

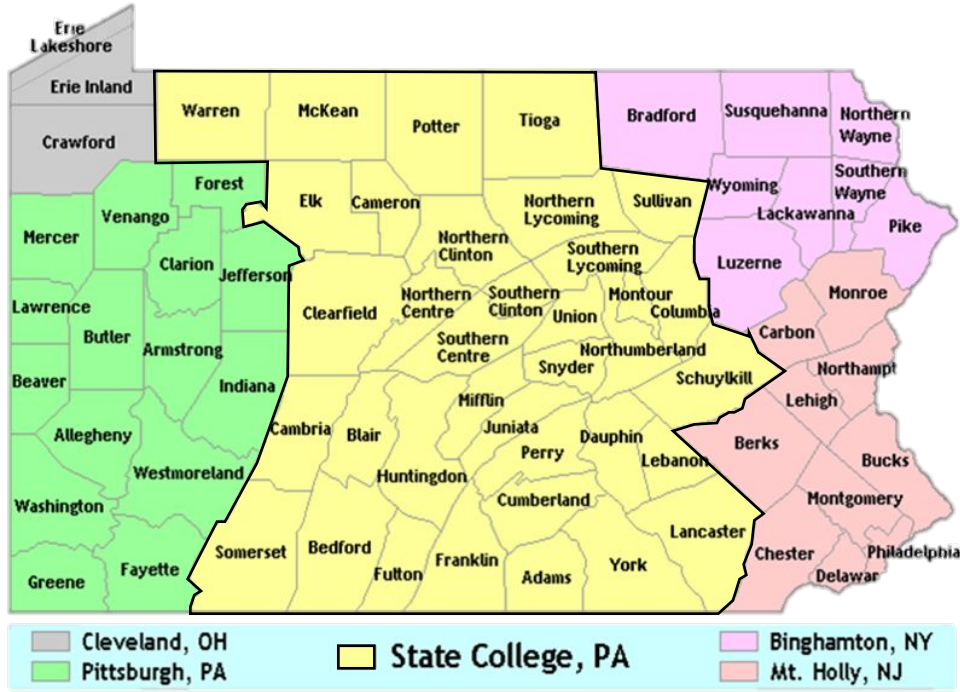
Basic Spotter Training 2022

NWS State College



NOAA Photo Library

How to Find Us Online



@NWSStateCollege

NEW!



@NWSStateCollege



/NWSStateCollege



/NWSStateCollege



www.weather.gov/ctp



NWSStateCollege

weather.gov/statecollege

National Weather Service



- National Weather Service
 - Our parent agency is NOAA
 - National Oceanic and Atmospheric Administration
 - NWS (and NOAA) fall under the Department of Commerce
 - Federal agency



- **Primary Mission:**

Provide weather, water and climate data, forecasts, warnings, and impact-based decision support services for the protection of life and property and enhancement of the national economy



NWSSStateCollege

weather.gov/statecollege

Organization of the National Weather Service



9 National Centers (NCEP)

1. AWC – Aviation Weather Center
2. CPC – Climate Prediction Center
3. EMC – Environmental Modeling Center
4. NCO – NCEP Central Operations
5. NHC – National Hurricane Center
6. OPC – Ocean Prediction Center
7. SPC – Storm Prediction Center
8. SWPC – Space Weather Prediction Center
9. WPC – Weather Prediction Center

Local Offices

122 Local Weather Forecast Offices

- Five offices serve Pennsylvania

13 River Forecast Centers

- Two serve Pennsylvania

6 Regional Offices

- Eastern, Central, Southern, Western, Alaska and Pacific

NWS Headquarters

- Silver Spring, MD



NWSSStateCollege

weather.gov/statecollege



SKYWARN Program



A group of **trained volunteers** who report hazardous weather in order to:

- Supplement remote sensing equipment
- Provide real-time ground truth reports
- Add credibility to NWS products and services



SKYWARN Spotters act as thousands of “eyes and ears” out in the field, supporting our forecast and warning program!



NWSSStateCollege

weather.gov/statecollege

SKYWARN Program



NWS State College has over 3,000 trained spotters

- State-Wide, there are about 10,000 spotters
- Nationally, there are nearly 300,000 trained spotters!

Note: Although you are receiving your training today from the State College office, your training is portable

- If you move, contact your new “local” office and we can start the process to transfer your credentials



NWSStateCollege

weather.gov/statecollege

Poll Question



When was the last time you took a SKYWARN training course?

- This is my first time
- Within the last 2 years
- 2-4 years ago
- 4-8 years ago
- >8 years ago



NWSSStateCollege

weather.gov/statecollege

NWS Offices Serving Pennsylvania

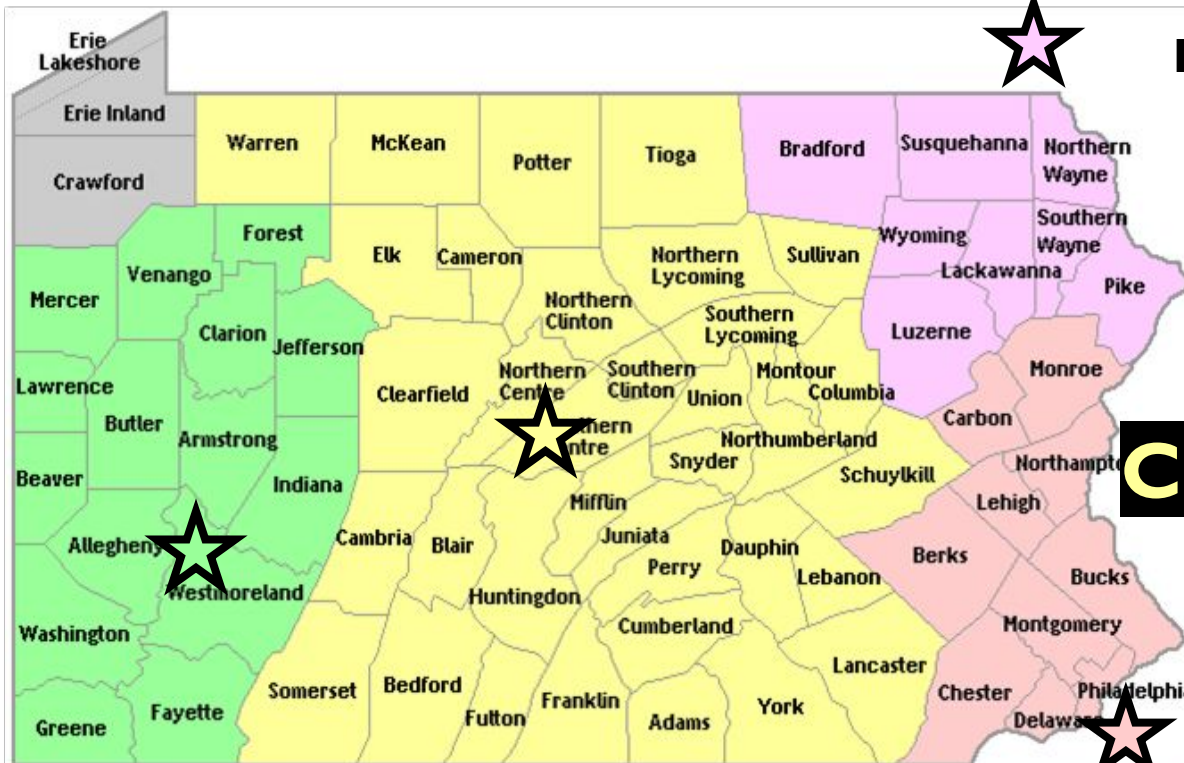


Cleveland, OH



Binghamton, NY

**Pittsburgh,
PA**



**State
College, PA**

**Philadelphia/
Mt. Holly, NJ**



NWSSStateCollege

weather.gov/statecollege

A look at the Local Office



NWS State College Central PA Weather Forecast Office

- 14 Forecasters
- 6 Electronic Technicians/IT Support
- 1 Hydrologist
- 1 Science & Operations officer
- 1 Observations Program Leader
- 1 Warning Coordination Meteorologist
- 1 Administrative Assistant
- 1 Meteorologist In Charge

Open 24x7x365 to provide forecasts and warnings, as well as maintain the Doppler radar and other observation systems



How We “typically” Work



Short Term

0-24 hours (maybe 36 hour forecast)

- Often staffed by the Lead Forecaster
 - Warning decisions, aviation support, staffing, etc.

Long Term

Day 2 – Day 7

- Looking at longer term models
- Often doing Decision Support duties

Public Service

- Phones, Product QC, NOAA Weather Radio, Social Media



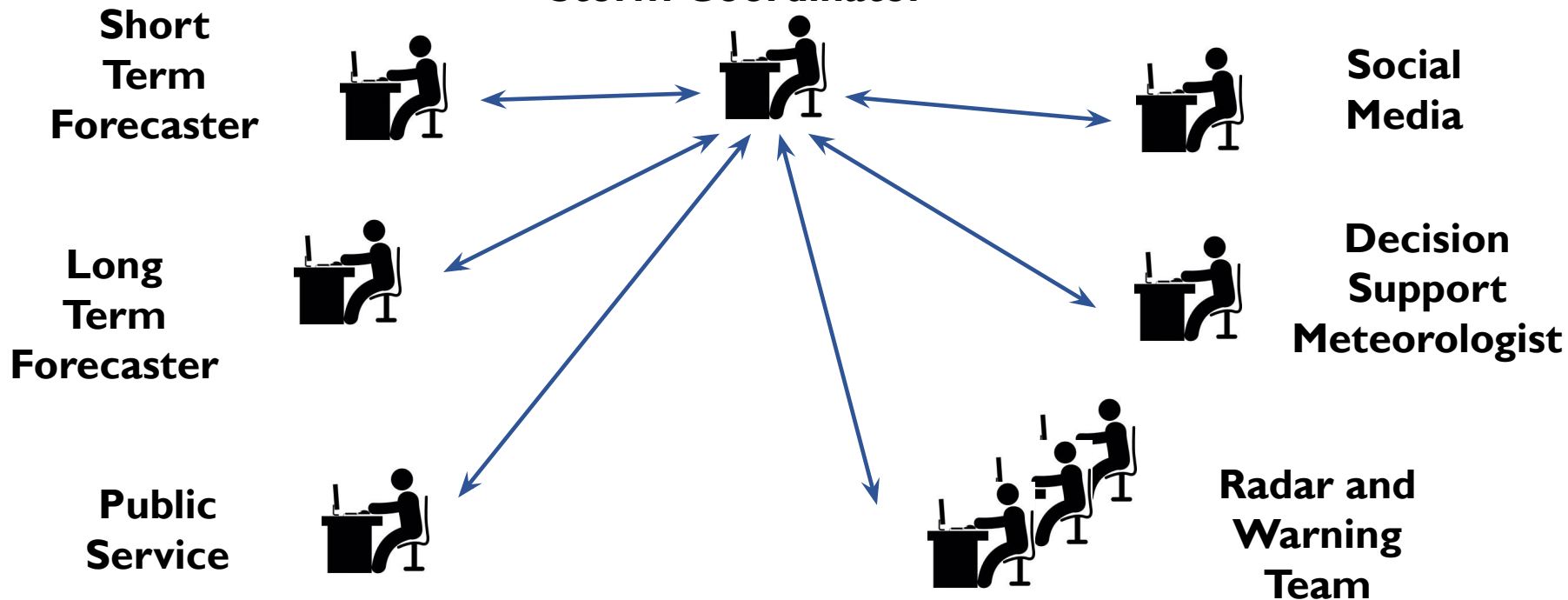
NWSSStateCollege

weather.gov/statecollege



When the weather “ramps up”

Storm Coordinator



NWSSStateCollege

weather.gov/statecollege

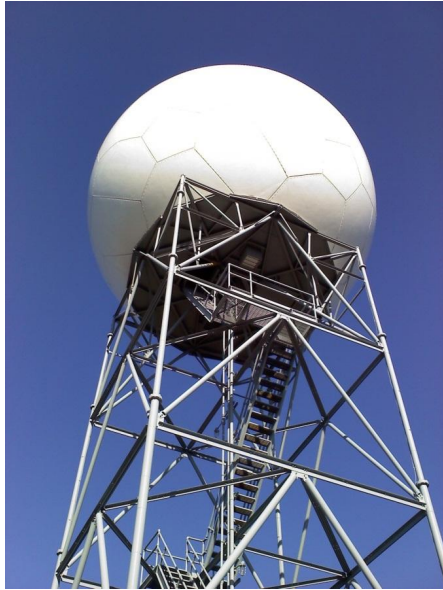
Radar Basics



NWSSStateCollege

weather.gov/statecollege

Key Pieces of Equipment



Doppler Radar



Satellites



Computers



Remote Sensing
Equipment

SKYWARN Program Background

The background image is a landscape photograph. The foreground is a green agricultural field with distinct rows of crops or furrows receding into the distance. A dark line of trees marks the horizon. The sky is filled with a massive, dark, and textured storm cloud formation, possibly a supercell or the beginning of a tornado, which dominates the upper half of the frame. The lighting suggests a sunset or sunrise, with a bright glow behind the clouds.

