National Weather Service

Newport/Morehead City

Basic SKYWARN Online Training 2021

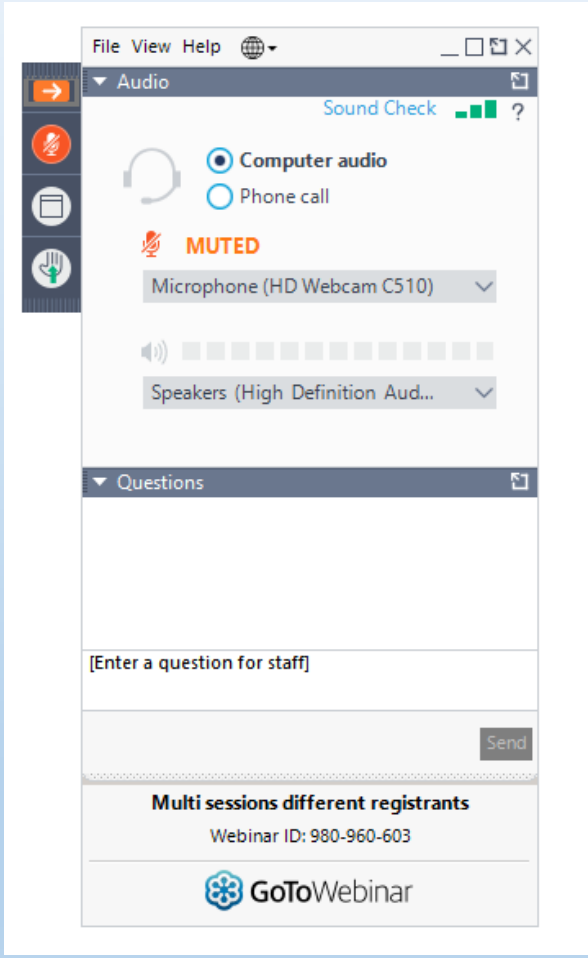
By: Erik Heden
erik.heden@noaa.gov

Technical Information

Your mics have been muted.

You can enlarge the presentation by dragging the window up to enlarge it or swiping right or left on the app to make it full screen

At the end we will take questions. Feel free to type in your question at anytime using the webinar feature.



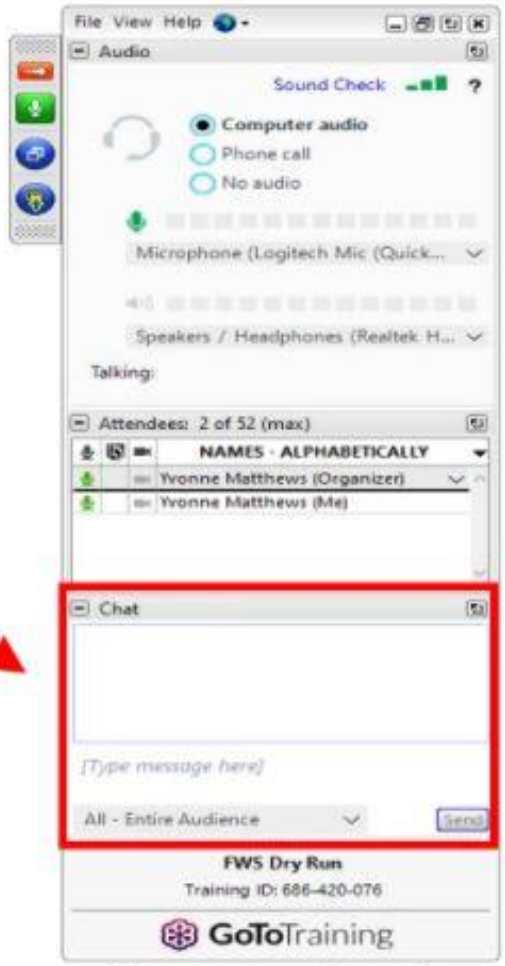
If you raise your hand, we can call on you, unmute your mic, and take a question verbally.

In the handouts section you can download this presentation and your spotter certificate!

This will be recorded and posted to YouTube shortly.

COMMUNICATING With the Presenters

1



Type your Question or Comment in the Chat box. Select who you would like to send it to, i.e., All-Entire Audience or a specific attendee. Click the **Send** Button

2

Don't see the question box?

