2014 NATIONAL TORNADO SUMMIT

Greg Carbin, WCM
NOAA/NWS Storm Prediction Center
Norman, Oklahoma

Outline

A Review of 2013 Tornado Activity

Use of SPC's Operational "SSEO" Forecast Guidance

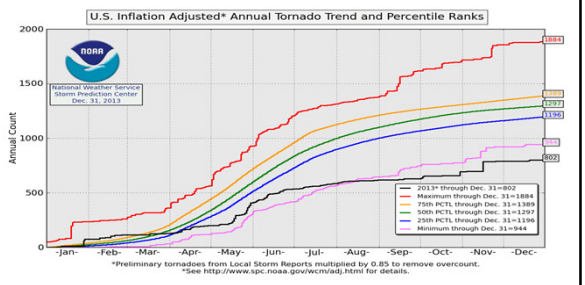
NOAA's Hazardous Weather Testbed (HWT) – 2013 Update

Climate Forecast System (CFS) for Severe Weather Outlooks

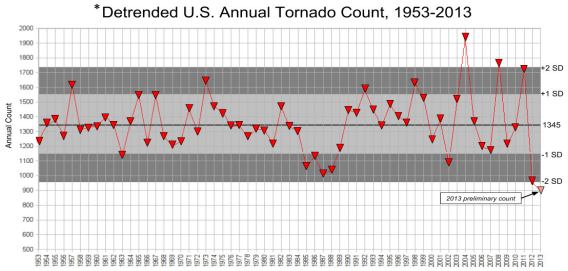
SPC Products and Services in 2014

Q & A

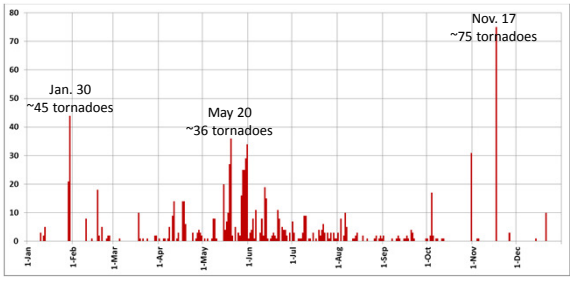
2013 Tornadoes



2013 Total – Lowest on Record*

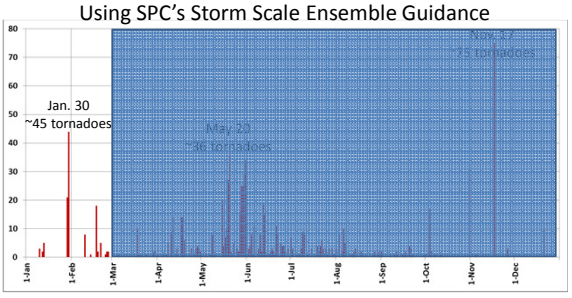


"Big" Tornado Days in 2013



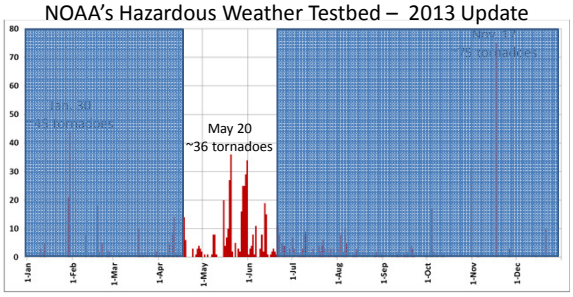
January 30, 2013

Using SPC's Storm Scale Ensemble Guidance



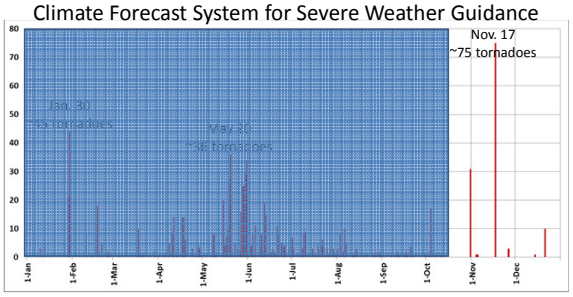
May 20, 2013

NOAA's Hazardous Weather Testbed – 2013 Update

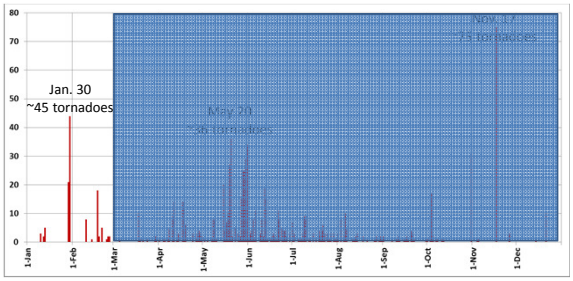


November 17, 2013

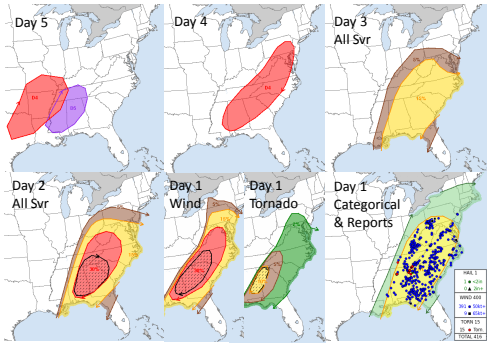
Climate Forecast System for Severe Weather Guidance