SKYWARN Program



Today's class will cover basic aspects of observing weather, and emphasize the accurate reporting of those observations

- Review of some key definitions
- A look at different weather elements

When the course is complete, you will be a certified member of the national SKYWARN Team!



NWSSStateCollege

weather.gov/statecollege

NWS State College Online Resources



BRIEFING PAGE

www.weather.gov/ctp/briefing

or click this icon at the bottom of the NWS CTP home page:



[Weather Hazards Briefing](#)

One-stop shop for all NWS forecast information.

Latest Weather Briefing (pdf)

This briefing is updated for significant weather events.

Hazardous Weather Outlook

Current Weather Rainfall/Flooding Thunderstorms Winter Weather Temps/Wind Drought/Fire Weather Tropics

Long Range Weather Information By County Forecast Tools

Hazardous Weather Outlook

Issued by NWS State College, PA

[Home](#) | [Current Version](#) | [Previous Version](#) | [Graphics & Text](#) | [Print](#) | [Product List](#) | [Glossary On](#)

Versions: [1](#) [2](#) [3](#) [4](#) [5](#) [6](#) [7](#) [8](#) [9](#) [10](#) [11](#) [12](#) [13](#) [14](#) [15](#) [16](#) [17](#) [18](#) [19](#) [20](#) [21](#) [22](#)

000
FLUS41 KCTP 010138
HWOCTP

Hazardous Weather Outlook
National Weather Service State College PA
838 PM EST Sun Feb 28 2021

PAZ004>006-010>012-017>019-024>028-035>037-041-042-045-046-049>053-056>059-063>066-020145-
Warren-McKean-Potter-Elk-Cameron-Northern Clinton-Clearfield-Northern Centre-Southern Centre-Cambria-Blair-Huntingdon-Mifflin-Juniata-Fulton-Franklin-Tioga-Northern Lycoming-Sullivan-Southern Clinton-Southern Lycoming-Union-Snyder-Montour-Northumberland-Columbia-Perry-Dauphin-Schuylkill-Lebanon-Cumberland-Adams-York-Lancaster-
838 PM EST Sun Feb 28 2021

Weather Hazard Outlooks

Snowfall Risk
Valid: 03/01/2021 02:00 AM - 03/01/2021 01:00 AM EST

Expected Snowfall: Official NWS Forecast
Valid: 03/01/2021 01:00 AM - 03/01/2021 01:00 PM EST

Pittsburgh | Cleveland | Binghamton
Philadelphia



NWSSStateCollege

weather.gov/statecollege

NWS State College Online Resources



Weekly Summary

Fri
Mar 5

Sat
Mar 6

Sun
Mar 7

Mon
Mar 8

Tue
Mar 9

Wed
Mar 10

Thu
Mar 11

Hourly Table

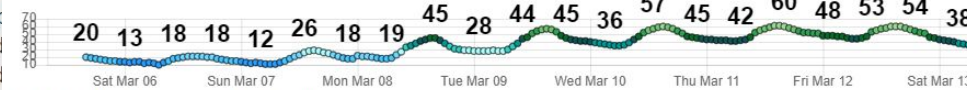
Day of week

Friday 3/5

Saturday 3/6

Hourly Graphs

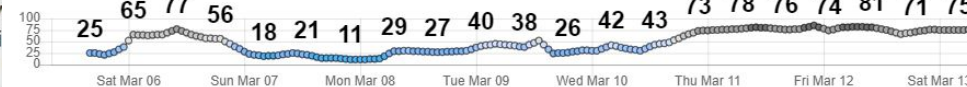
Wind Chill, °F:



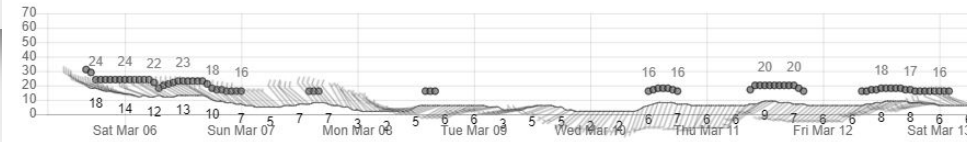
Probability of Precipitation, %



Sky Cover, %



Wind Speed/Direction/Gust, mph



FORECAST PAGE

www.weather.gov/forecastpoints

Type in zip code and then click
“Bookmark”

Best graphical display of
NWS forecast information
available.



NWSSStateCollege

weather.gov/statecollege

A snowy winter scene with evergreen trees, a brick building, and a parking lot. The ground is covered in a thick layer of snow, and the trees are heavily laden with snow. A brick building is visible in the background, and a parking lot with a few cars is on the right. A red stop sign is visible on the left. The sky is overcast and grey.

Winter Weather

**Winter weather reporting is an important part
of the SKYWARN program**

**We'll briefly review how to measure snowfall
"The National Weather Service Way"**



Six Basic Steps for Properly

MEASURING SNOW



Accurate and timely snowfall measurements are extremely important to your National Weather Service office, your community, local media, and many others. Here are the six steps you need to know for measuring snow:

3

Set-up



Set up before snow begins



Put your board out and mark it with the flag

4

Measuring Snow



Measure once daily at the same time, after measuring place the board on top of snow

Or, measure up to 4x a day, wiping the snowboard clean no more than once every 6 hours

5

When Snow Stops



Measure as soon as the snow stops to avoid lower totals due to melting, settling and drifting

2

Planning



Find an open area away from tall objects, but sheltered from wind

6

Reporting



SEND us your report!



NWSSStateCollege

weather.gov/statecollege



MEASURING ICE

Freezing rain can lead to widespread significant impacts including dangerous travel and widespread power outages.

When rain falls with air and surface temperatures at or below 32°F, a fraction of the rain will freeze onto surfaces.

Accretion efficiency depends on a variety of factors including rainfall intensity and wind. Light rain, cold air, and strong winds lead to the highest ice-to-liquid ratios.



Example:

**$\frac{3}{4}$ " ice on bottom +
 $\frac{1}{4}$ " ice on top = 1"
then divide by 2
Total Ice = $\frac{1}{2}$ "**

Accurate ice reports are needed from spotters so forecasters can assess the forecast in real time, adjust as necessary, and message increasing/decreasing threat.



NWSSStateCollege

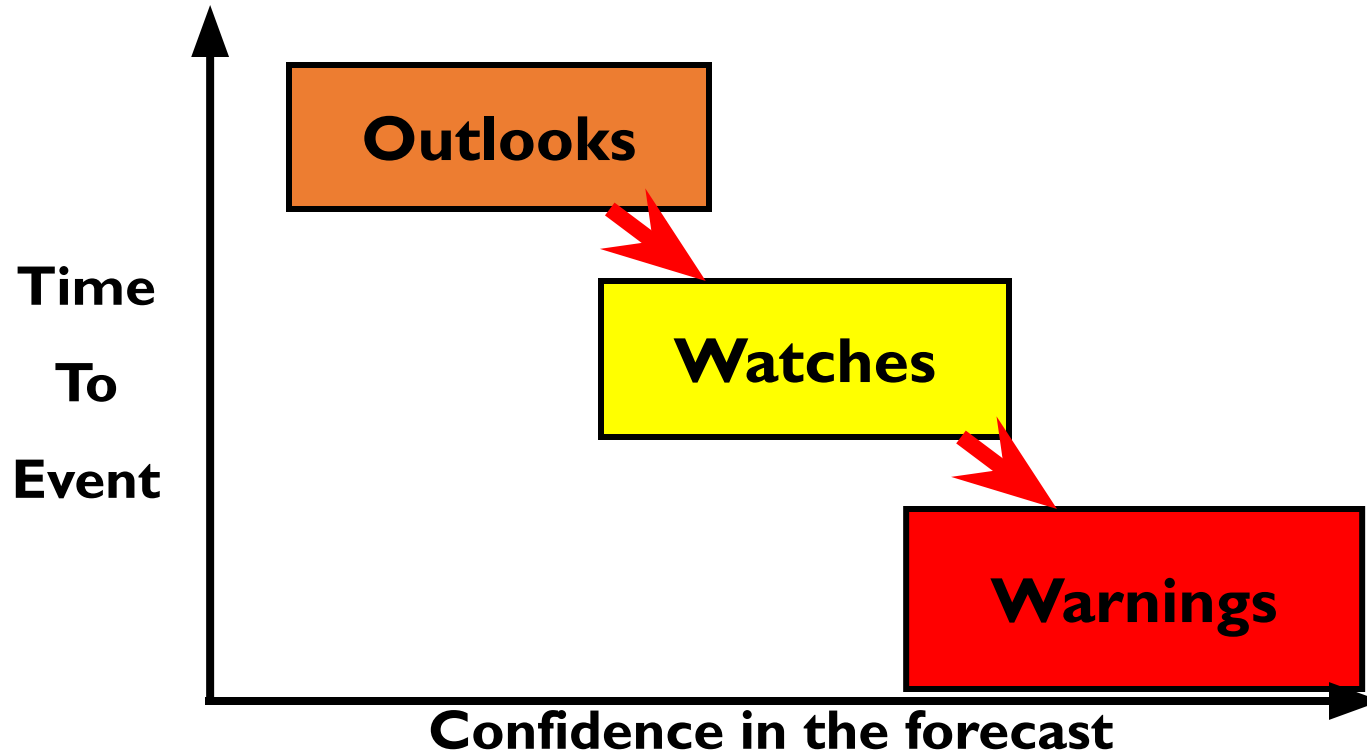
weather.gov/statecollege

A landscape photograph featuring a rainbow arching over a valley. In the foreground, there is a paved road and some dry brush. The middle ground shows a small town or village nestled in a valley, with hills in the background. The sky is filled with large, white, fluffy clouds. The text "NWS Products" is written in a large, white, sans-serif font, and "Watches, Warnings, and Advisories" is written in a slightly smaller, white, sans-serif font below it.

NWS Products

Watches, Warnings, and Advisories

NWS Products: A 3-Tiered Approach





Outlook vs. Watch vs. Warning

OUTLOOK: possible weather event in the future

- Lower confidence... a **30 - 49%** chance of occurrence
- Lead time can range from about 3 to 7 days
- No details, either in timing or severity...just a “heads-up”

WATCH: Conditions are favorable for a given weather event

- Still not a Certainty...in fact the chances of occurrence are **50 - 79%**
- Lead Time can range in time from a few hours to several days
- Some Watches will result in bad weather...some will not.

WARNING: Conditions imminent (or extremely likely) for a given weather event

- Not necessarily 100% certainty, but getting there **> 80%**
- Lead Time can range from a few minutes (Severe) to about a day (Flood, Winter)





Outlook vs. Watch vs. Warning

OUTLOOK: possible weather event in the future

- Lower confidence... a **30 - 49%** chance of occurrence
- Lead time can range from about 3 to 7 days
- No details, either in timing or severity...just a “heads-up”

WATCH: Conditions are favorable for a given weather event

- Still not a Certainty...in fact the chances of occurrence are **50 - 79%**
- Lead Time can range in time from a few hours to several days
- Some Watches will result in bad weather...some will not.

WARNING: Conditions imminent (or extremely likely) for a given weather event

- Not necessarily 100% certainty, but getting there **> 80%**
- Lead Time can range from a few minutes (Severe) to about a day (Flood, Winter)



Product Guide - Outlook



- HWO (Hazardous Weather Outlook)

Hazardous Weather Outlook
National Weather Service State College PA
1243 PM EDT Wed Jun 3 2020

PAZ012-018-019-041-042-045-046-049>053-058-041645-
Northern Clinton-Northern Centre-Southern Centre-Northern Lycoming-
Sullivan-Southern Clinton-Southern Lycoming-Union-Snyder-Montour-
Northumberland-Columbia-Schuylkill-
1243 PM EDT Wed Jun 3 2020

This Hazardous Weather Outlook is for central Pennsylvania.

.DAY ONE...This afternoon and tonight.

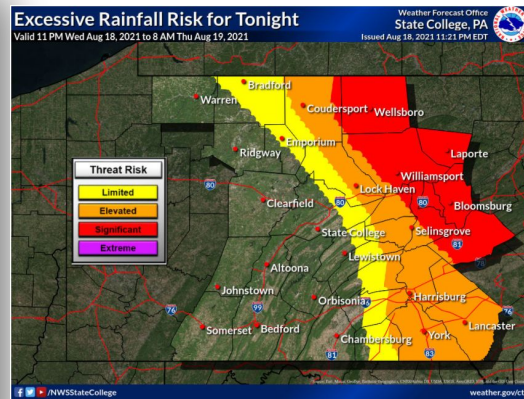
Isolated strong to severe thunderstorms with localized damaging wind gusts 60 mph or greater and large hail exceeding 1 inch in diameter are possible late this afternoon and evening. An isolated weak, short-lived tornado is also possible.

.DAYS TWO THROUGH SEVEN...Thursday through Tuesday.