3

Use the *Raise your Hand* button to respond to the presenter(s) when they ask for a show of hands.

Welcome To Our Third Year Of Online Classes

- Our hope is you will learn a bit more about who we are as the National Weather Service and severe weather, while learning how important it is to report severe weather to the National Weather Service
- You will now be in our spotter database, using the information you signed up with.
- Sit back and enjoy! The class will be about 50 minutes. The final 10 minutes will be questions from you, for a total of around an hour.

Topics

- National Weather Service Overview
- SKYWARN Facts
- Thunderstorms Ingredients
- Thunderstorm life cycle
- Single Cell Thunderstorms
  - *Downbursts/Microbursts*
- Supercell Thunderstorms and Tornadoes
- Squall Lines and Bow Echoes
- Flash Floods
- Keeping informed of severe weather
- Review of spotter procedures

Some things to keep in mind

- There is a lot of information that will be presented here. Do not expect to be able to absorb everything in one class.

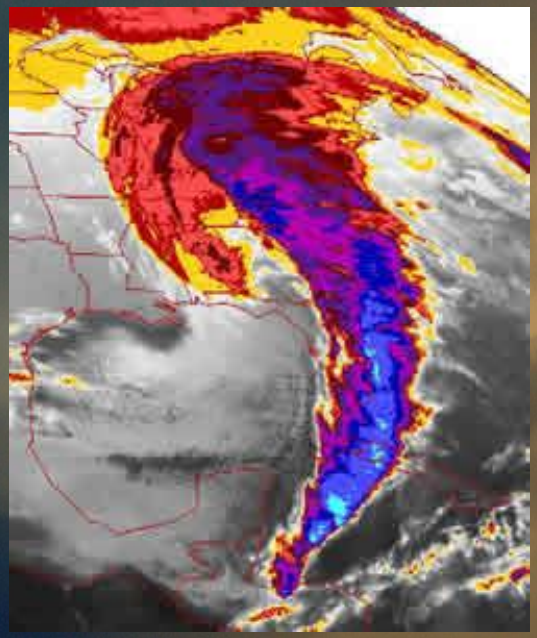
- We want to give you a **bit of science** so that you understand why storms occur but our main goal is that you **report to us when severe weather happens**

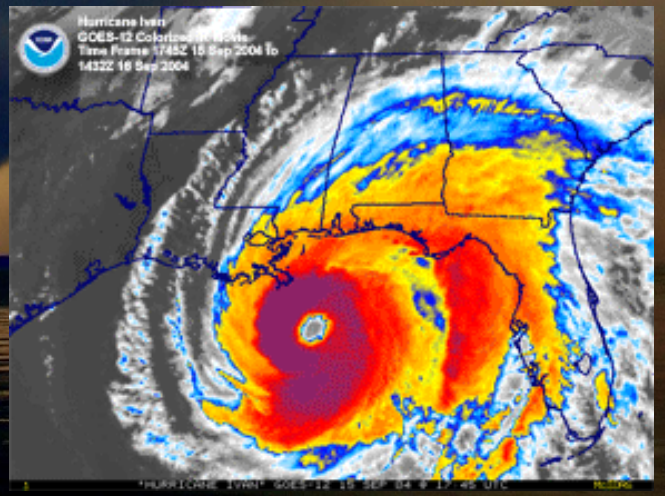
- Enjoy the class but pay special attention to **what to report, how to report it, and when.**

Ask Questions!!

When The Weather Turns Severe…

- Mission = Protect Life and Property.
- Issue warnings to alert public of severe weather, floods, blizzards, ice storms, high winds, hurricanes and coastal storms.





National Weather Service - Nationwide

Our Local Office

Eastern part of North Carolina

Includes: Land areas, inland rivers, sounds, and adjacent ocean

Other parts of the state covered by other local offices (Raleigh, Wilmington, etc)

Open 24/7/365

Hurricane Florence

Staff here for 3 to 7 days

Our building is designed to withstand storms

We stay when the weather is bad

SKYWARN

- SKYWARN is a National volunteer program run by the National Weather Service
- SKYWARN's goal is to provide NWS with "Ground Truth Reports" of significant weather

Tree Damage
Warsaw, NC 2/24/16

How do Weather Spotters help the NWS?