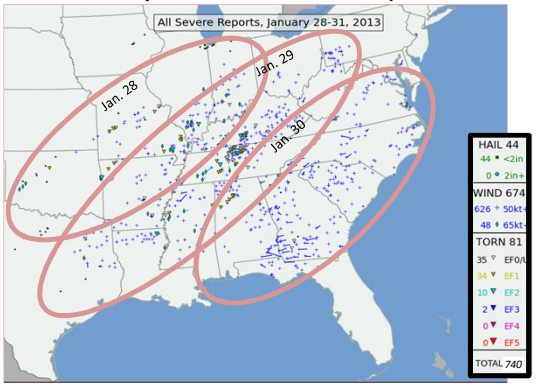
January 30, 2013 – SPC's SSEO Guidance



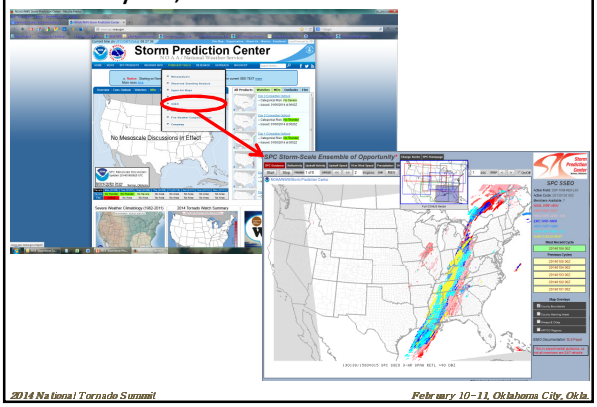
January 30, 2013 – Outlook Evolution



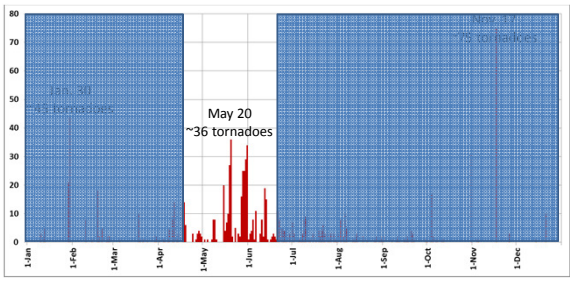
January 28-30, 2013 – Reports



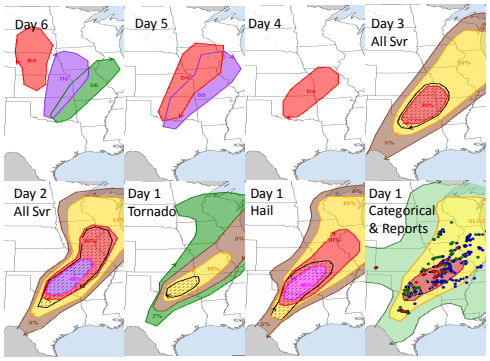
January 30, 2013 – SPC's SSEO Guidance

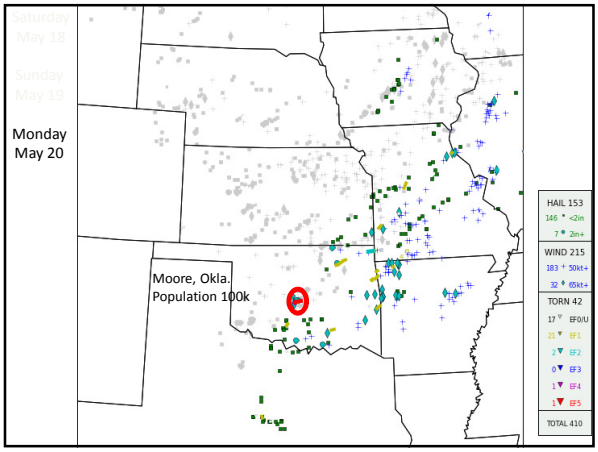


May 20, 2013 & NOAA's HWT Update