The probability for widespread hazardous weather is low.

.SPOTTER INFORMATION STATEMENT...

Spotter activation is not expected at this time.



24 Hr Hazard Risks

	Day 1	Thu	Fri	Sat	Sun	Mon	Tue
Severe Thunderstorm	Yellow	Green	Green				
Tornado	Yellow	Green					
Thunderstorm Wind	Yellow	Green					
Hail	Green	Green					
Lightning	Red	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow
Excessive Rainfall	Red	Green	Yellow				
Excessive Heat	Green	Orange	Green	Green	Yellow	Yellow	Yellow
Non-Thunderstorm Wind	Green	Green	Green	Green	Green	Green	Green
Frost/Freeze	Green	Green	Green	Green	Green	Green	Green
Fog	Green	Green	Green	Green			
Fire Weather	Green	Green	Green	Green	Green	Green	Green

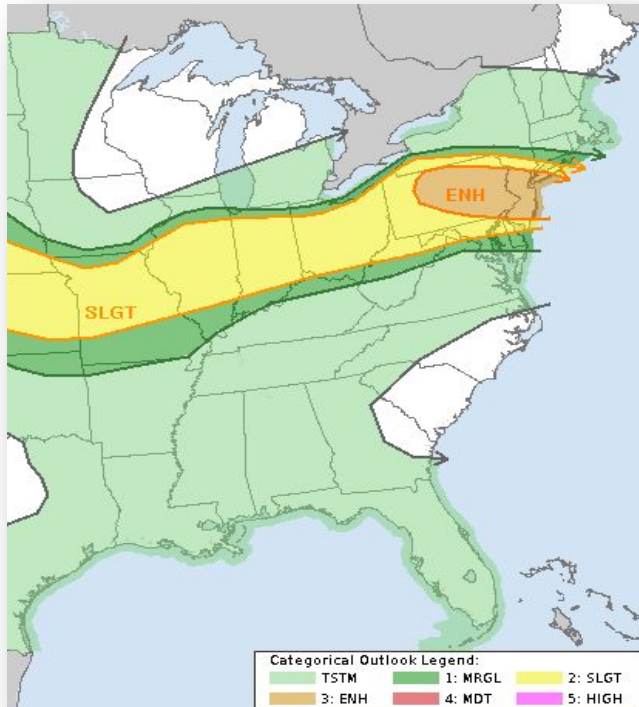
<https://www.weather.gov/erh/ghwo?wfo=ctp>









NWSSStateCollege

weather.gov/statecollege

Severe Weather Outlooks



Understanding Severe Thunderstorm Risk Categories

THUNDERSTORMS (no label)	1 - MARGINAL (MRGL)	2 - SLIGHT (SLGT)	3 - ENHANCED (ENH)	4 - MODERATE (MDT)	5 - HIGH (HIGH)
No severe* thunderstorms expected	Isolated severe thunderstorms possible	Scattered severe storms possible	Numerous severe storms possible	Widespread severe storms likely	Widespread severe storms expected
Lightning/flooding threats exist with <u>all</u> thunderstorms	Limited in duration and/or coverage and/or intensity	Short-lived and/or not widespread, isolated intense storms possible	More persistent and/or widespread, a few intense	Long-lived, widespread and intense	Long-lived, very widespread and particularly intense
					

* NWS defines a severe thunderstorm as measured wind gusts to at least 58 mph, and/or hail to at least one inch in diameter, and/or a tornado. All thunderstorm categories imply lightning and the potential for flooding. Categories are also tied to the probability of a severe weather event within 25 miles of your location.



National Weather Service

www.spc.noaa.gov

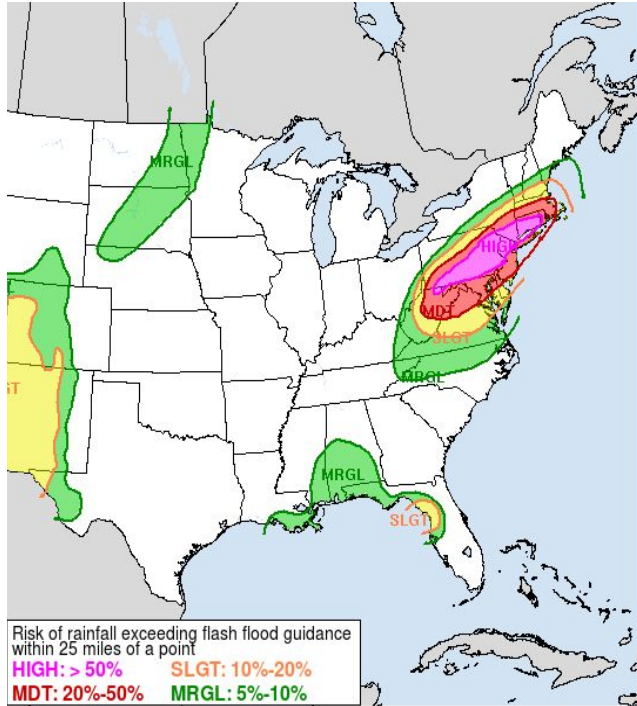


NWSSStateCollege

www.spc.noaa.gov

weather.gov/statecollege

Excessive Rainfall Outlooks



Understanding WPC Excessive Rainfall Risk Categories

No Area/Label	MARGINAL (MRGL)	SLIGHT (SLGT)	MODERATE (MDT)	HIGH (HIGH)
Flash floods are generally not expected.	Isolated flash floods possible	Scattered flash floods possible	Numerous flash floods likely	Widespread flash floods expected
www.wpc.ncep.noaa.gov @NWSWPC	Localized and primarily affecting places that can experience rapid runoff with heavy rainfall.	Mainly localized. Most vulnerable are urban areas, roads, small streams and washes. Isolated significant flash floods possible.	Numerous flash flooding events with significant events possible. Many streams may flood, potentially affecting larger rivers.	Severe, widespread flash flooding. Areas that don't normally experience flash flooding, could. Lives and property in greater danger.
Flash flooding near me?	Flash Flooding	Flash Flooding	Flash Flooding	Flash Flooding
NO Flash Flooding	Flash Flooding	Flash Flooding	Flash Flooding	Flash Flooding
<p>WEATHER PREDICTION CENTER</p>				



NWSSStateCollege

www.spc.noaa.gov

weather.gov/statecollege

Product Guide - Watch



378
WWUS61 KCTP 031408
WCNCTP

WATCH COUNTY NOTIFICATION FOR WATCH 242
NATIONAL WEATHER SERVICE STATE COLLEGE PA
1008 AM EDT WED JUN 3 2020

PAC001-013-021-027-033-035-037-041-043-055-061-067-071-075-081-
087-093-097-099-107-109-113-119-133-031900-
/O.NEW.KCTP.SV.A.0242.200603T1408Z-200603T1900Z/

THE NATIONAL WEATHER SERVICE HAS ISSUED SEVERE THUNDERSTORM WATCH
242 IN EFFECT UNTIL 3 PM EDT THIS AFTERNOON FOR THE FOLLOWING
AREAS

IN PENNSYLVANIA THIS WATCH INCLUDES 24 COUNTIES

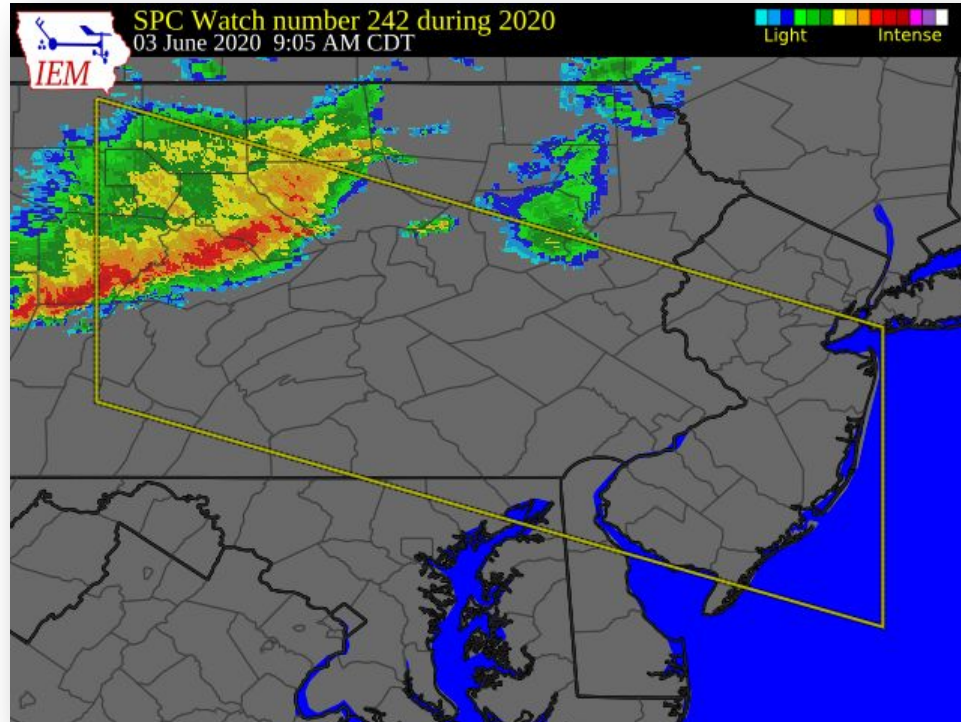
IN CENTRAL PENNSYLVANIA

ADAMS	BLAIR	CAMBRIA
CENTRE	CLEARFIELD	CLINTON
COLUMBIA	CUMBERLAND	DAUPHIN
FRANKLIN	HUNTINGDON	JUNIATA
LANCASTER	LEBANON	LYCOMING
MIFFLIN	MONTOUR	NORTHUMBERLAND
PERRY	SCHUYLKILL	SNYDER
SULLIVAN	UNION	YORK

THIS INCLUDES THE CITIES OF ALTOONA, BERWICK, BLOOMSBURG,
CARLISLE, CHAMBERSBURG, CLEARFIELD, DANVILLE, DUBOIS, GETTYSBURG,
HARRISBURG, HERSHEY, HUNTINGDON, JOHNSTOWN, LANCASTER, LAPORTE,
LEBANON, LEWISBURG, LEWISTOWN, LOCK HAVEN, MIFFLINTOWN,
MOUNT UNION, NEWPORT, POTTSVILLE, RENOV, SELINGSGROVE, SHAMOKIN,
STATE COLLEGE, SUNBURY, WAYNESBORO, WILLIAMSPORT, AND YORK.

\$\$

LAMBERT



NWSSStateCollege

weather.gov/statecollege

Product Guide - Warning



737
WUUS51 KCTP 032011
SVRCTP
PAC027-035-119-032115-
/O.NEW.KCTP.SV.W.0044.200603T2011Z-200603T2115Z/

BULLETIN - IMMEDIATE BROADCAST REQUESTED
Severe Thunderstorm Warning
National Weather Service State College PA
411 PM EDT Wed Jun 3 2020

The National Weather Service in State College PA has issued a

* Severe Thunderstorm Warning for...
East central Centre County in central Pennsylvania...
Union County in central Pennsylvania...
Southeastern Clinton County in north central Pennsylvania...

* Until 515 PM EDT.

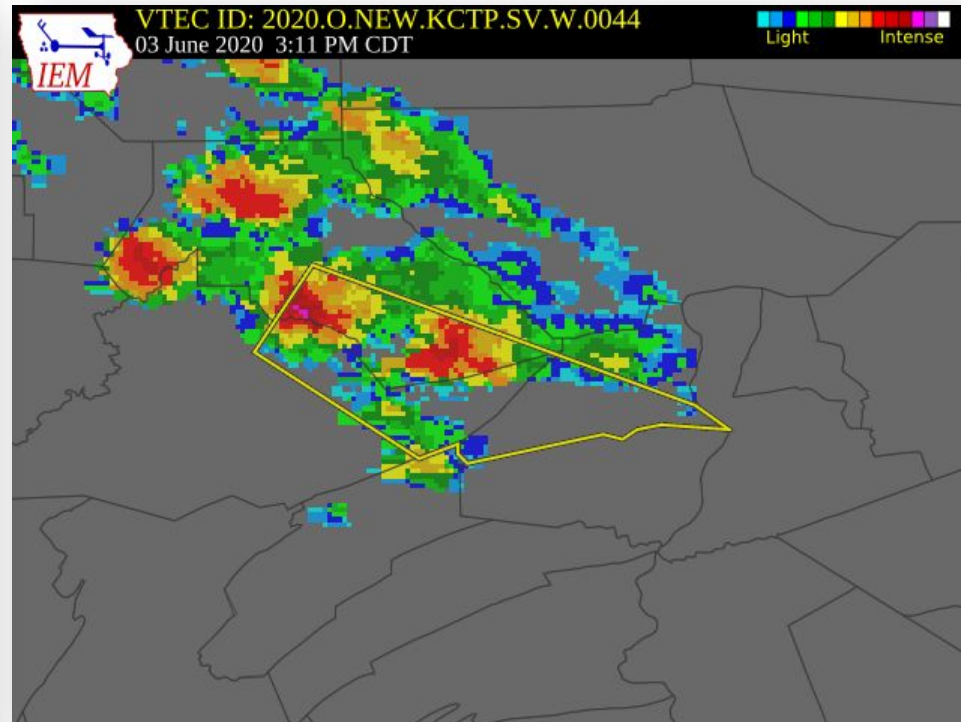
* At 410 PM EDT, a severe thunderstorm was located over Monument,
moving southeast at 35 mph.

