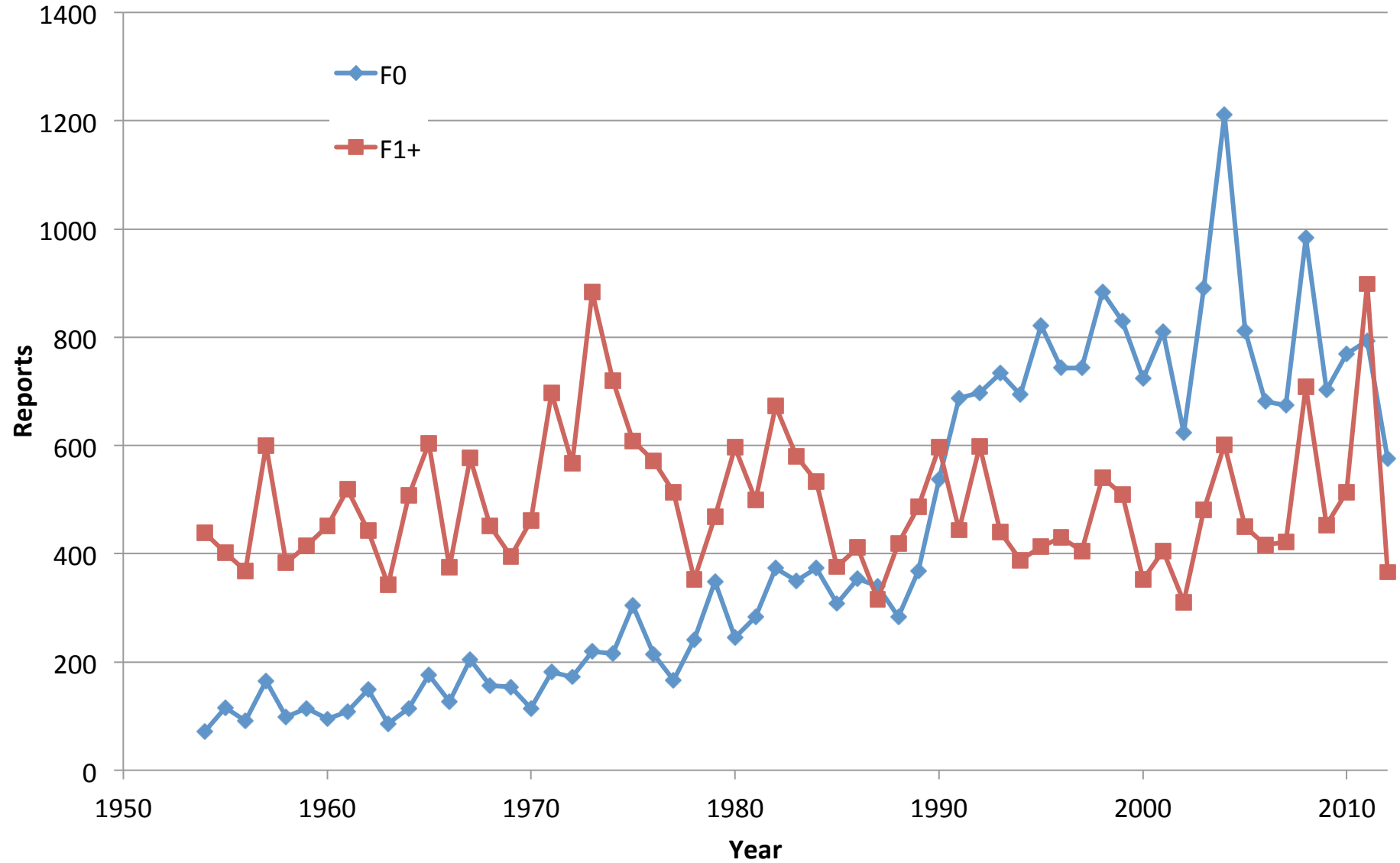
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Reports-A logical place to start

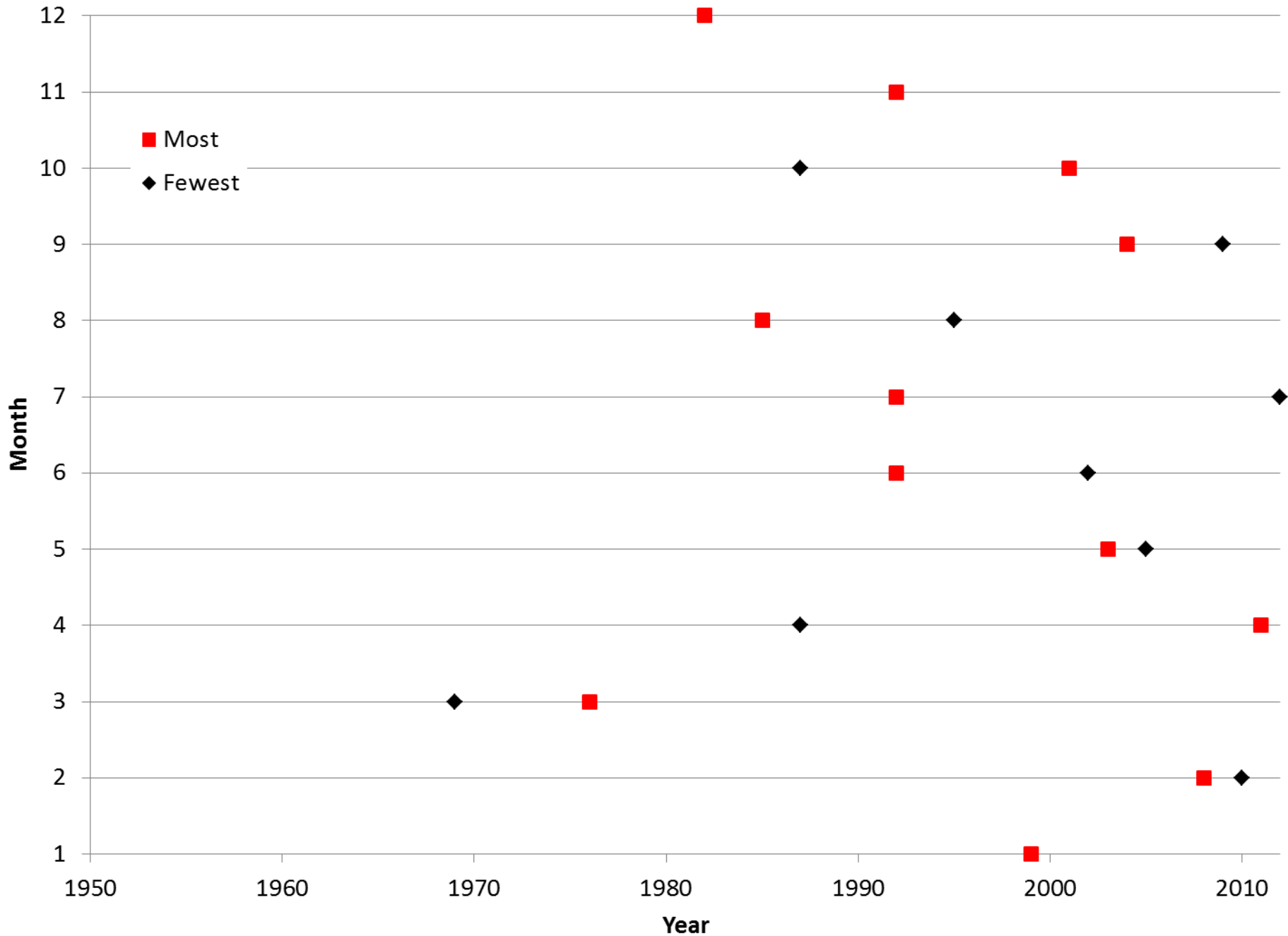


- US reporting database
 - Target of opportunity
 - Changes in *de jure* and *de facto* standards
- Look at monthly records