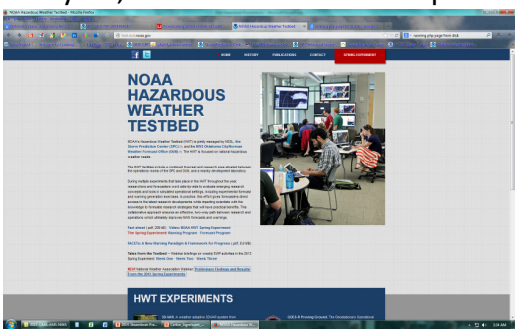


May 20, 2013 – Outlook Evolution





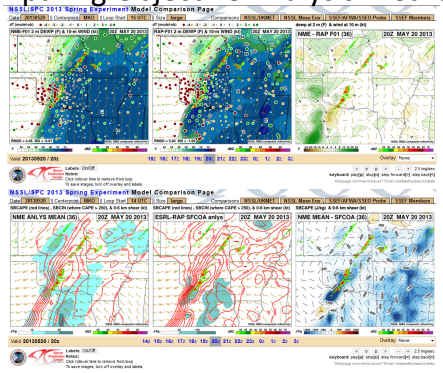
May 20, 2013 – NOAA's HWT Update



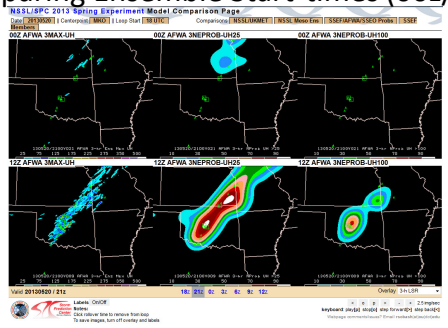
http://hwt.nssl.noaa.gov/spring_experiment/tales/2013-NWA/

http://hwt.nssl.noaa.gov/Spring_2013/

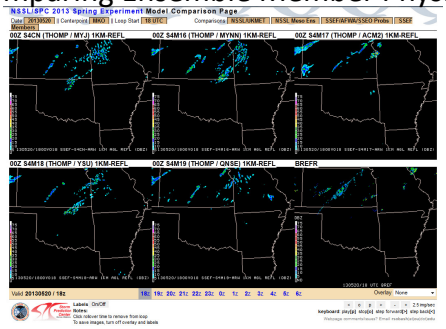
Comparing Objective Analysis Methods



Comparing Ensemble Start-times (00z/12z)