- Real time reports assist the National Weather Service in our warning decisions.
- Helps forecasters gauge how severe a storm is.
- Your information may be the reason a warning is issued, and/or provides credibility to a warning.
- You could help provide the citizens of your community with potentially life-saving information.
- SKYWARN provides a backbone of emergency communications.
- The trained eye of the storm spotter is still our greatest asset!

Photo by: Lee Allen

Fundamental Definitions

Watch

Conditions are favorable for the weather event in/near the watch area. Issued by NWS Storm Prediction Center (SPC).

Warning

The weather event is imminent or occurring in the warned area. Issued by NWS Newport.

Severe Thunderstorm

A storm which produces hail 1 inch diameter or larger and/or wind gusts 58 mph or stronger.

Fundamental Definitions

Tornado:

A violently *rotating column of air* pendant from a thunderstorm and *in contact with the ground.*


Hopkins Cty, KY F4 tornado by Leonard Costanzo

Funnel Cloud:

A *rotating*, funnel-shaped (typically)cloud extending from a thunderstorm base. A funnel cloud is attached to the cloud base and **does not reach the ground**. It exhibits rapid rotation and is most often smooth in appearance.

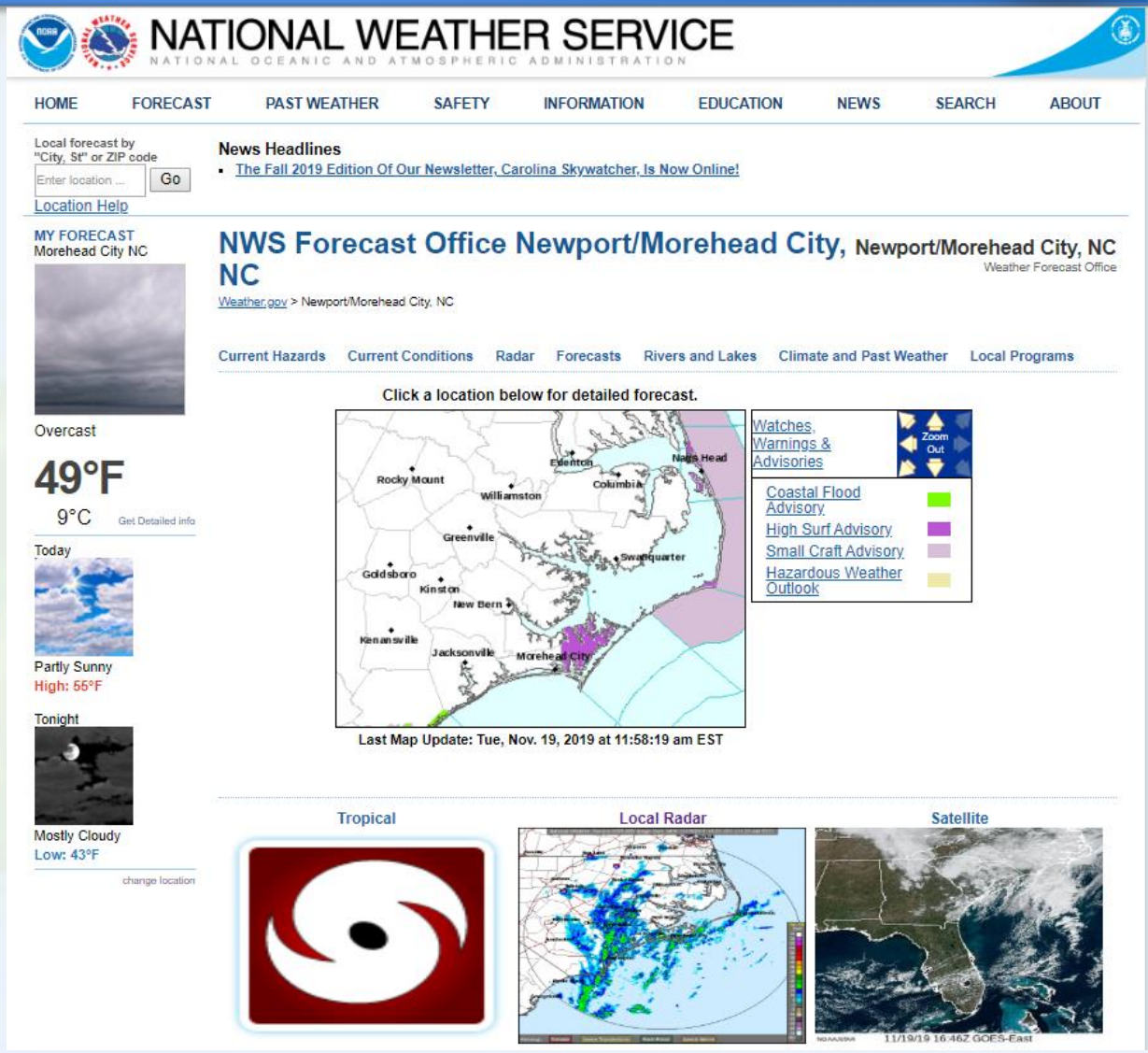
Our Website

weather.gov/newport

Weather information from past events, current weather, and forecast

Explore the website and bookmark or save what you like

Go in depth as much as you need



7- Day Forecast

weather.gov/newport

Sky cover

High/low temperatures

Winds

Chance of precipitation

Detailed Forecast

Today	Mostly cloudy, with a high near 54. Light northwest wind.
Tonight	Mostly cloudy, with a low around 38. West wind 5 to 7 mph.
Wednesday	Sunny, with a high near 60. Northwest wind 7 to 9 mph.
Wednesday Night	Mostly clear, with a low around 38. Light north wind.
Thursday	Sunny, with a high near 60. Light and variable wind becoming northwest around 5 mph.
Thursday Night	Partly cloudy, with a low around 44.
Friday	Mostly sunny, with a high near 67.
Friday Night	Mostly cloudy, with a low around 48.
Saturday	A chance of showers. Mostly cloudy, with a high near 64. Chance of precipitation is 50%.
Saturday Night	A chance of showers. Mostly cloudy, with a low around 44. Chance of precipitation is 50%.
Sunday	Partly sunny, with a high near 58.
Sunday Night	Mostly clear, with a low around 39.
Monday	Sunny, with a high near 60.

Extended Forecast for
New Bern NC

Today	Tonight	Wednesday	Wednesday Night	Thursday	Thursday Night	Friday	Friday Night	Saturday
								
Mostly Cloudy	Mostly Cloudy	Sunny	Mostly Clear	Sunny	Partly Cloudy	Mostly Sunny	Mostly Cloudy	Chance Showers
High: 54 °F	Low: 38 °F	High: 60 °F	Low: 38 °F	High: 60 °F	Low: 44 °F	High: 67 °F	Low: 48 °F	High: 64 °F