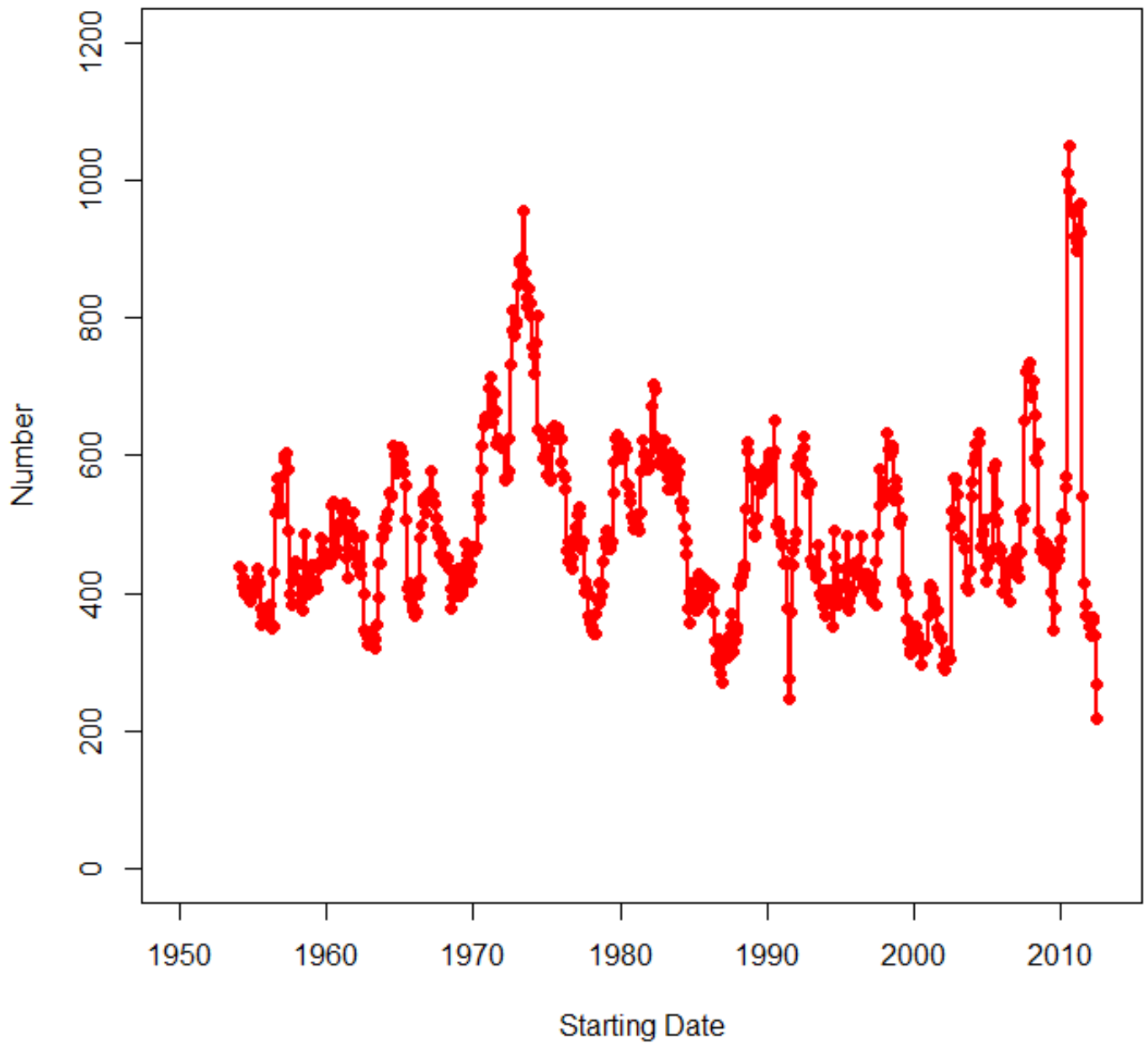
Annual US Tornado Reports by F-scale



Monthly F1+ Tornado Records

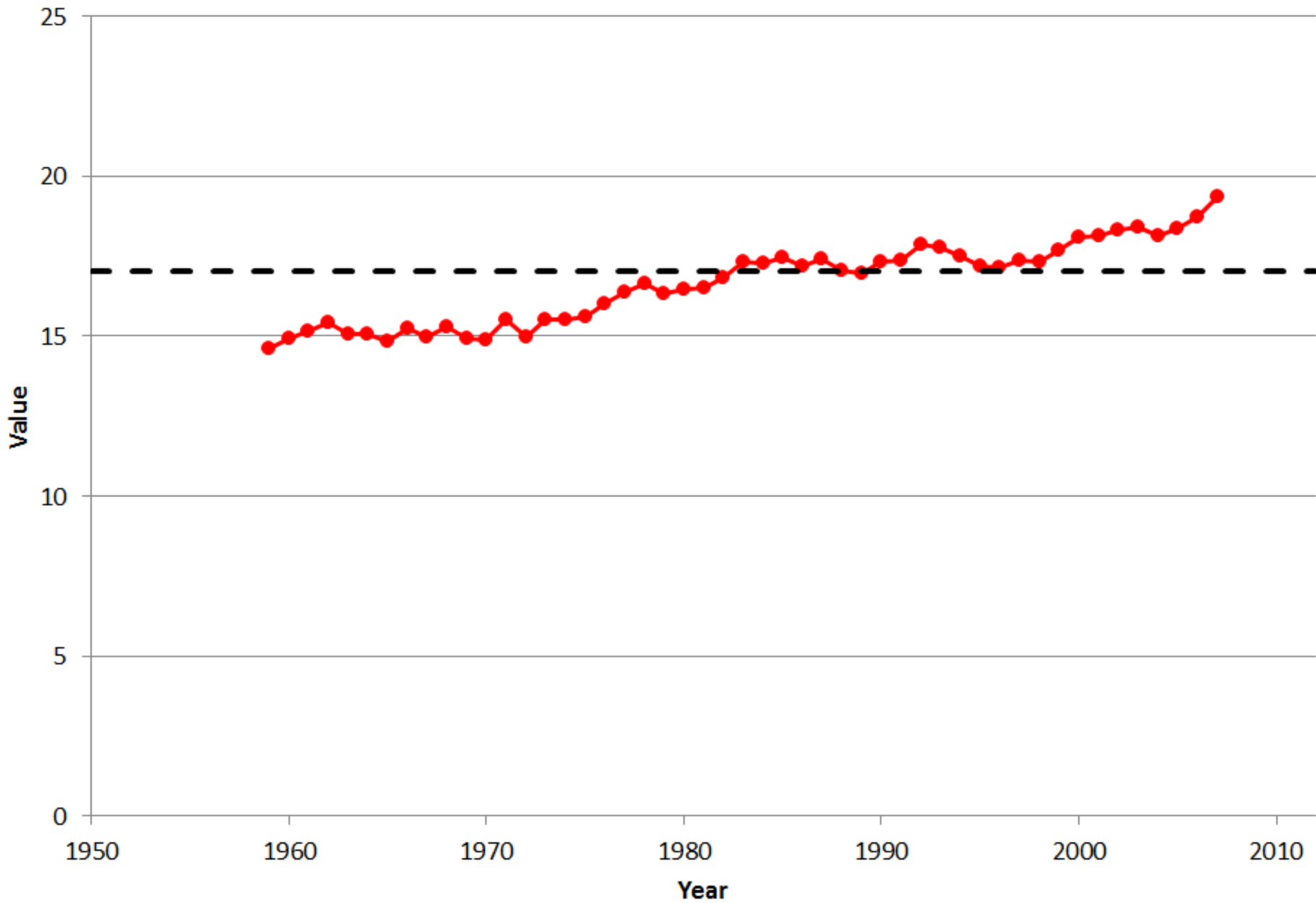


(E)F1+ US Tornadoes in 12-month Periods (1954-present)



Standard Deviation of Monthly Ranks (11-year Mean)