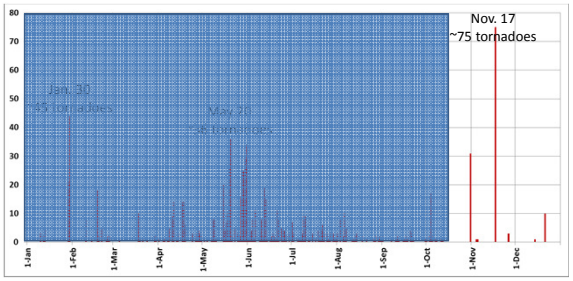
Comparing Ensemble Member Physics



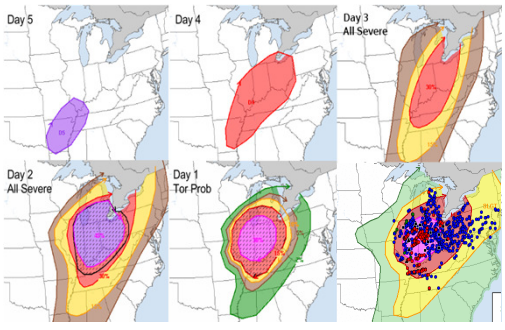
2013 Spring Forecasting Experiment

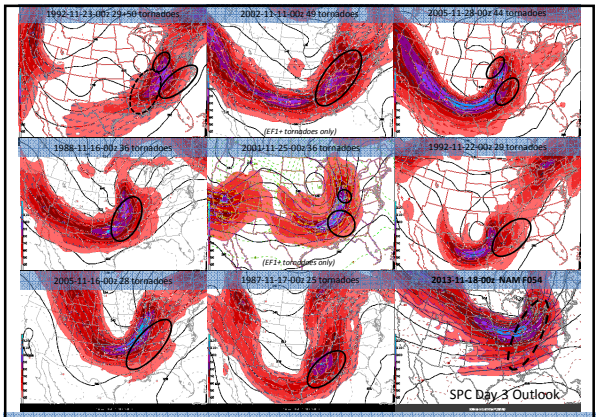
- The promising ensemble approach of the NME occasionally performed better than the deterministic RAPv2 for analyses and short-term forecasts of the pre-convective environment.
- The initial conditions had a noticeable impact on 00 UTC NSSL WRF convective forecasts with the quality of the forecast during the afternoon often strongly tied to how well overnight convection was depicted.
- Forecasts from 12 UTC convection-allowing ensembles displayed a broader distribution of forecast ratings than the 00 UTC ensembles for severe weather guidance.
- More work is needed in the perturbation strategy and design of formal convection-allowing ensembles to improve the overall forecast performance for severe weather prediction.
- An effective collaboration with the UKMET office was established through five-week participation and examination of their convection-allowing model runs, which proved to be very competitive with WRF-ARW based models.