HAZARD...60 mph wind gusts and quarter size hail.

SOURCE...Radar indicated.

IMPACT...Hail damage to vehicles is expected. Expect wind damage
to trees, roofs, and siding.

* Locations impacted include...
Lock Haven, Mifflinburg, Carroll, Woodward, Winfield, Lamar, Mill
Hall, Flemington, Castanea, Millheim, Blanchard, Penns Creek,
Aaronsburg, Rebersburg, Vicksburg, Coburn, Madisonburg, Monument,
Weikert and Bald Eagle State Park.



NWSSStateCollege

weather.gov/statecollege

A dramatic sky scene featuring a large, dark, and billowing cumulonimbus cloud mass in the center. Sunbeams (crepuscular rays) are visible streaming downwards from the edges of the dark cloud. A vibrant rainbow is visible in the lower right quadrant, arching from the bottom edge towards the center. The sky is a deep blue, and there are smaller, white cumulus clouds scattered around the main storm system.

Severe Thunderstorms

Severe Thunderstorms



- What makes a thunderstorm severe?

- ☐ Winds \geq 58 mph (50 knots)
- ☐ Hail \geq 1 inch in maximum dimension
- ☐ Tornado

- Other threats:

- ☐ Lightning
- ☐ Flooding

TORNADO	HAIL	LIGHTNING	WIND	FLOODING
				
ACTION Take shelter immediately in a sturdy structure	ACTION Move indoors away from windows	ACTION Move indoors if you hear thunder	ACTION Move indoors away from windows	ACTION Avoid rising creeks and water covered roads



Understanding
SEVERE WEATHER HAZARDS



NWSSStateCollege

weather.gov/statecollege



What about those sub-severe storms?

- SPECIAL WEATHER STATEMENTS can be issued for storms that may have some impacts, but do not meet severe criteria
 - Can be issued for thunderstorms producing:
 - Winds of 30-55 mph
 - Pea to Nickel sized hail
 - These will not set off tone alerts or EAS, and rarely trigger phone apps.



Thunderstorm Ingredients



Thunderstorm Ingredients



1. Instability

2. Moisture

3. Lift

Most severe storms
also require wind
shear



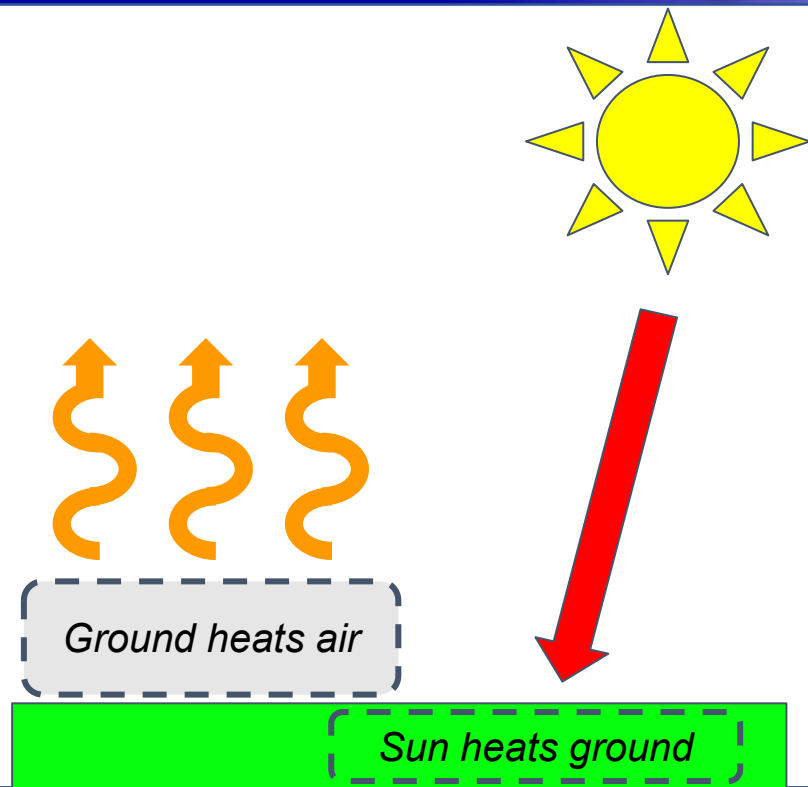
NWSSStateCollege

weather.gov/statecollege



Thunderstorm Ingredients: Instability

- Hot air rises. *How do we get hot air?*
 - Sun heats the ground → ground heats the air
- The larger the temperature difference between the surface and the air above, the greater the instability
 - Instability is maximized on warm, sunny days with abnormally cold air aloft





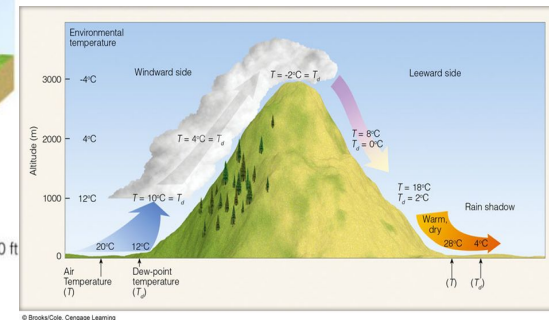
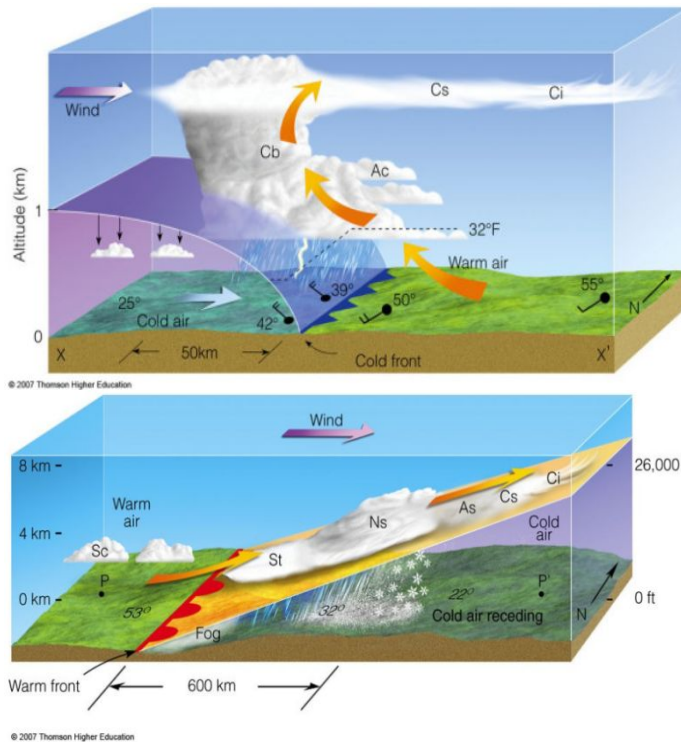
Thunderstorm Ingredients: **Moisture**

- Moisture is needed to form clouds and precipitation
- Moisture increases instability (CAPE). *Why?*
 - When water vapor in a rising parcel of air **condenses** to form cloud droplets, the parcel of air is **warmed** relative to its surroundings
 - This warming enhances instability



Thunderstorm Ingredients: Lift

- Forced ascent (lift) is needed to create thunderstorms
- What can force air to rise?
 - Cold Fronts
 - Warm Fronts
 - Mountains



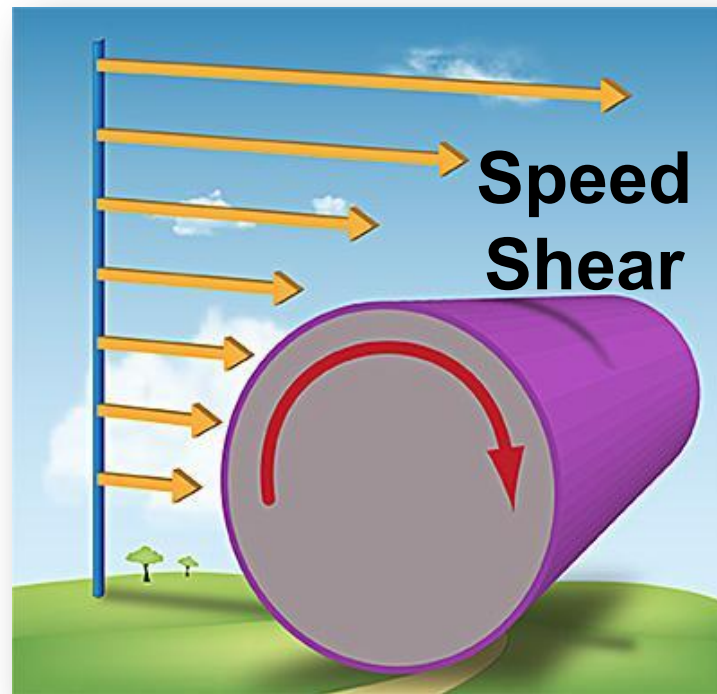


Thunderstorm Ingredients: **Wind Shear**



**Directional
Shear**

Wind **direction** changes with height



**Speed
Shear**

Wind **speed** changes with height



NWSSStateCollege

weather.gov/statecollege



Thunderstorm Ingredients: **Wind Shear**

Low Wind Shear →

Rain falls through updraft, killing the short-lived storm. Lower chance for severe weather.



High Wind Shear →

Rain falls downwind of updraft and updraft remains intact. Higher chance for severe weather.



