The Massachusetts Tornado Outbreak of June 1, 2011

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Event Overview

- 4 tornadoes
  - Long-track EF3
  - Two EF1s
  - One EF0
- 4 fatalities, 72 injuries
- $175 million in damage
- Damage to 1400 houses and 78 businesses
- 10,000 acres of woodlands destroyed
Event Overview

- Tornadoes were part of a larger severe weather outbreak in a high CAPE, high shear environment

Hail up to 2” in diameter

Scattered reports of wind damage
500 mb closed low in southern Canada

Shown to be associated with most New England tornadoes
(WFO BOX local study)
Radar and Surface Plot: 14 UTC

Banacos et al 2011
Elevated Mixed Layer

NOAA HYSPLIT MODEL
Backward trajectories ending 01/12 UTC
GDAS Meteorological Data

anticyclonic loop

Source ★ at 42.75 N 73.80 W
Starting Trajectories Heights (at ALB)
- 4500m AGL
- 4000m AGL
- 3500m AGL

hPa
576 653

600 650 700 750

Banacos et al 2011
Elevated Mixed Layer

Banacos et al 2011
Radar and Surface Plot: 19 UTC
SPC Mesoanalysis: 19 UTC

MUCAPE / SFC-6 km Shear

0-1 km SRH / Storm Motion

VGP / 0-3 km Shear

0-1 km EHI

SigTor Parameter

Mosaic Composite Reflectivity

Banacos et al 2011
BULLETIN - EAS ACTIVATION REQUESTED
SEVERE THUNDERSTORM WARNING
NATIONAL WEATHER SERVICE TAUNTON MA
418 PM EDT WED JUN 1 2011

THE NATIONAL WEATHER SERVICE IN TAUNTON HAS ISSUED A
* SEVERE THUNDERSTORM WARNING FOR...
EXTREME SOUTHWESTERN WORCESTER COUNTY IN CENTRAL MASSACHUSETTS...
NORTH CENTRAL HARTFORD COUNTY IN NORTHERN CONNECTICUT...
NORTHERN Tolland County in NORTHERN CONNECTICUT...
EXTREME NORTHEASTERN WINDHAM COUNTY IN NORTHERN CONNECTICUT...
CENTRAL HAMPDEN COUNTY IN WESTERN MASSACHUSETTS...
THIS INCLUDES THE CITIES OF...SPRINGFIELD...CHICOPEE...
EXTREME SOUTHEASTERN HAMPSHIRE COUNTY IN WESTERN MASSACHUSETTS...
* UNTIL 500 PM EDT
* AT 413 PM EDT...NATIONAL WEATHER SERVICE DOPPLER RADAR INDICATED A
SEVERE THUNDERSTORM CAPABLE OF PRODUCING QUARTER SIZE HAIL...AND
DAMAGING WINDS IN EXCESS OF 60 MPH. THIS STORM WAS LOCATED NEAR
WESTFIELD...OR 11 MILES WEST OF CHICOPEE...AND WAS MOVING EAST AT
35 MPH.
Importance of NWSChat

(4:03:51 PM) media-nick.a.bannin: getting some funnel reports in northampton and a funnel report in granby 1 minute ago

(4:13:16 PM) media-nick.a.bannin: any confirmed visuals of a tornado/funnel other than viewer reports?

(4:20:49 PM) nwsbox-wtb: Nick...No confirmed reports as of yet...nothing aside from what you passed on to us a few minutes ago.

(4:26:02 PM) nwsbot: WESTFIELD/BARNES,MA (BAF) ASOS reports Tornado KBAF 012024Z 30005KT 11/4SM R20/4500VP6000FT FC +TSRA BKN024 BKN030 OVC065 26/22 A2884 RMK FUNNEL CLOUD B23 E24 A02 LTG DSNT NW E TS1958RAB00 P0023

(4:31:02 PM) nwsbot: BOX issues Tornado Warning for Hampden, Hampshire, Worcester [MA] and Hartford, Tolland, Windham [CT] till 5:15 PM EDT..." AT 426 PM EDT...NATIONAL WEATHER SERVICE DOPPLER RADAR INDICATED A SEVERE THUNDERSTORM CAPABLE OF PRODUCING A TORNADO NEAR WEST SPRINGFIELD...OR 6 MILES WEST OF SPRINGFIELD...MOVING EAST AT 40 MPH.

(4:31:13 PM) NECN.matt.noyes: Funnel is Westfield MA from our viewers


(4:34:26 PM) media-nick.a.bannin: tornado on ground in West Springfield on our live skycam

(4:36:14 PM) nwsbox-eleanor.v-t: Folks...getting several reports of tornado on ground in Springfield...heading toward downtown. Ham radio operator sees it on the ground at the moment.

(4:39:56 PM) media-nick.a.bannin: no longer on skycam

(4:40:22 PM) media-nick.a.bannin: our skycam is shooting damage right now along river front park next to Ct. River in Springfield

(4:40:40 PM) Ryan Hanrahan: Live video from WWLP had tornado with significant debris crossing 91 and the CT river
KBOX 0.5 REF/SRM: 2036 UTC
KBOX 0.5 REF/SRM: 2100 UTC
KBOX 0.5 REF/SRM: 2113 UTC
KBOX 0.5 REF/SRM: 2127 UTC
Best Practices

- **Skywarn Operations**
  - Provided first verified report of tornado
  - Nearly continuous reports as it was on the ground

- **NWSChat**
  - Continuous flow of information to and from WFO

- **Live NWR Broadcast**
  - 436 pm Severe Weather Statement
Challenges

- Raise forecaster awareness of higher-end tornado events
  - Follow-up Tornado Drill assigned

- Radar operations
  - New color curves for VEL/SRM
  - Proficiency in adjusting PRF

- Roles and responsibilities
  - Formal Severe Weather Operations Plan developed

- EMs, Media, and other partners
  - Focused meetings
Reference

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