Dashed Line-Random

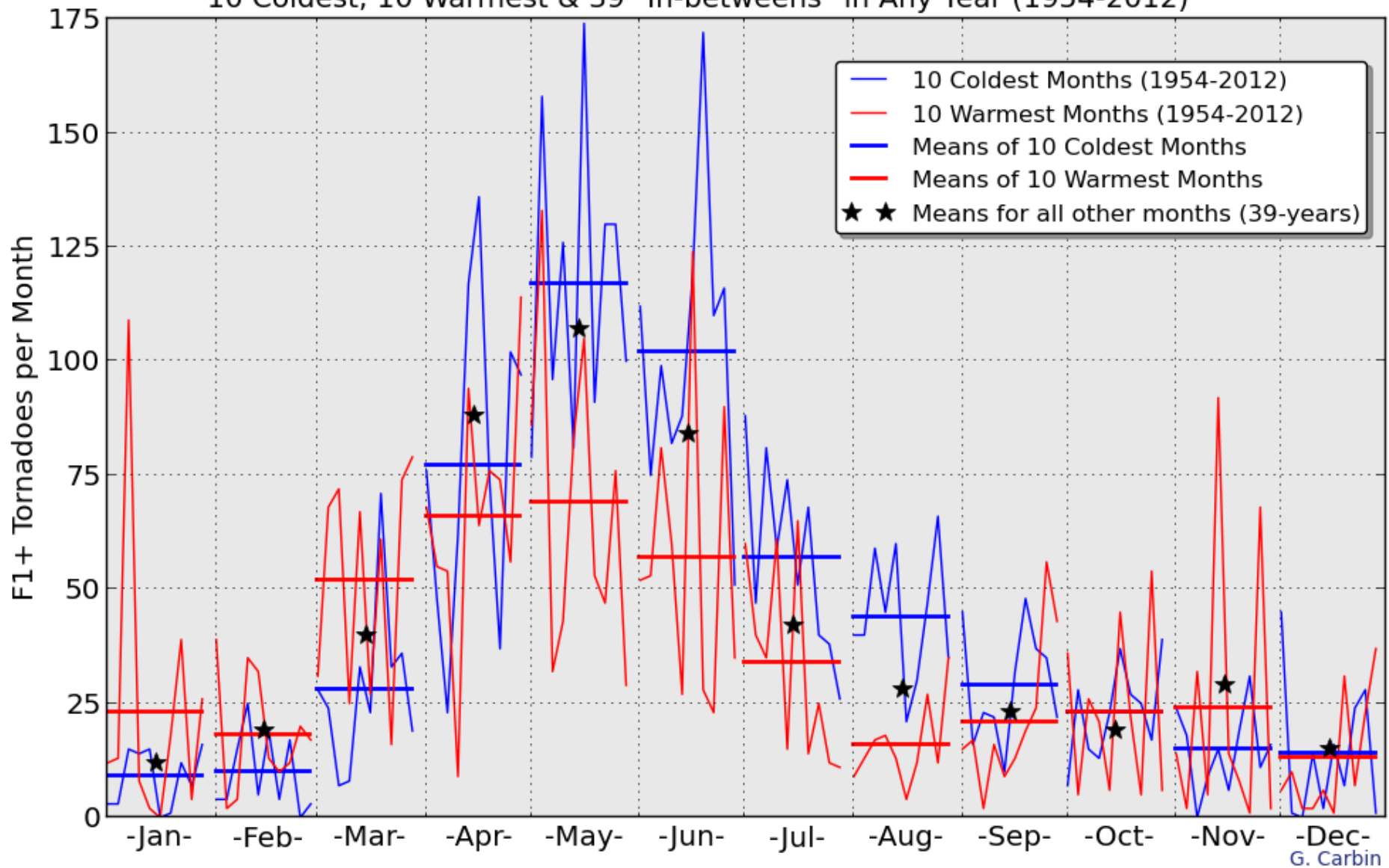


Look at hot/cold months

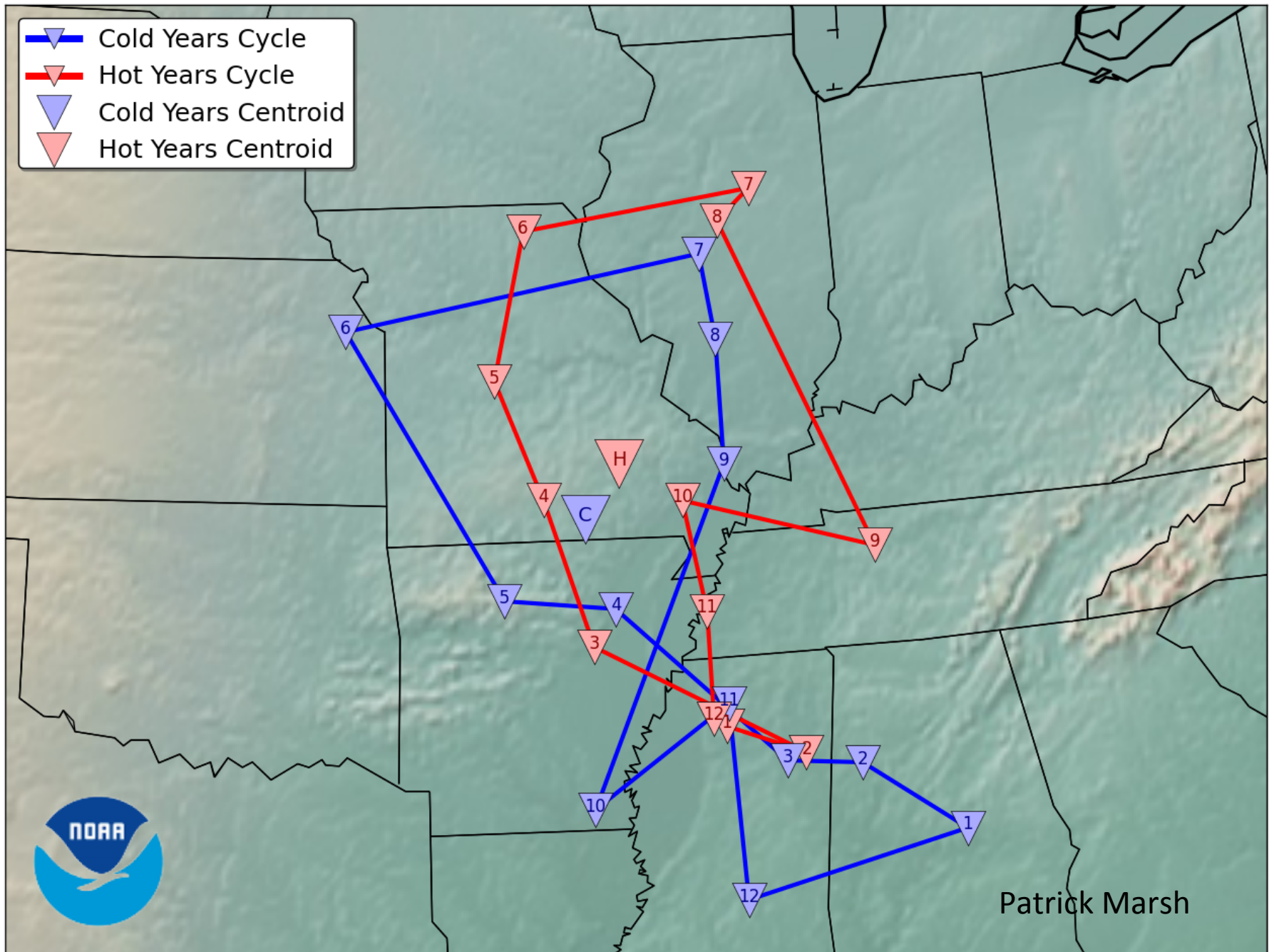


- 1954-2012
 - Look at January-take 10 warmest, 10 coolest
 - Repeat for each month

Cycle Plot of Tornadoes per Month & Monthly Means for