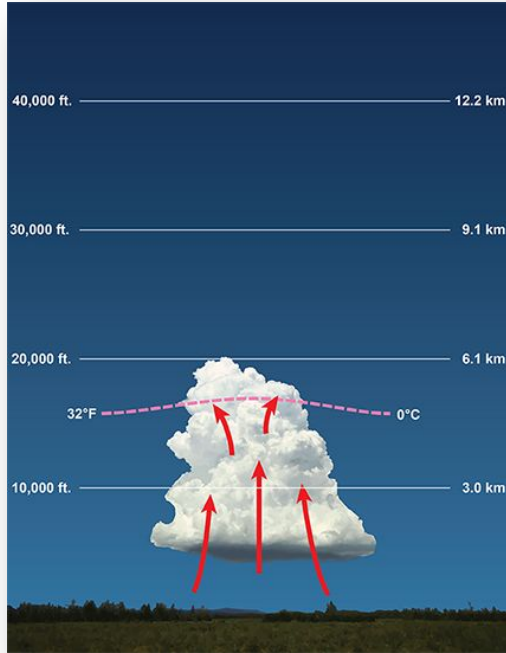
NWSSStateCollege

weather.gov/statecollege

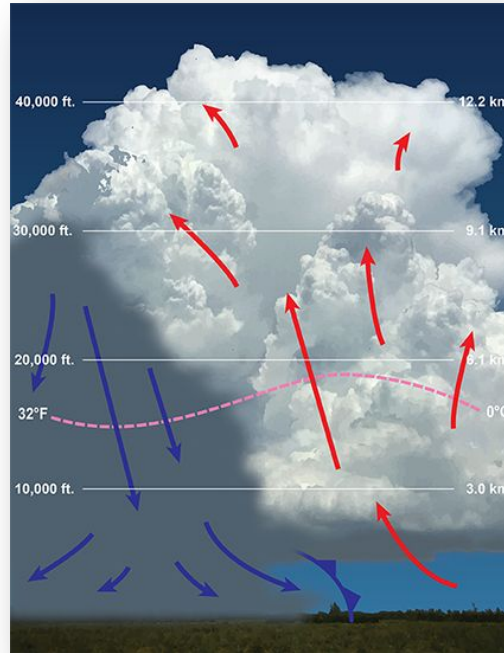


Types of Thunderstorms

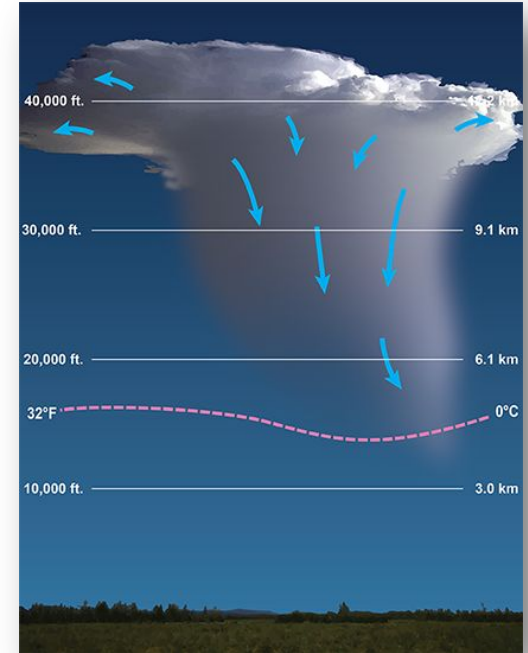
Ordinary Thunderstorms



Towering Cumulus



Mature Storm



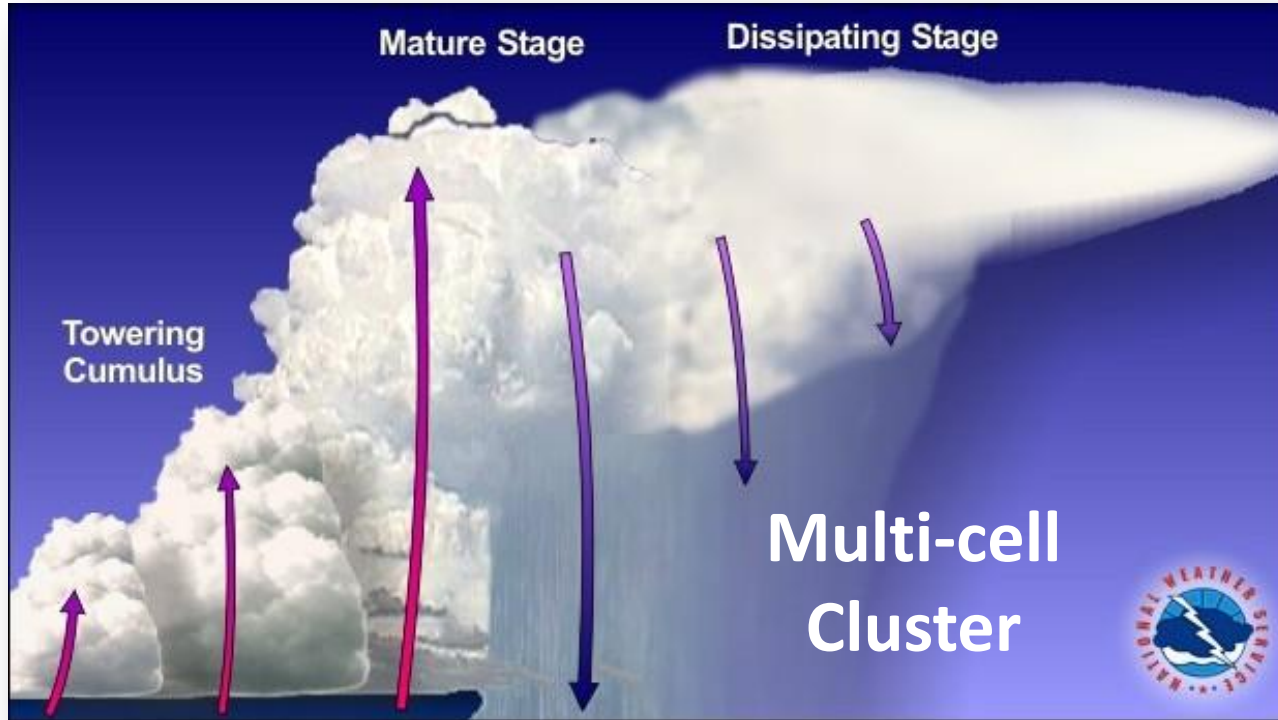
Dissipation



NWSSStateCollege

weather.gov/statecollege

Multi-cell Thunderstorms



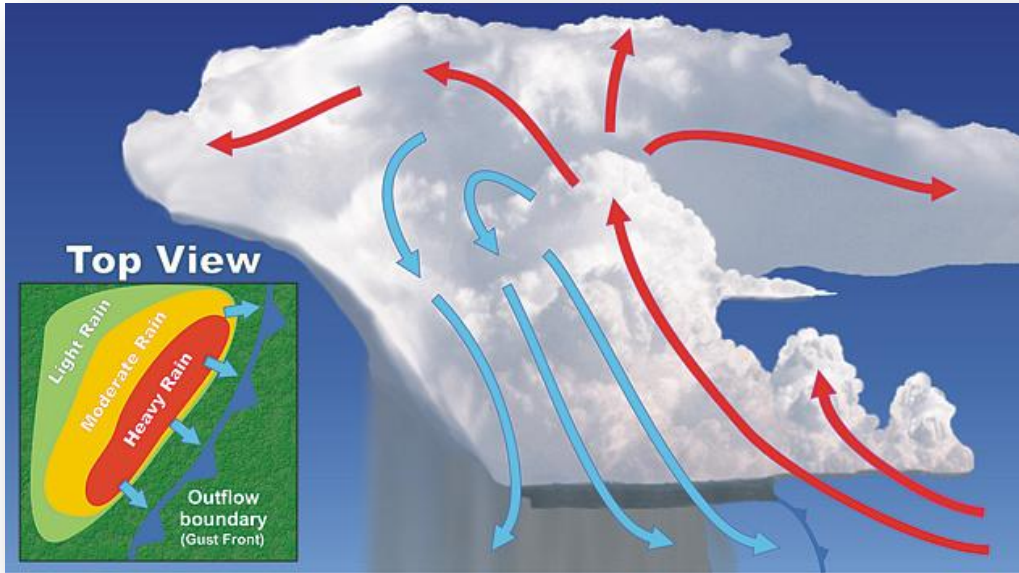
- Upper-level winds carry the first cell downstream with a new cell forming upwind of the previous cell.
- If the upper-level wind is opposite of the low-level winds, **backbuilding** can develop – leading to flash flooding.
- A line of multi-cell thunderstorms is called a squall line.



NWSSStateCollege

weather.gov/statecollege

Squall Lines



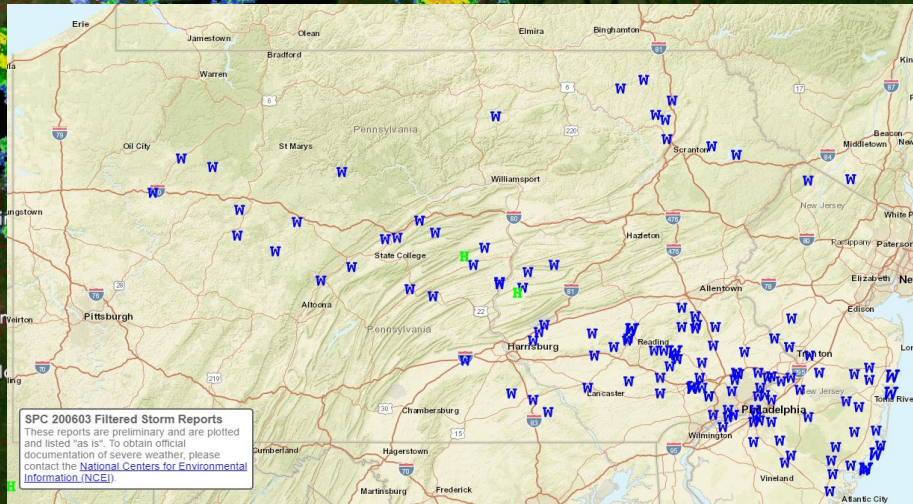
- New cells continually reform at the leading edge of a cold pool.
- Updrafts and downdrafts along the line can become strong, resulting in large hail and damaging winds.



Derechos



8:00am Wednesday Radar
Precipitation Intensity



June 3, 2020

Canaan Valley

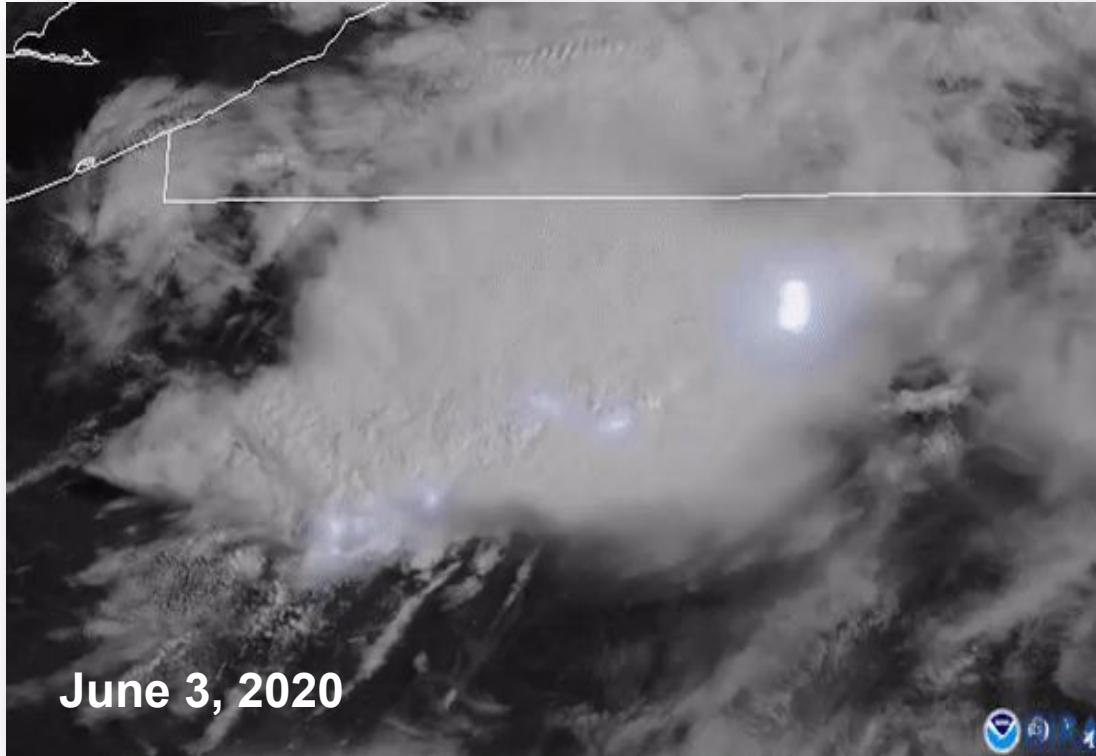
- Widespread, long-lived wind storm associated with a rapidly moving squall line or quasi-linear convective system
- Must include wind gusts of 58+ mph along most of its length.
- Must have several well-separated 75 mph wind gusts
- Wind damage swath must extend more than 250 miles



NWSSStateCollege

[weather.gov/statecollege](https://www.weather.gov/statecollege)

Derechos



- Widespread, long-lived wind storm associated with a rapidly moving squall line or quasi-linear convective system
- Must include wind gusts of 58+ mph along most of its length.
- Must have several well-separated 75 mph wind gusts
- Wind damage swath must extend more than 250 miles

weather.gov/statecollege

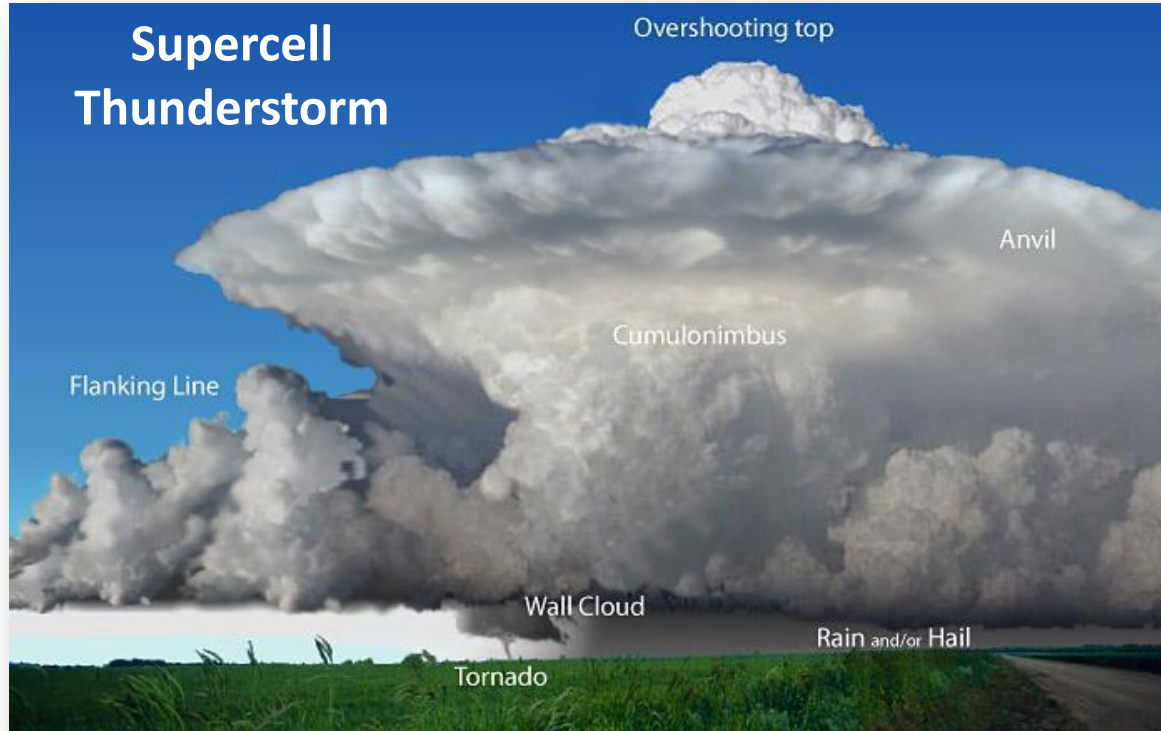


NWSSStateCollege

Supercell Thunderstorms



Supercell Thunderstorm



- Characterized by **rotating updrafts** that can attain vertical velocities over 100 mph
- Supercells are responsible for producing the most extreme severe weather, including giant hail and violent tornadoes
- Downdrafts can produce downbursts/outflow winds in excess of 100 mph.
- Increased risk for tornadic supercells when winds turn clockwise with height (veering).