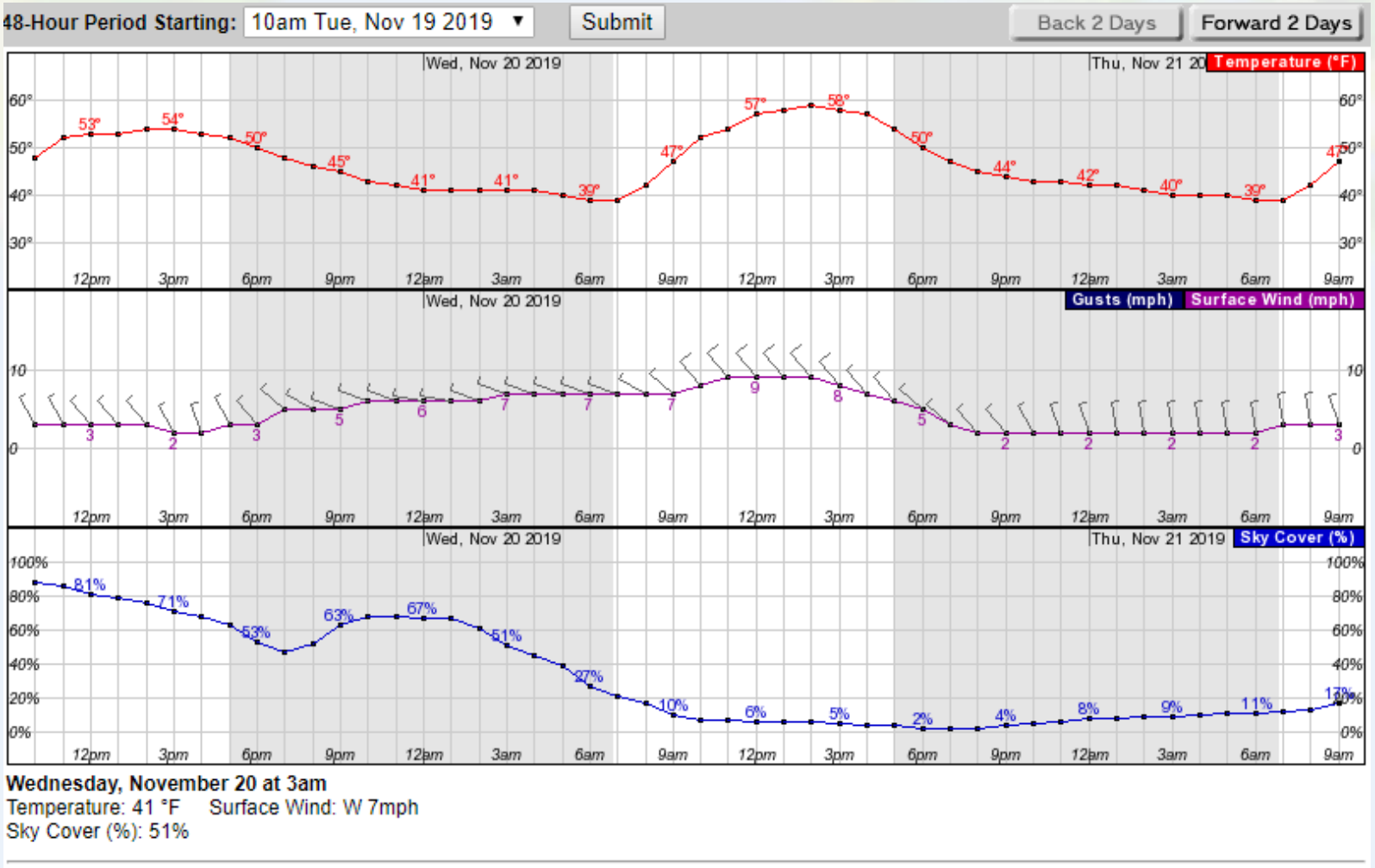
Hourly Forecast

weather.gov/newport

Check on and off any weather