November 17, 2013 – Using CFS for Severe



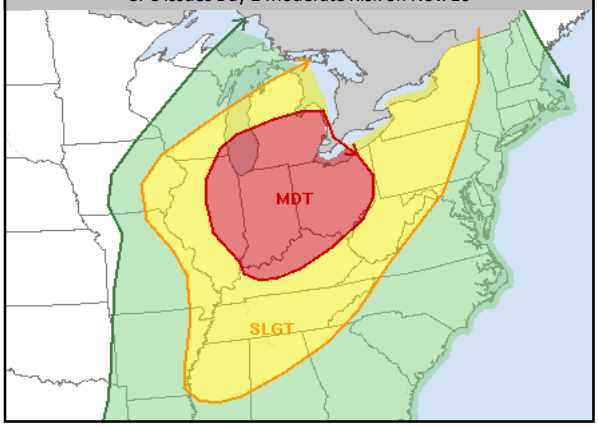
November 17, 2013 – Outlook Evolution



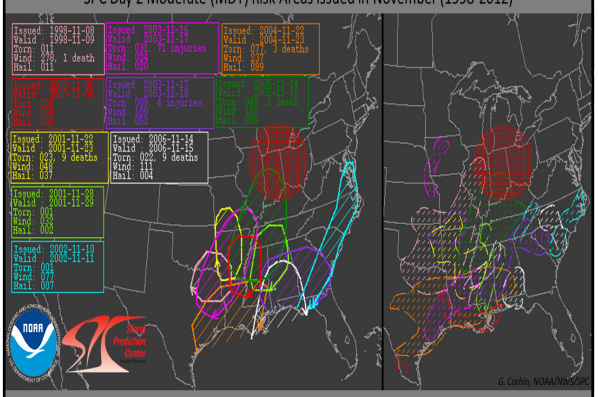


500mb patterns for November tornado outbreaks & **NAM forecast valid Sat/Sun, 11/17-18/13**
Areas of severe weather indicated by dark outlines; SPC Day 4 Outlook (dashed)

SPC Issues Day 2 Moderate Risk on Nov. 16

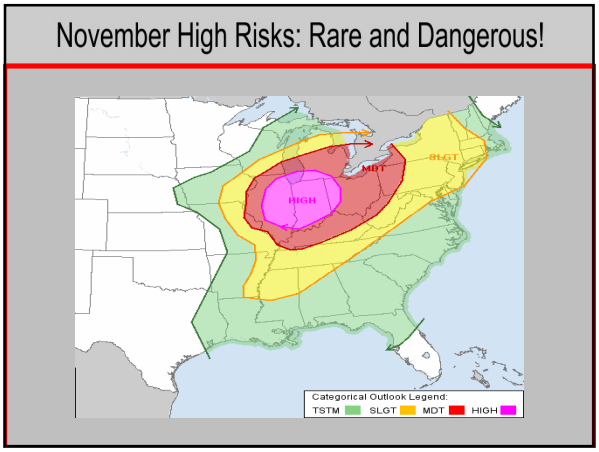


SPC Day 2 Moderate (MDT) Risk Areas Issued in November (1998-2012)

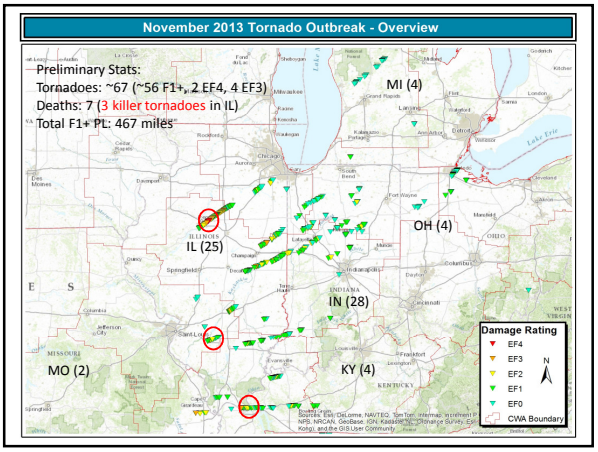


Day 2 MDT risk areas (left) and corresponding verifying severe weather areas (right)

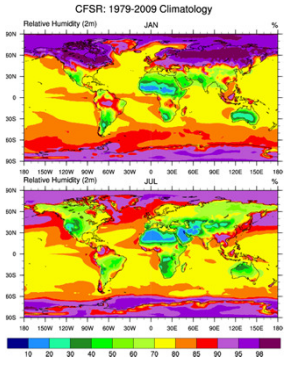
November High Risks: Rare and Dangerous!