 10 Coldest, 10 Warmest & 39 "In-betweens" in Any Year (1954-2012)



Monthly Mean Tornado Location



Reports-A logical place to start



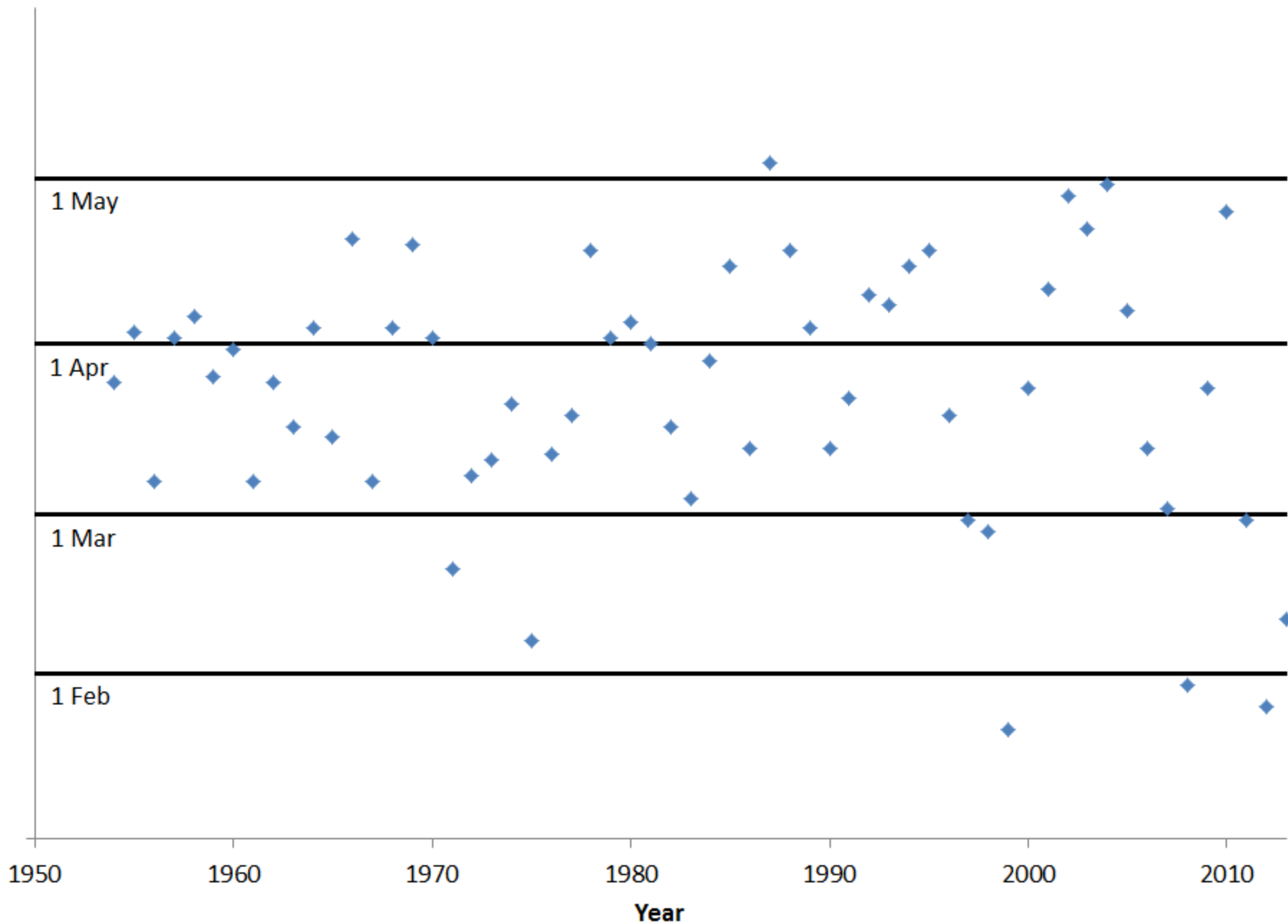
- US reporting database
 - Target of opportunity
 - Changes in *de jure* and *de facto* standards
- Delta temp-~3 C, ~20% fewer tornadoes in warm