parameter you want

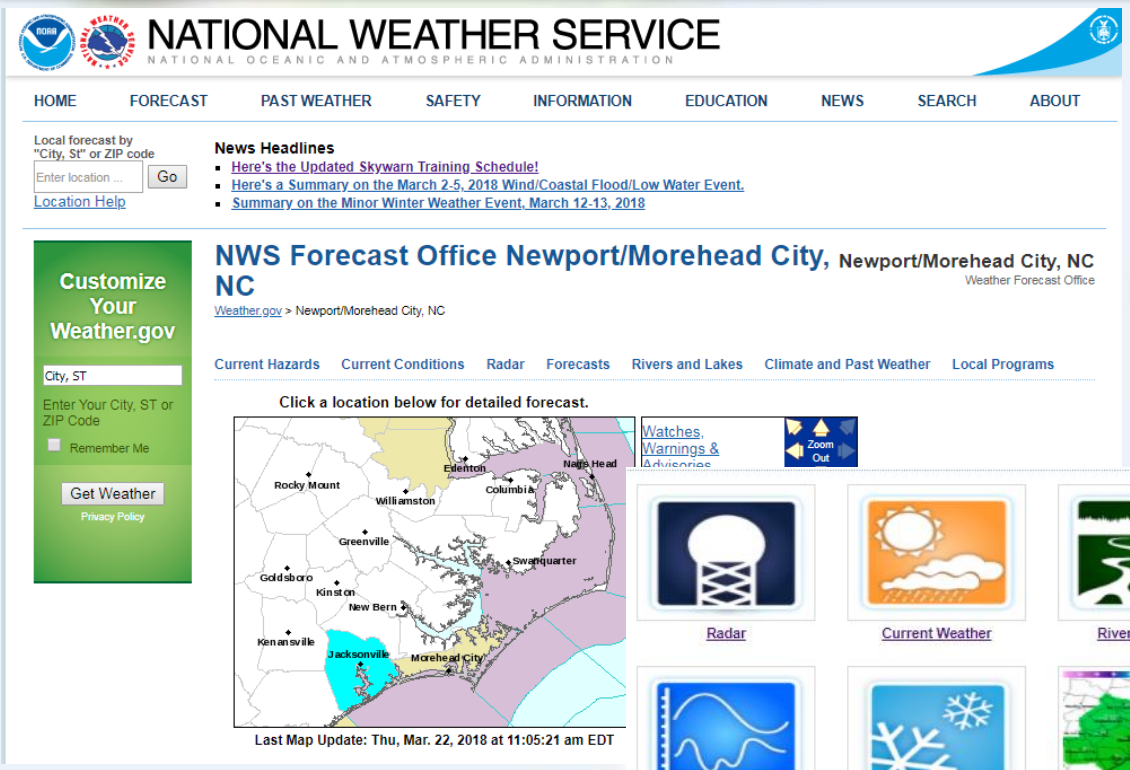
See trends in hourly increments out through 7 day