November 2013 Tornado Outbreak - Overview



Climate Forecast System (CFS) Guidance



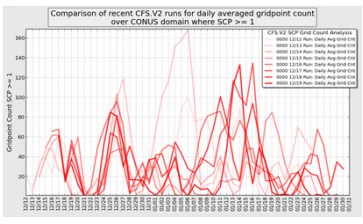
- 2nd version of NCEP Climate Forecast System
- V2 Became operational in March 2011
- Global model: coupled ocean-sea ice-land-atmosphere
- 1979-2011 CFS-reanalysis was used to calibrate and initialize the CFSv2 but CDASv2 is used to init operational CFSv2 runs
- T126 horizontal resolution (~100km) & 64 vertical sigma-pressure hybrid layers
- 16 CFSv2 operational runs per day:
  - 4 out to 9 months
  - 3 out to 1 season
  - 9 out to 45 days

2014 National Tornado Summit — February 10–11, Oklahoma City, Okla.

Early work using NCEP CFSv2 to compute SCP (Dec. 2012)

Utilizing IRI Data Library for access to CFSv2 data:

1) Download 00 UTC CFSv2 subset of grids over the CONUS for 1000&500mb u/v winds, 0-180mb MUCAPE, 0-3km SRH, & model convective precipitation*
2) Compute a modified simple Supercell Composite Parameter (SCP) as follows:
   SCP = MUCAPE/500 X 0-3km SRH/50 X EBWD-term

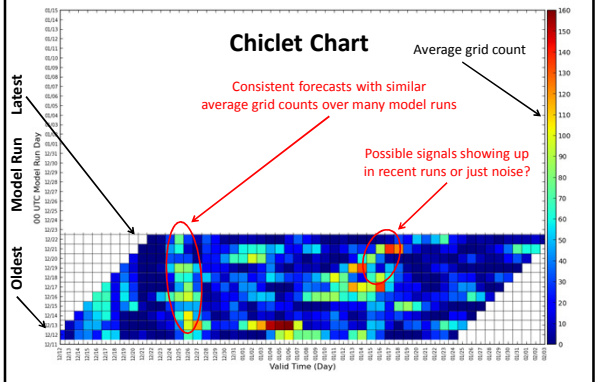


3) Count grid points in domain (out of 651) where 24-hour average (12z-12z):
   SCP >= 1
   …for Day 1 through Day 45.

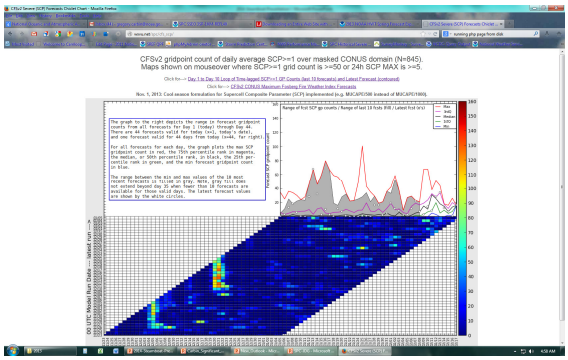
**Initially tried constraining to areas where QPF>0 but resulting grid counts were too low.*

2014 National Tornado Summit — February 10–11, Oklahoma City, Okla.

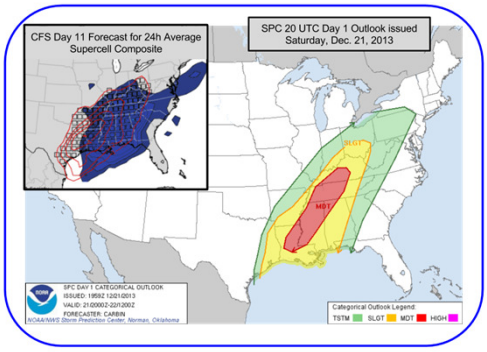
The CFSv2 SCP Chiclet Chart is born (Python and matplotlib*)



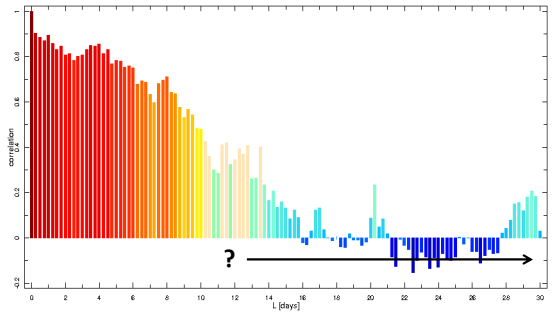
CFS Chiclet Chart and Nov. 17, 2013



CFS Day 11 & SPC Day 1 on Nov. 17, 2013



CFS Trends to Climatology (or worse!)