Modelling the distribution

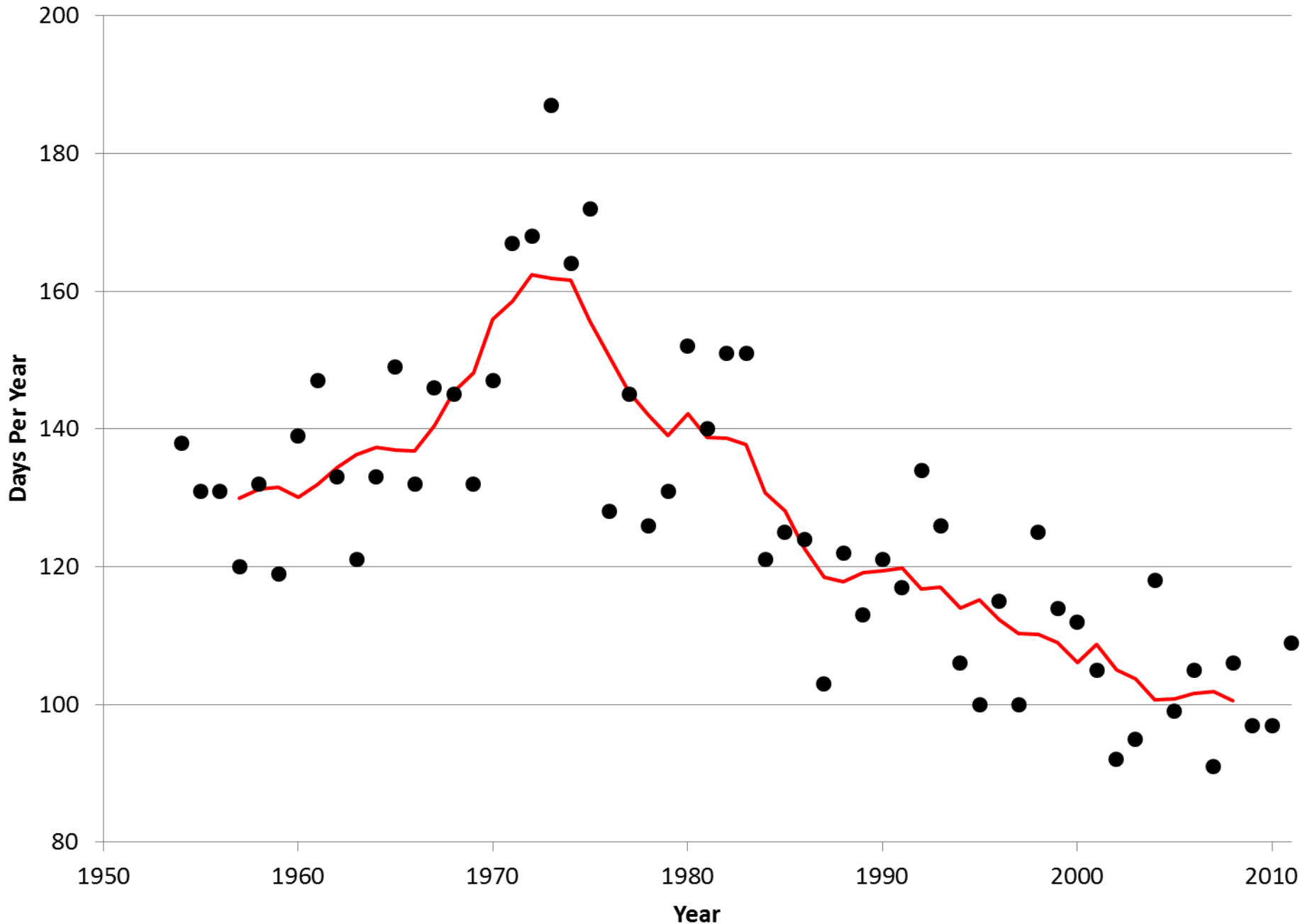


- When does season start?
- Tornado days per year
- Annual cycle
- Distribution of tornadoes per tornado day
- Run for 1000 years

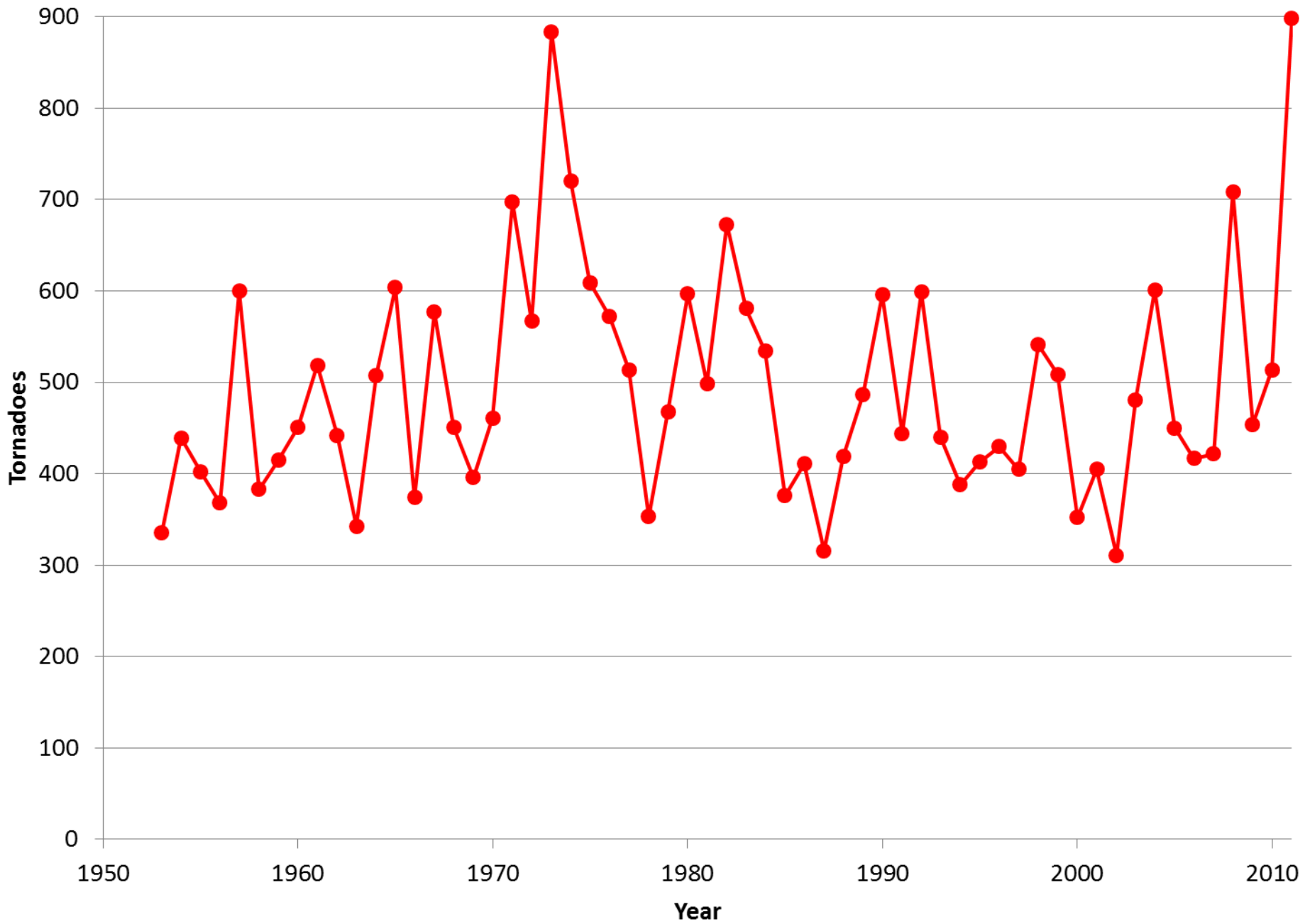
Date When 50th F1+ Tornado Of Year Occurs