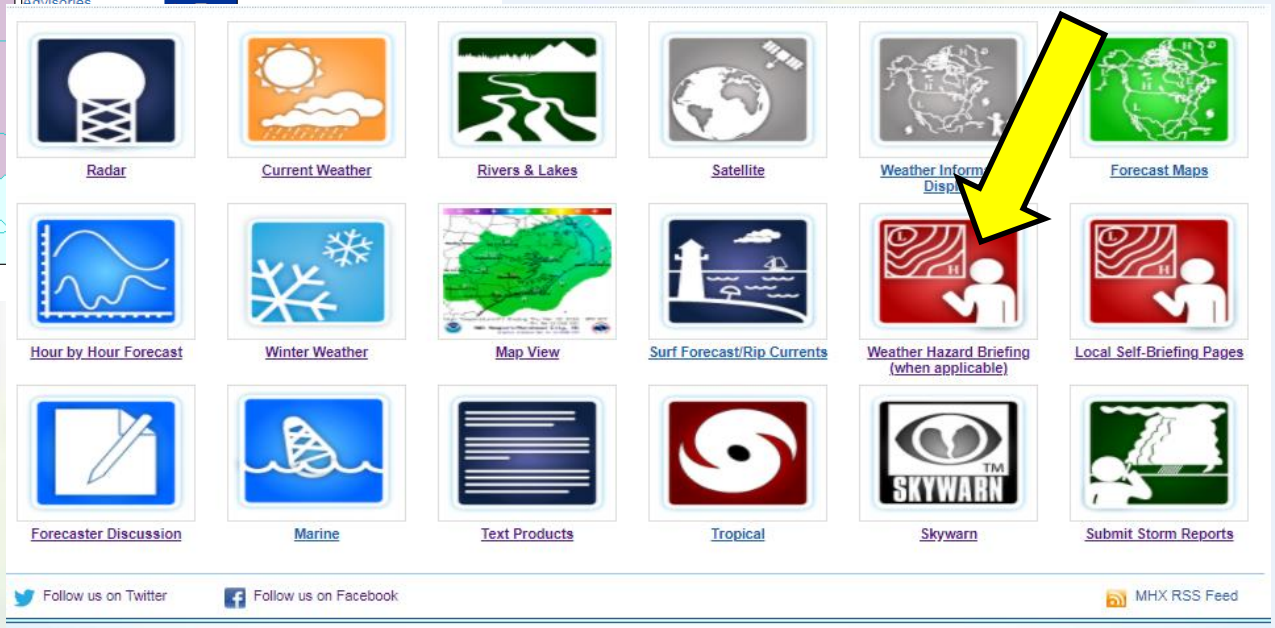
Digital readout available



Weather Briefings

weather.gov/newport

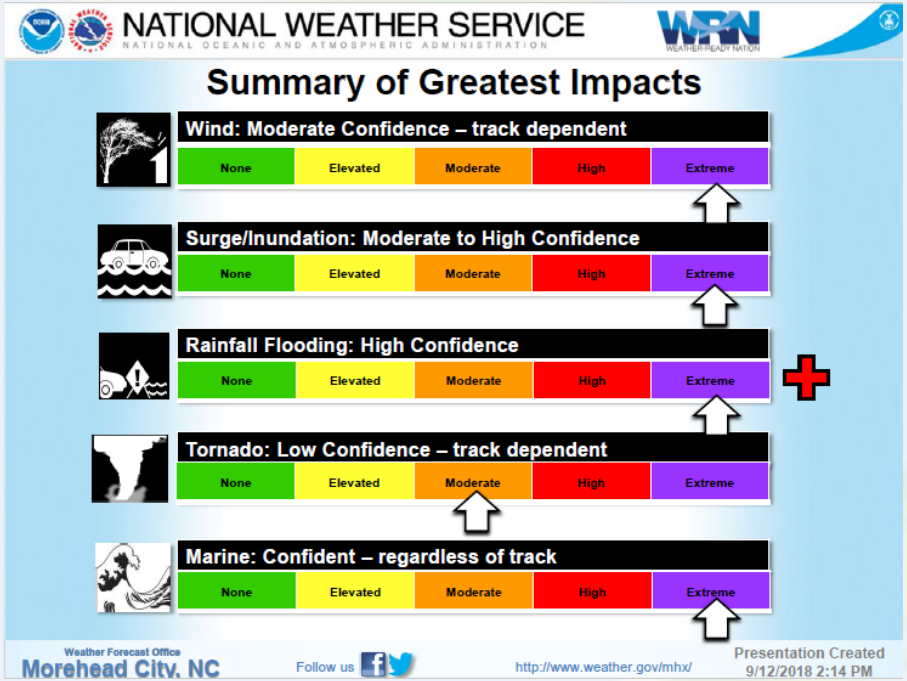