SPC Outlook Enhancements in 2014

- The SPC will revise Day 1 through Day 8 Severe Weather Outlooks to better communicate risk and describe Probabilistic Severe Weather Threats. These format changes will also improve use of SPC severe weather forecasts within GIS.

SPC Severe Weather Outlook Probability-to-Categorical Description Tables (2014)

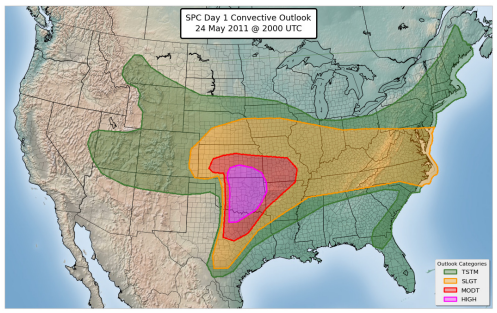
Day1	0%	2%	5%	10%	10% sig	15%	15% sig	30%	30% sig	45%	45% sig	60%	60% sig
Tor	TSTMS	MARGINAL	SLGT	ENHANCED				MDT		HIGH			
Wind	TSTMS		MARGINAL		SLGT		ENHANCED			MDT		HIGH	
Hail	TSTMS		MARGINAL		SLGT		ENHANCED			MDT			

Day2	0%	5%	15%	15% sig	30%	30% sig	45%	45% sig	60%	60% sig
All Svr	TSTMS	MARGINAL	SLGT		ENHANCED			MDT		HIGH

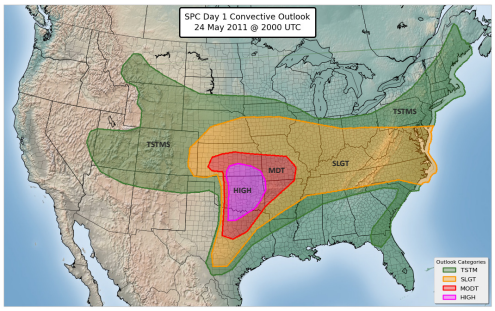
Day3	0%	5%	15%	15% sig	30%	30% sig	45%	45% sig
All Svr	TSTMS	MARGINAL	SLGT		ENHANCED			MDT

Day4-8	15%	30%
All Svr	SLGT	ENHANCED

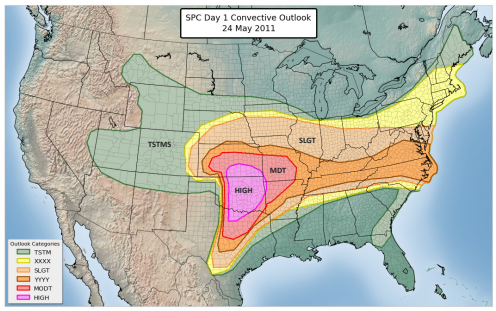
SPC Outlook Enhancements in 2014



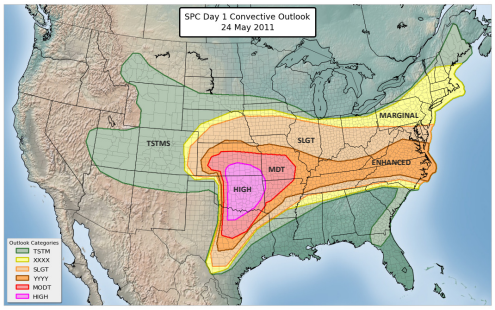
SPC Outlook Enhancements in 2014



SPC Outlook Enhancements in 2014



SPC Outlook Enhancements in 2014



2014 National Tornado Summit

Q & A

Thank You!

Find us on Facebook

http://www.facebook.com/US.NOAA.StormPredictionCenter

http://twitter.com/NWSSPC

E-mail: Gregory.Carbin@noaa.gov