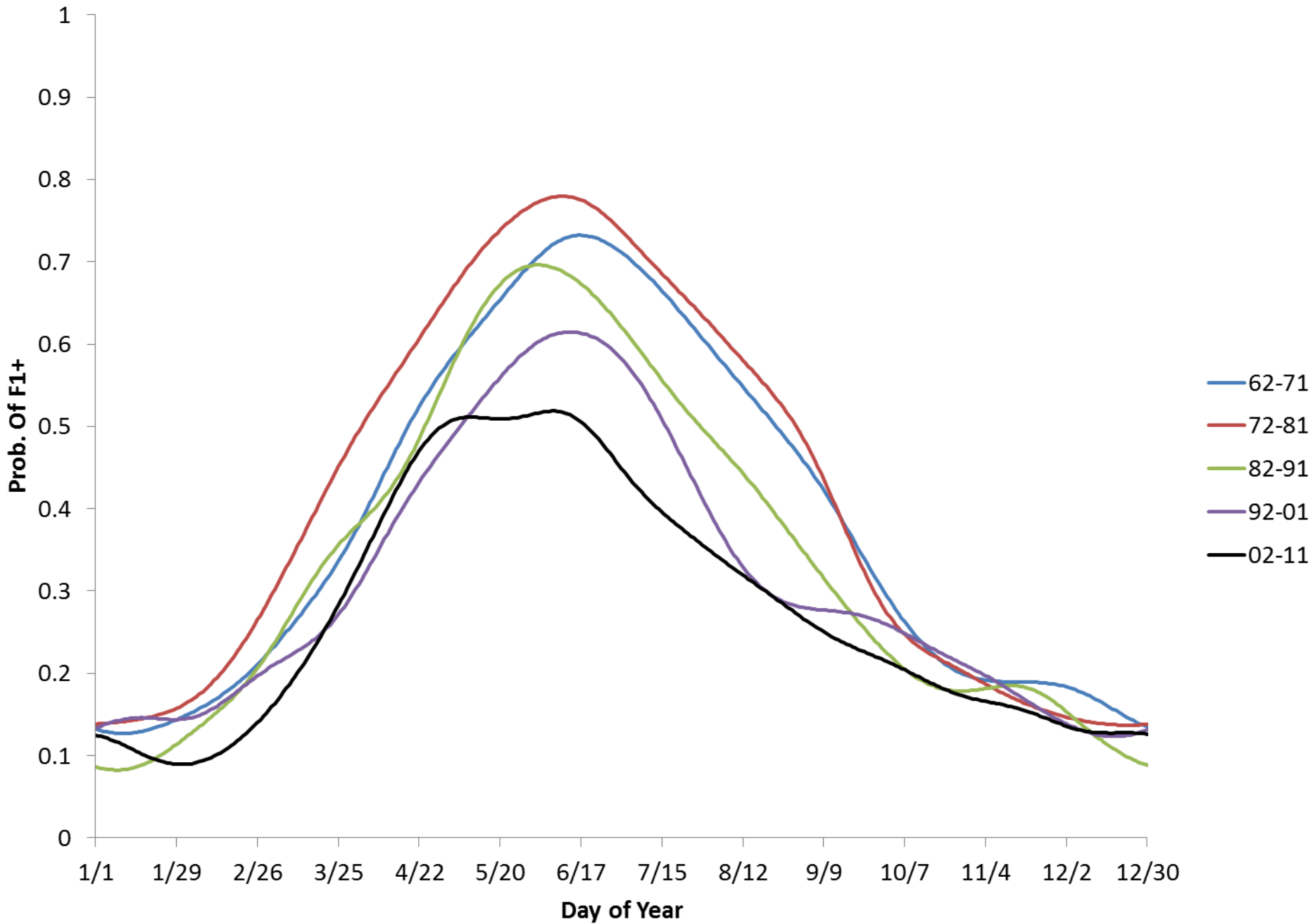
Days Per Year With At Least 1 F1+ Tornado in US



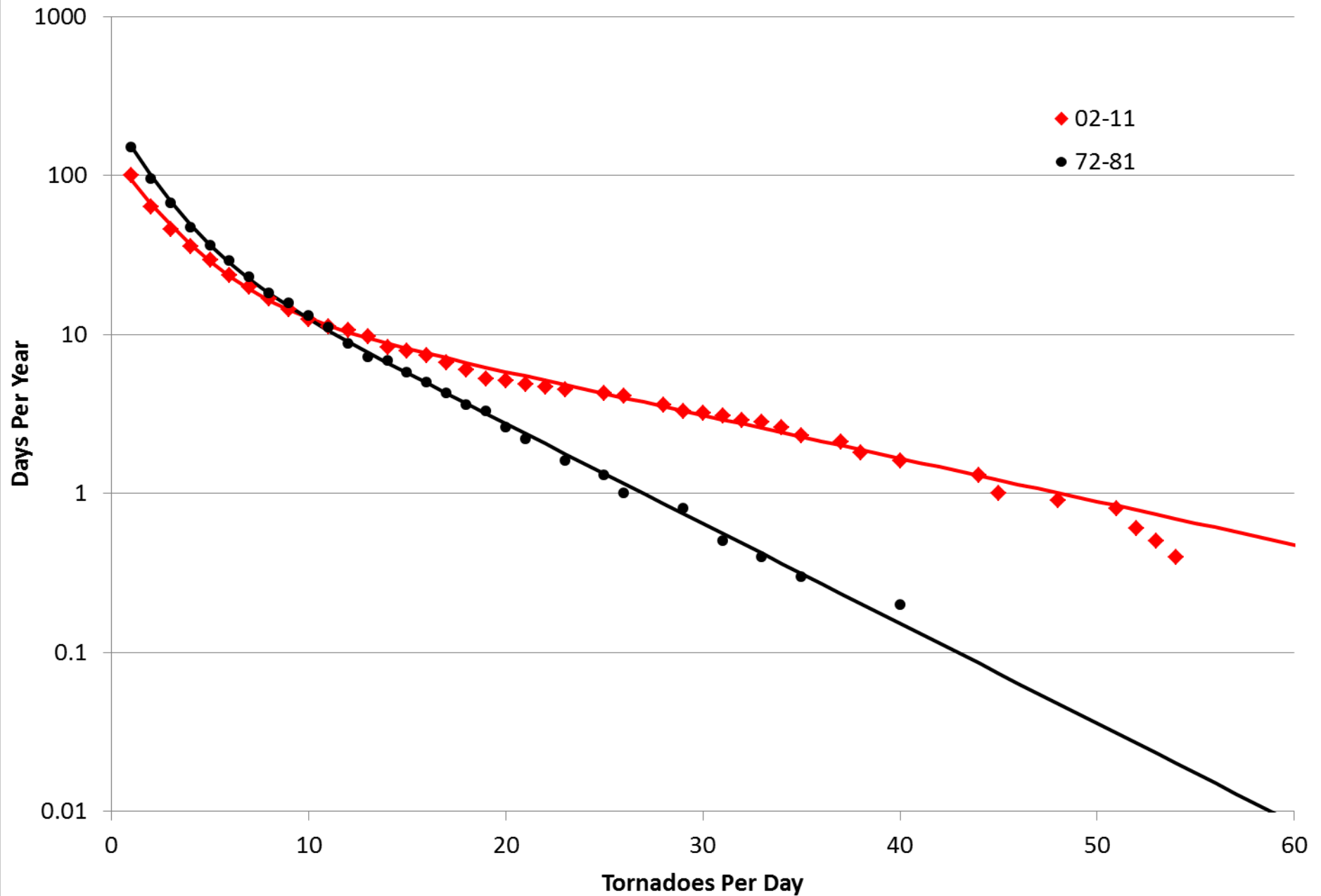
Annual Total of F1 and Greater Tornadoes