NWSSStateCollege

weather.gov/statecollege

Types of Supercell Thunderstorms



**Low-Precipitation (LP)
Supercell**



**High-Precipitation (HP)
Supercell**



NWSSStateCollege

weather.gov/statecollege

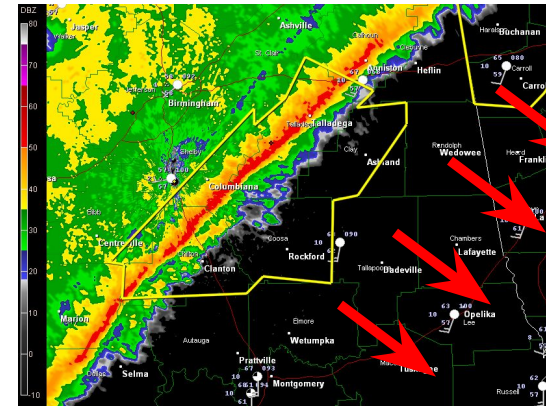


Thunderstorm Hazards

Straight Line Winds



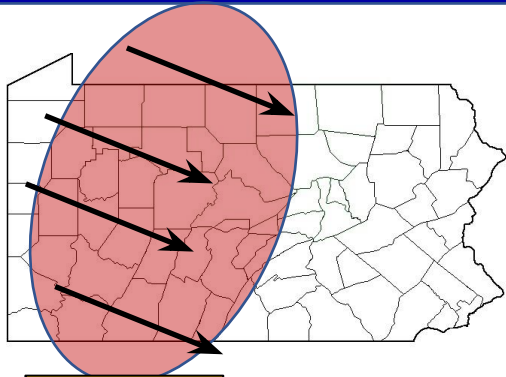
- The most common type of wind damage we see here in Pennsylvania
- Result from a combination of the storm's forward motion, the transport of momentum from strong wind aloft, and the generation of storm-relative outflow as a downdraft descends to the ground
- Winds produce damage generally in a single direction, oriented parallel to the direction the storms were coming from
- Straight line winds may occur ahead of the actual "storm" at the leading edge (or gust front)



NWSSStateCollege

weather.gov/statecollege

Straight Line Winds



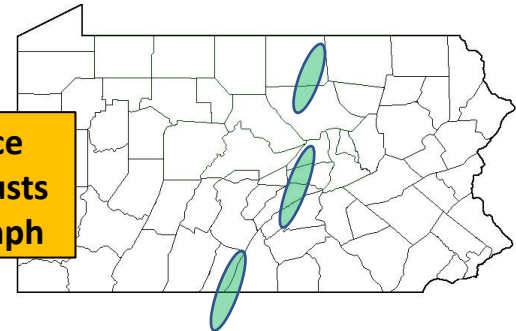
**35 mph
winds at
5000 feet**

+



**Downdraft-
Enhanced
Winds**

=



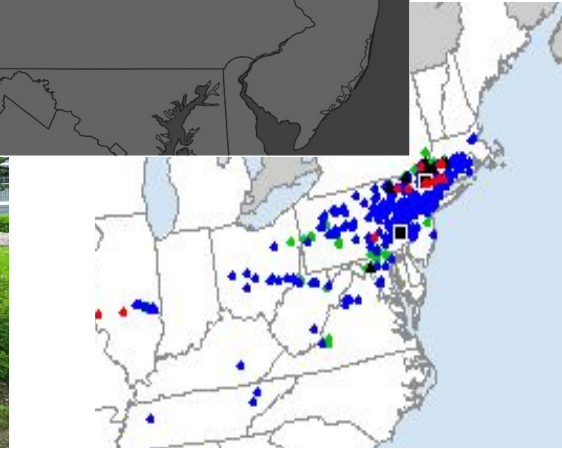
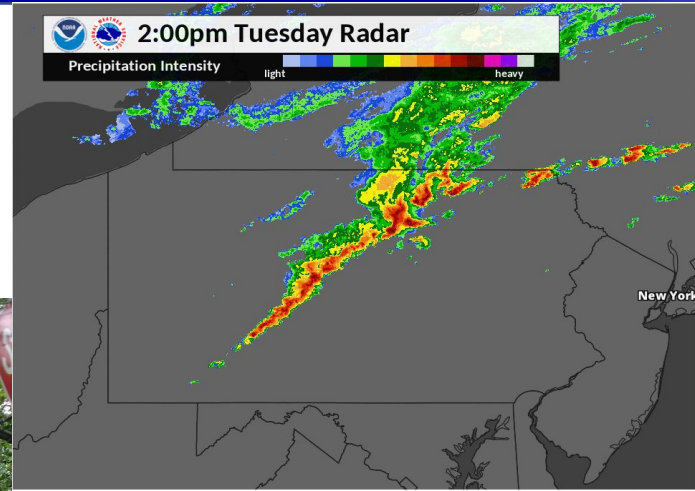
**Surface
wind gusts
of 65 mph**



NWSSStateCollege

weather.gov/statecollege

Straight-line wind event May 15, 2018



Straight Line Winds



Damage shows
a clear
**UNI-
DIRECTIONAL**
pattern



**STRAIGHT
LINE WIND**
“footprint”



NWSSStateCollege

weather.gov/statecollege



Shelf Cloud

- A low, horizontal wedge-shaped cloud associated with a thunderstorm gust front (or occasionally with a cold front, even in the absence of thunderstorms).
- Rising cloud motion often can be seen in the leading (outer) part of the shelf cloud, while the underside often appears turbulent, boiling, and wind-torn.
- If a shelf cloud becomes detached from the parent thunderstorm (e.g., in an outflow dominant storm) it becomes a roll cloud.



Downbursts



Downburst

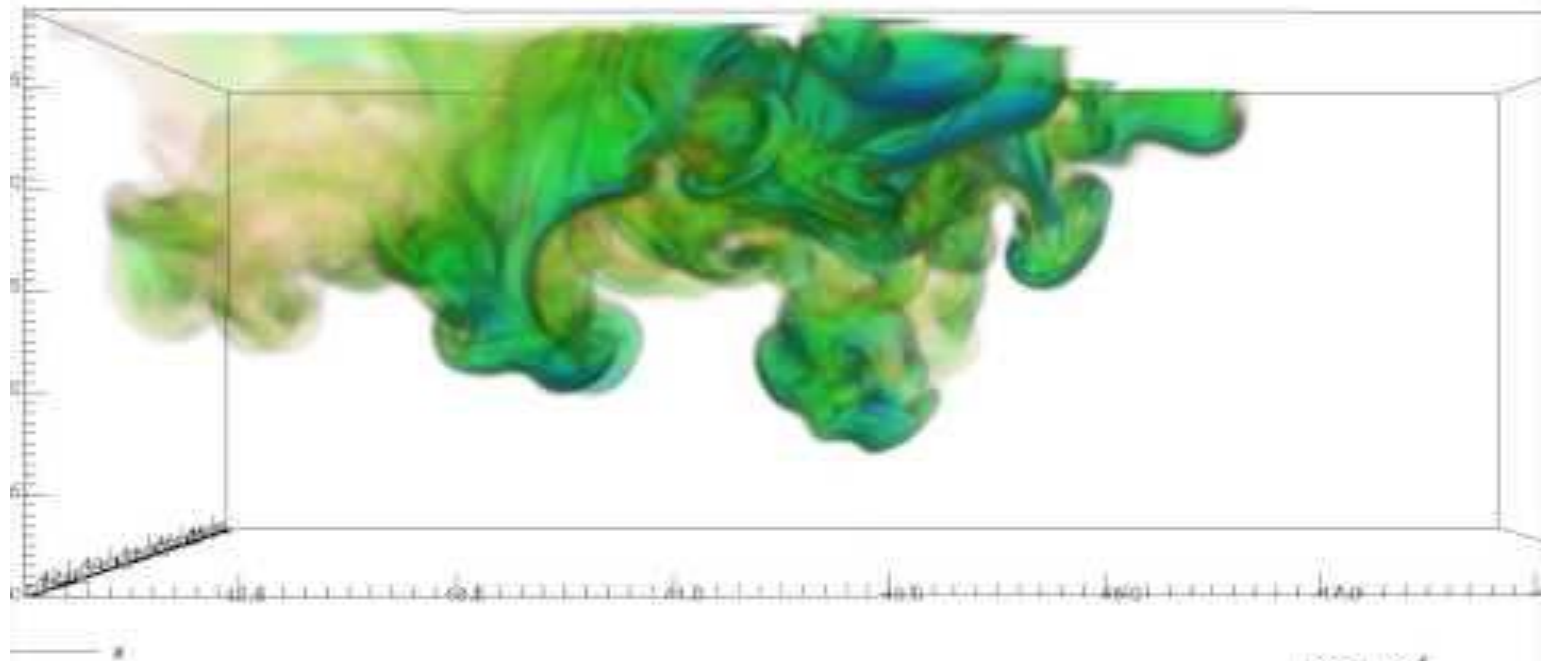
- Strong straight-line winds caused by an exceptionally strong downdraft, where cold, dense air descends from above, hits the ground, and spreads out at the surface
- Downburst winds can exceed 100 mph!



- **Microburst** – Downburst wind damage covering an area 2.5 miles or less
- **Macroburst** – Downburst wind damage covering an area more than 2.5 miles



o.cm | visit



From Dr. Leigh Orf,
University of
Wisconsin - Madison

user: orf
Mon May 4 13:



Downburst



Damage shows
a clear
DIVERGING
pattern



DOWNBURST
“fingerprint”



NWSSStateCollege

weather.gov/statecollege

CAM1

2020-06-04 17:03:32



Tornado



- A rapidly rotating column of air in contact with the ground, attached to the base of a thunderstorm or convective shower
- About 1 in 10,000 thunderstorms produce a tornado
 - Tornadoes usually produce a very small and defined area of damage (swath/path)
- **Remember:** the amount of damage does not indicate whether or not there was a tornado!



Poll Question



On average, how many tornadoes occur in Pennsylvania each year?

- 0-10
- 10-20
- 20-30
- 30-40



NWSSStateCollege

weather.gov/statecollege

Poll Question



On average, how many tornadoes occur in Pennsylvania each year?

- 0-10
- 10-20
- 20-30
- 30-40

Answer: 15



NWSSStateCollege

weather.gov/statecollege

April 2019 – A record breaking month



County	Date	Hour	Rating
Crawford	4/14	6 PM	EF-0
Venango	4/14	7 PM	EF-0
Venango	4/14	7 PM	EF-0
Warren	4/14	8 PM	EF-2
Union	4/15	12 AM	EF-1
Columbia	4/15	1 AM	EF-2
Sullivan	4/15	1 AM	EF-1
Lackawanna	4/15	1 AM	EF-0
Susquehanna	4/15	1 AM	EF-1
Fulton	4/19	7 PM	EF-1
Franklin	4/19	7 PM	EF-2
Huntingdon	4/19	7 PM	EF-1
Juniata	4/19	7 PM	EF-1
Mifflin	4/19	7 PM	EF-2



Total 2019 Tornadoes: 14
NEW Record for April
Previous: 11-1991

Strength	Count
EF-0 (65-85mph)	4
EF-1 (86-110mph)	6
EF-2 (111-135mph)	4



pennsylvania
EMERGENCY MANAGEMENT AGENCY



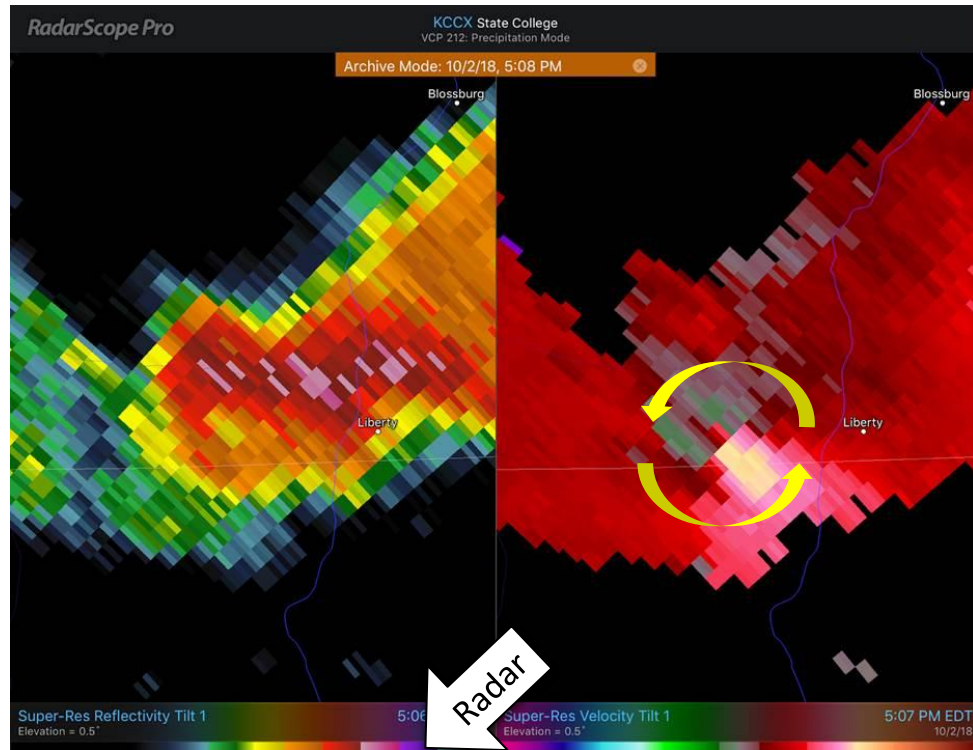
NWSSStateCollege

weather.gov/statecollege

A look at a Tornado on Doppler Radar



- When radar samples a tornadic thunderstorm, it typically samples a rapidly rotating mesocyclone, *not* the tornado vortex itself
- Rare exception: when a tornado passes very close to a radar



NWSSStateCollege

weather.gov/statecollege



Tornadoes – Some Terms

Wall Cloud – A lowering (and often rain-free) section of a thunderstorm, indicative of a strong updraft

- A rotating wall cloud can be a sign that conditions within the storm are right for producing a tornado
 - But what are the low-level conditions below the storm?
- Typically smaller than a shelf cloud
- A Wall Cloud, while looking impressive, **is not causing damage!**



Copyright - Samuel D. Barricklow - All Rights Reserved



NWSSStateCollege

weather.gov/statecollege

Funnel Cloud



Funnel Cloud – Fast spinning funnel descending from the thunderstorm cloud...but not yet reaching the ground

- Rotation is the key!
- Sign that conditions **within** the storm are right for producing a tornado
 - Again, what about conditions below the storm?
- A Funnel Cloud, while looking very impressive, is **NOT** causing damage.
 - But it may become a tornado soon!



Funnel cloud

National Weather Service Forecast Office, San Antonio, TX

NOAA Central Library



NWSSStateCollege

weather.gov/statecollege

A Couple Tornado Videos



Tornado
Nanty-Glo, Pennsylvania



Tornado Damage



Damage shows a
clear
CRISS-CROSS
pattern of
convergence



TORNADO
“footprint”



NWSSStateCollege

weather.gov/statecollege

Tornado Damage

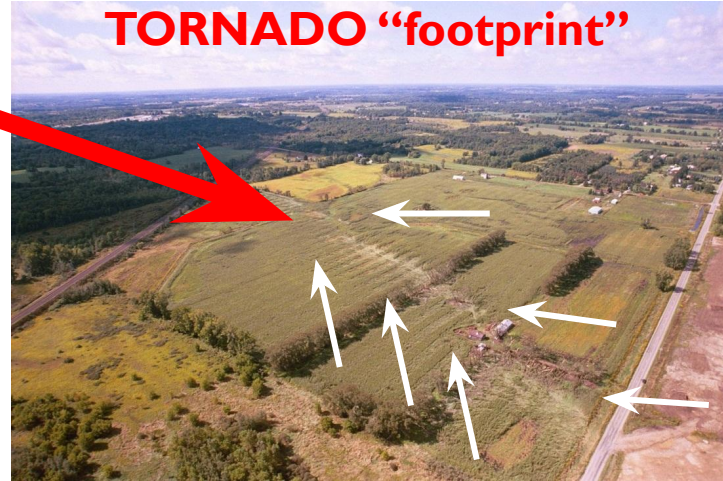


Damage shows a clear
CONVERGENT
pattern



NWS La Crosse

TORNADO “footprint”



Damage shows a clear
CYCLONIC turning

**TORNADO
“footprint”**



NWSSStateCollege

weather.gov/statecollege

Tornado Damage– Oct 2, 2018



NWSSStateCollege

weather.gov/statecollege

Poll Question



What would you report to the NWS if you saw this?

- Nothing
- Tornado
- Damaging Winds
- Funnel Cloud



NWSSStateCollege

weather.gov/statecollege

Flooding/Heavy Rain

A black and white cow with a yellow tag numbered 565 is standing in floodwater. The water is murky and reaches up to the cow's chest. In the background, there is a green field, a wooden fence, and a tree.

Photo: Mike Brulo

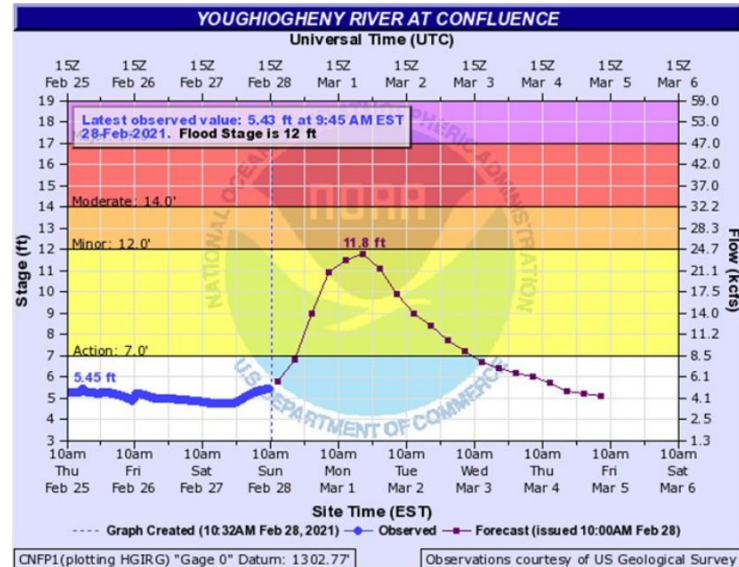
River Flooding



- Forecasts handled by the River Forecast Center
 - These are for specific, gauged locations along Main Stem Rivers and large tributaries
 - Locations where it takes more than 6 hours for the waterway to respond to heavy rainfall
 - Many streams and creeks are ungauged, and are covered by Flood and Flash Flood products
- River Forecasts are driven by...
 - Time of Year (foliage)
 - Routing of upstream water
 - Reservoir and Dam releases

water.weather.gov

Click on your location on the map



NWSSStateCollege

weather.gov/statecollege



FLOOD ALERTS



FLOOD WATCH

Flooding is possible.

Be prepared.

Stay tuned for further info and be ready to move to higher ground.

FLOOD ADVISORY

Flooding is imminent.

Exercise Caution.

Rivers and streams rise. Water may pond on roads and in urban areas.

FLOOD WARNING

Significant flooding is imminent.

Take Action.

Move to higher ground.
Never drive through flooded roadways.



@NWSStateCollege

Flash Flooding



- Rapid Rises on small (ungauged) streams and creeks
 - Mainly driven by...
 - Slow moving, heavy rain producing thunderstorms
 - Repeated rainfall over the same area
 - Dam Breaks
 - These streams and creeks respond in minutes to a few hours after a heavy rain event
 - Major threat to LIFE and PROPERTY
- Long duration moderate rain may also cause flooding, but at a slower rate.



NWSSStateCollege

weather.gov/statecollege

Areal Flooding



- Slower Rises on small (ungauged) streams and creeks
 - Mainly driven by...
 - Slow moving, prolonged rain events
 - Repeated rainfall over the same area
- Situations where streams and creeks respond after several hours of rain
- More of a threat to **PROPERTY** than **LIFE**



Spotter Reporting Guidelines



Poll Question

True or False: It is safe to chase storms, especially at night

- a. True
- b. False



NWSSStateCollege

weather.gov/statecollege

Poll Question

True or False: It is safe to chase storms, especially at night

a. True

b. False



NWSSStateCollege

weather.gov/statecollege

What a spotter IS

- ✓ Observes the weather
- ✓ Communicates
- ✓ Stays safe!
- ✓ Critical role in helping the National Weather Service and local officials

What a spotter ISN'T

- ✗ Storm chaser (*though almost all storm chasers are spotters!*)
- ✗ An NWS meteorologist
- ✗ Above the law
- ✗ Immune to the laws of physics



What to Report

Time

When did it occur?

Location

Where?

(Unsure? Give us a nearby intersection or landmark and we'll figure it out!)

Condition

What are you reporting?

Source

Who are you?

“Hi, this is John. I’m one of your spotters and I’m calling to report hail. I’m located in Lancaster City and we’ve got at least quarter size hail falling right now, maybe larger.”



NWSSStateCollege

weather.gov/statecollege



Reporting Tips

1. Late reports are okay (but please call us on the phone as soon as you can safely do so if you see a tornado)
2. We really appreciate your pictures and videos
3. Please remember to tell us where you are, even if it's just a highway and a city reference

Time

Location

Condition

Source

"Yo, it's getting dark here. Look like it might be a tornado."



NWSSStateCollege

weather.gov/statecollege

Storm Reports for the National Weather Service



Time

When did it occur?

Location

Where?

(Unsure? Give us a nearby intersection or landmark and we'll figure it out!)

Condition

What are you reporting?

Source

Who are you?

Wind Damage



Matthew Kendall

- ☐ Uprooted or downed trees
- ☐ Large branches down
- ☐ Wires down
- ☐ Damaged infrastructure
- ☐ Include photos if possible

Hail



Venango County, PA

- ☐ Hail of any size
- ☐ Please measure hail with a ruler or a common object for accurate sizing
- ☐ If possible, measure the weight and include photos

Tornadoes and Funnel Clouds



Tish Evans

- ☐ Visible rotation in a wall cloud
- ☐ Funnel cloud
- ☐ Tornado
- ☐ Include photos if possible

Flooding



Chris Kelley

- ☐ Any significant (uncommon) flooding
- ☐ Water over roads
- ☐ Streams rising to near bank full
- ☐ Include photos if possible



/NWSStateCollege



/NWSStateCollege





@NWSStateCollege



www.weather.gov/ctp

Storm Reports for the National Weather Service



Time	Snow	Sleet	Freezing Rain
When did it occur?	<ul style="list-style-type: none">☐ <i>Snowfall – During the Storm</i> (nearest 1/10 of an inch) <i>Report when accumulations reach thresholds</i>☐ <i>Snowfall – Storm Total</i> (nearest 1/10 of an inch) <i>Report as soon as you can after the storm ends</i>		
Location			
Where? <i>(Unsure? Give us a nearby intersection or landmark and we'll figure it out!)</i>	<ul style="list-style-type: none">☐ <i>Snow Depth – TOTAL snow on the ground</i> (nearest inch) <i>Might be the result of multiple storms</i> <i>Remember, snowfall ≠ snow depth</i>☐ <i>Snowfall RATES</i> <i>1 inch or more per hour (that's pretty heavy snow!)</i> <i>Visibility restrictions below 1/4 mile</i>	<ul style="list-style-type: none">☐ <i>Any occurrence and any accumulation</i>	<ul style="list-style-type: none">☐ <i>Any occurrence</i>☐ <i>Measuring on branches is easiest</i>☐ <i>Tougher on sidewalks, driveways</i>☐ <i>Remember to divide by 2 if measuring total ice accumulation on a branch!</i>
Condition			
What are you reporting?			
Source			
Who are you?			



/NWSStateCollege



/NWSStateCollege



@NWSStateCollege



www.weather.gov/ctp

How to Report



UNLISTED:
800-697-0010
LISTED:
814-954-6440



@NWSSStateCollege
#PAwx



US National
Weather Service
State College, PA



ctp.stormreports@noaa.gov



NWSSStateCollege

weather.gov/statecollege

How to Receive Weather Alerts



Select which alerts you want to receive (recommendations shown here)

The screenshot shows the "iNWS - My Alerts" web interface. At the top is the NOAA logo and the title "iNWS - My Alerts". Below this is a text field for "Alert Name" containing "Dauphin County, PA". The main section is divided into two columns. The left column, titled "Alert Types", contains a list of checkboxes: Severe Weather (checked), Winter Weather (checked), Hydrology (checked), Fire Weather (checked), Marine Weather (unchecked), Coastal Hazards (unchecked), Tropical Weather (checked), Aviation (unchecked), Non-precipitation (checked), Civil Emergency (checked), and Other (checked). The right column, titled "Alert Area", contains a section for "Area Type" with three radio buttons: Point (unchecked), County/Parish (checked), and Custom Polygon (unchecked). Below this are dropdown menus for "State" (Pennsylvania) and "County" (Dauphin). A map of Dauphin County, PA, is displayed below the dropdowns, with a green shaded area indicating the alert region. At the bottom of the form are three buttons: "Save", "Delete", and "Cancel".