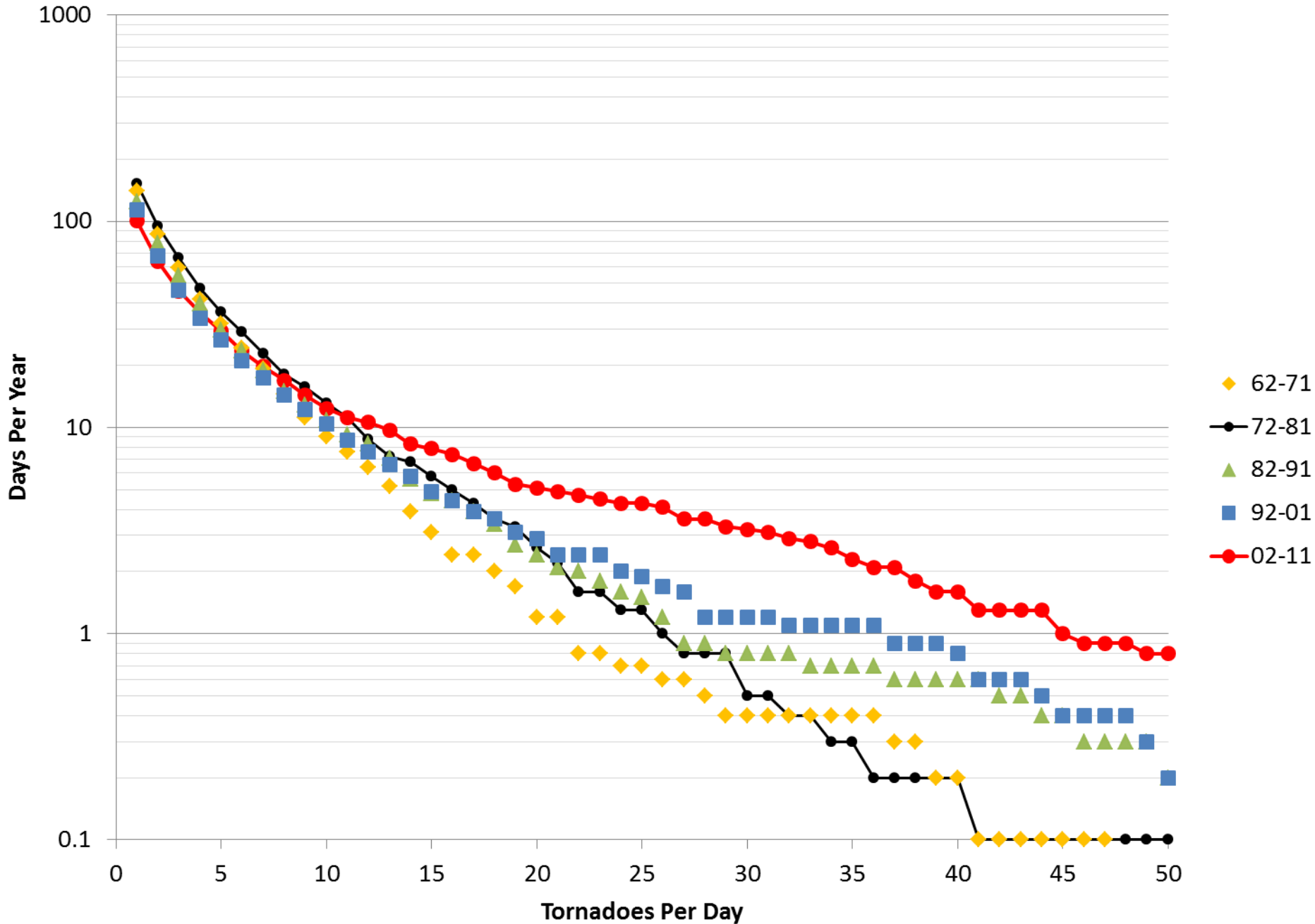
Probability of At Least One F1+ Tornado in US (Smoothed)