Choose whether you want to be alerted for a point (town), county, or custom-drawn polygon

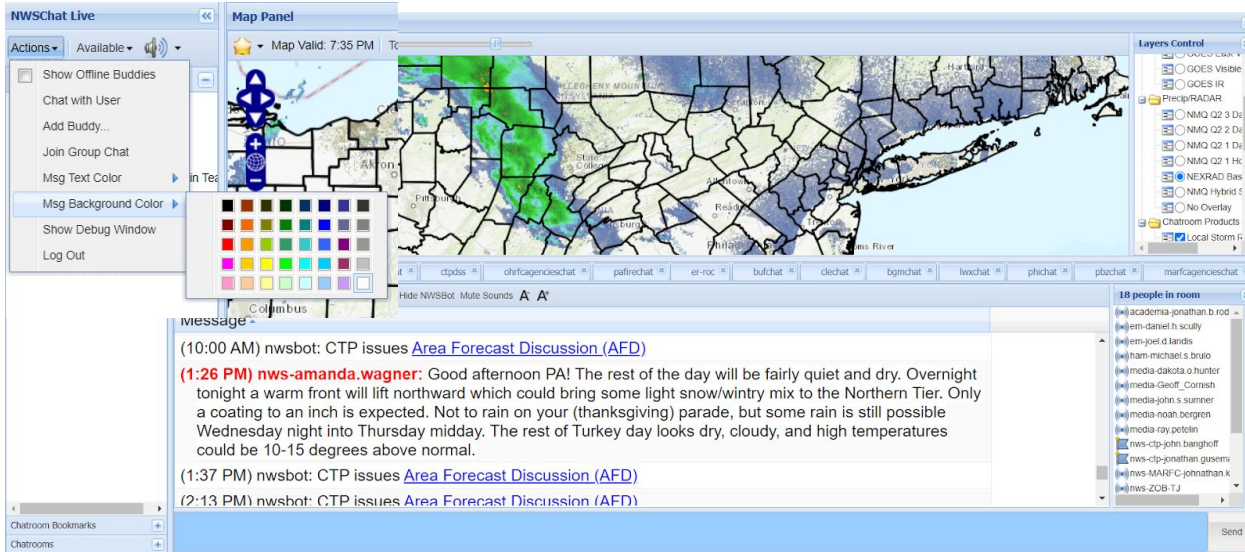
<https://inws.ncep.noaa.gov>



NWSSStateCollege

weather.gov/statecollege

NWSChat



ctpchat

- **NWS**
 - Blue
- **EMs**
 - Red text on white background
- **Media**
 - Green
- **Transportation**
 - Yellow
- **Others**
 - Purple



NWSSStateCollege

weather.gov/statecollege

<https://nwschat.weather.gov>

NWSChat



You are accessing a U.S. Government information system, which includes: 1) this computer, 2) this computer network, 3) all computers connected to this network, and 4) all devices and storage media attached to this network or to a computer on this network. You understand and consent to the following: you may access this information system for authorized use only; you have no reasonable expectation of privacy regarding any communication of data transiting or stored on this information system; at any time and for any lawful Government purpose, the Government may monitor, intercept, and search and seize any communication or data transiting or stored on this information system; and any communications or data transiting or stored on this information system may be disclosed or used for any lawful Government purpose.

NWSChat is an Instant Messaging program utilized by NWS operational personnel to share critical warning decision expertise and other types of significant weather information essential to the NWS's mission of saving lives and property.

This information is exchanged in real-time with the media and emergency response community, who in turn play a key role in communicating the NWS's hazardous weather messages to the public.

NWS partners can use NWSChat as an efficient means of seeking clarifications and enhancements to the communication stream originating from the NWS

NWSChat Live!

[Access NWSChat Live.](#)

Access Online Tools

NWSChat Username (not handle) :

nws-jonathan.gusema

@nwschat.weather.gov

Password:

.....

Important Links

[Change NWSChat Password](#)

[Request NWSChat Account - NWS Partners](#)

[Request Account - NWS Personnel](#)

[Documentation](#)

[Office Contacts](#)





<https://nwschat.weather.gov>

1. Agree to Terms

☐ I have read and agree to the terms of use .

2. Requested NWSChat Username (must be lowercase!)

This is your username which you will use to log into the chat server. This username is much like an email address, so the same formatting rules apply (no spaces, no apostrophes, no special characters, etc.)

Option 1: Fill out this form to generate my NWSChat username. Note: First and Last name must be your actual name. Generic or group accounts are not allowed.

Prefix / Affiliation: First Name: Middle Initial (optional): Last Name:

Option 2: If you believe the above format does not apply, or you are unsure as to which prefix/affiliation to choose, please email the nwschatadmin@noaa.gov team and explicitly state your NWSChat Username preference.

3. Common Name on Account

This is the name that your account will appear to others as in their Buddy List. You should enter something descriptive of you and your organization. (Nothing greater than 36 characters)

- Include your call letters, if you are media (Ex: kxyz-chief.meteorologist or KPXTV-Jane.Doe)
- Include your geography, if you are an ema (Ex: fulton-ga-ema-lastname)
- Include your agency and office, if you are government (Ex: faa-memphis-lastname)
- If fire or law/dispatch, include your jurisdiction and at least your last name
- If amateur radio, include your callsign (Ex: ARES-Smith-County-WD0TWU-Johnson)

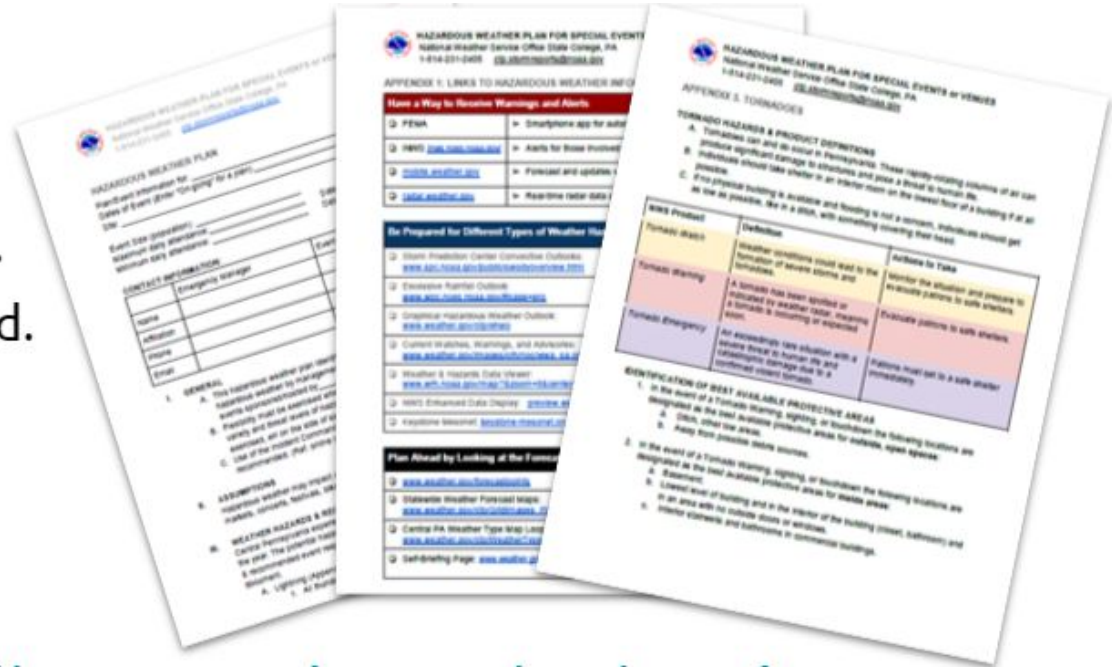
**Please give your
affiliation &
jurisdiction**



Hazardous Weather Action Plan



- Contact information, relevant links, hazard-specific response.
- Appendix for each hazard.
- **Completion will be required to receive support from NWS State College.**



<https://www.weather.gov/ctp/weathersupport>



NWSSStateCollege

weather.gov/statecollege

Amateur Radio

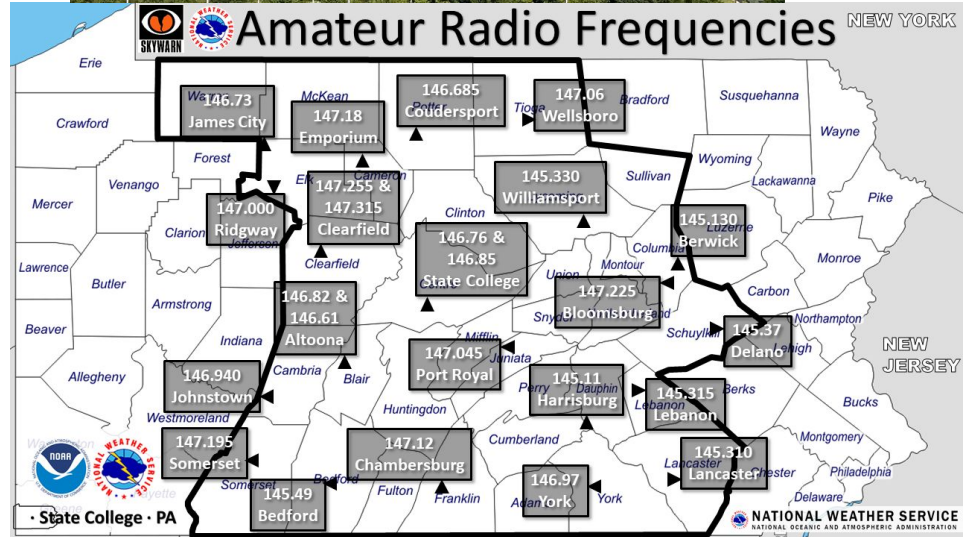


- NWS State College Call Sign: **WX3CTP**
- We can monitor most of the frequencies listed from the office.
- **ACTION ITEM**: build out contact database for amateur radio throughout the NWS State College weather forecast area.
- Want point of contact for each county
 - EM or Skywarn/Amateur Radio group
 - Best way to do this?

SKYWARN™ Spotter Program



• State College • PA



NWSSStateCollege

weather.gov/statecollege

Upcoming Spotter Talks



BASIC SKYWARN TRAINING

SPRING/SUMMER 2022 TALK SCHEDULE

Thursday, April 7th 6:00PM – 8:00PM

Tuesday, April 12th 2PM-4PM & 6-8PM

Thursday, April 28th 6:00PM – 8:00PM

Wednesday May 11th 6:00PM – 8:00PM

Virtual Talk *In-person (Lancaster)*



To register find the spotter talk on the calendar below and click the link!



State College · PA



NWSSStateCollege

weather.gov/statecollege

Weather-Ready Nation Ambassadors



<https://www.weather.gov/wrn/amb-tou>

AMBASSADOR™
WRN
WEATHER-READY NATION



NWSSStateCollege

weather.gov/statecollege

What's next?



EMAIL WILL BE SENT OUT TOMORROW

What to expect:

- Are you a spotter already?
- Contact Information
- Course Evaluation



NOT A SPOTTER YET?

- You'll receive a spotter confirmation letter.
- Please be patient as we process 200+ registrants.



NWSSStateCollege

weather.gov/statecollege



A note about spotter IDs

- We are discontinuing issuance of Spotter IDs
- If you already have one – you can keep!
- If you don't have one yet, we'll just ask for your name!



NWSSStateCollege

weather.gov/statecollege

SKYWARN Registration and Course Evaluation



Please scan the QR code to complete your SKYWARN registration.

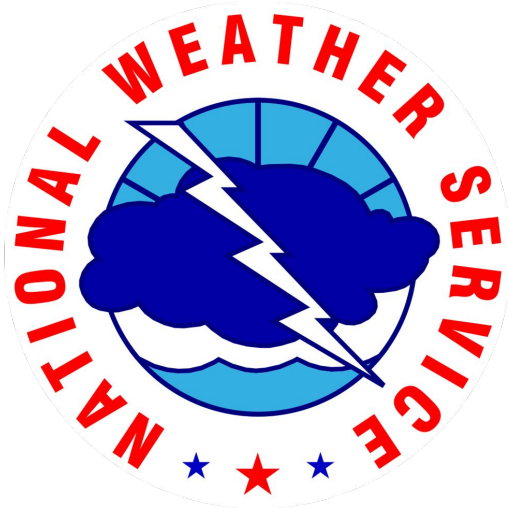
We also appreciate any and all feedback about the course. Negative or positive, don't be shy!



NWSSStateCollege

weather.gov/statecollege

Thank You!



STATE COLLEGE, PA

ctp.stormreports@noaa.gov



@NWSSStateCollege

NEW!



@NWSSStateCollege



/NWSSStateCollege



/NWSSStateCollege



www.weather.gov/ctp



NWSSStateCollege

weather.gov/statecollege



Any Questions?



NWSSStateCollege

weather.gov/statecollege