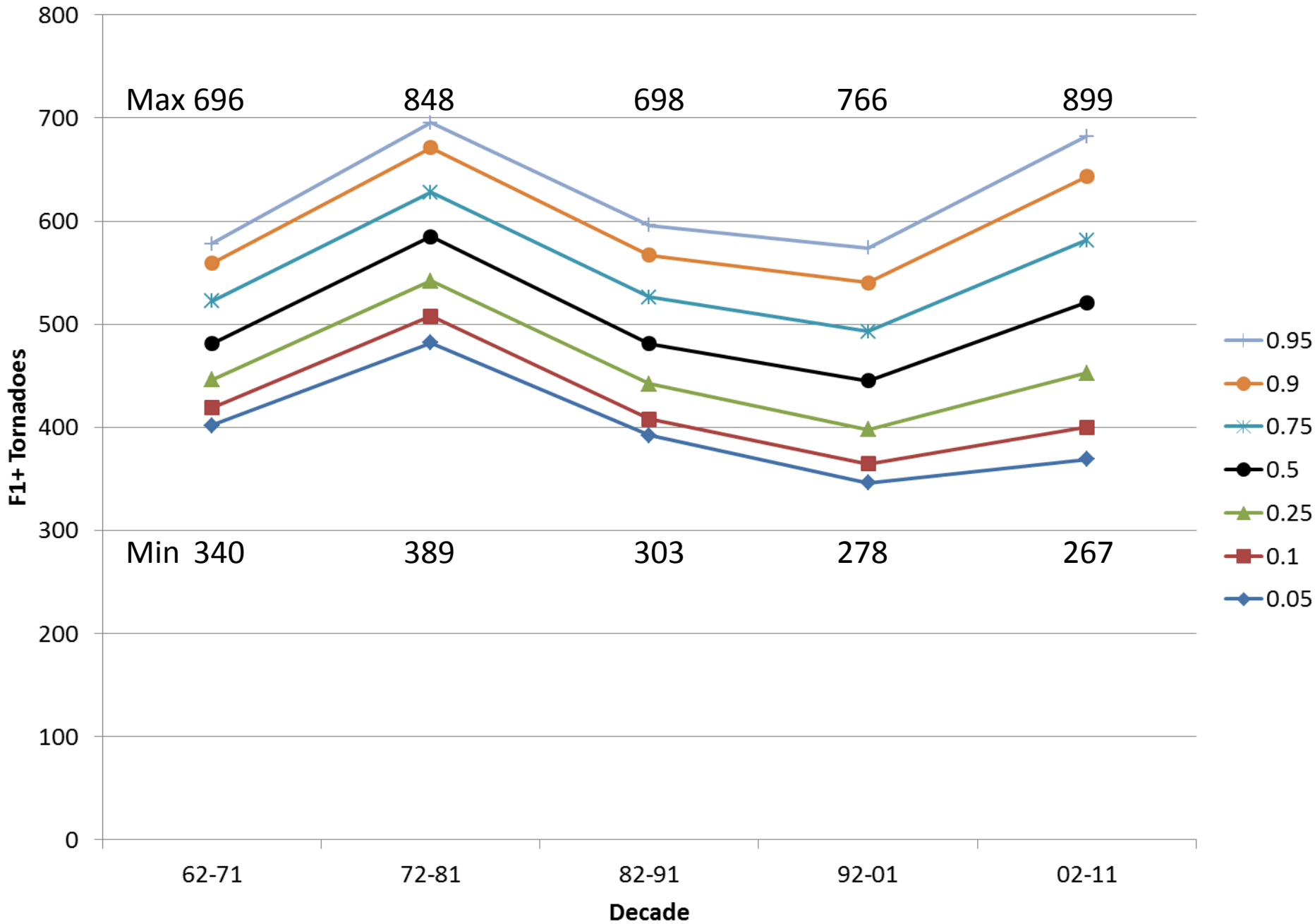
Annual Frequency of "At Least" X F1+ Tornadoes Per Day By Decade



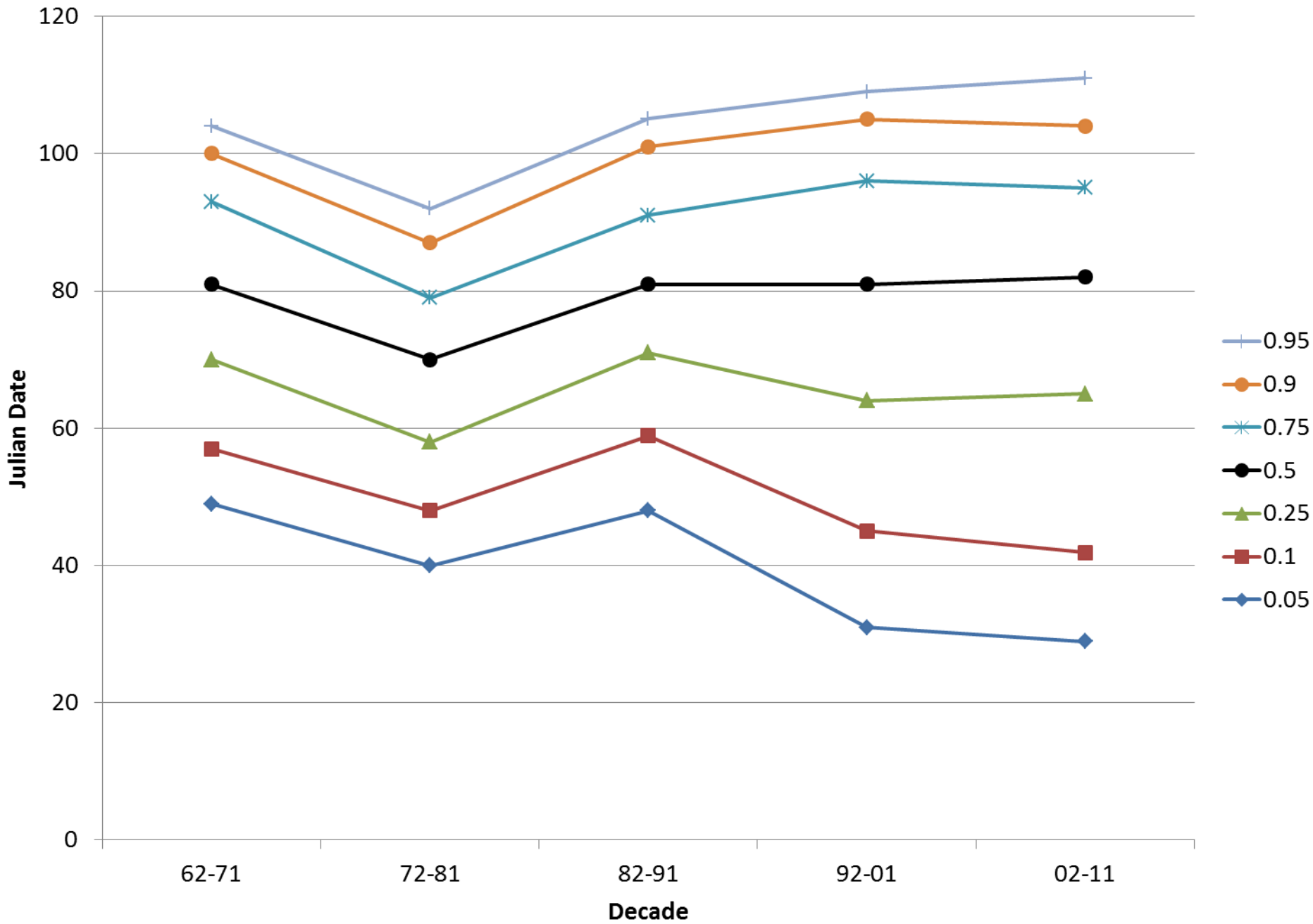
Decadal Distribution of Tornado Exceedance (F1+)



Quantiles of Number of F1+ Tornado by Decade (Simulation)



Quantiles of Julian Date of 50th F1+ Tornado by Decade (Simulation)



Closing thoughts



- Mean has changed little
- Variability (daily, monthly, annual) has increased
 - Leads to earlier/later starts
 - Fewer days, big days with more
- Why?