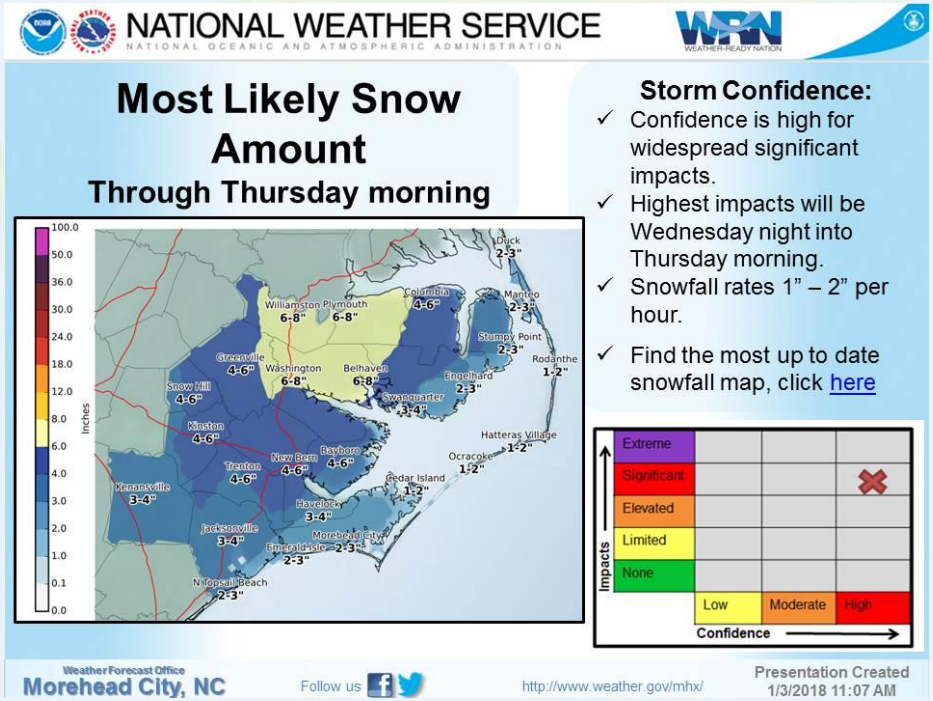
Created prior to bigger events of severe weather

Weather Briefings

weather.gov/newport



January 2018 Winter Storm

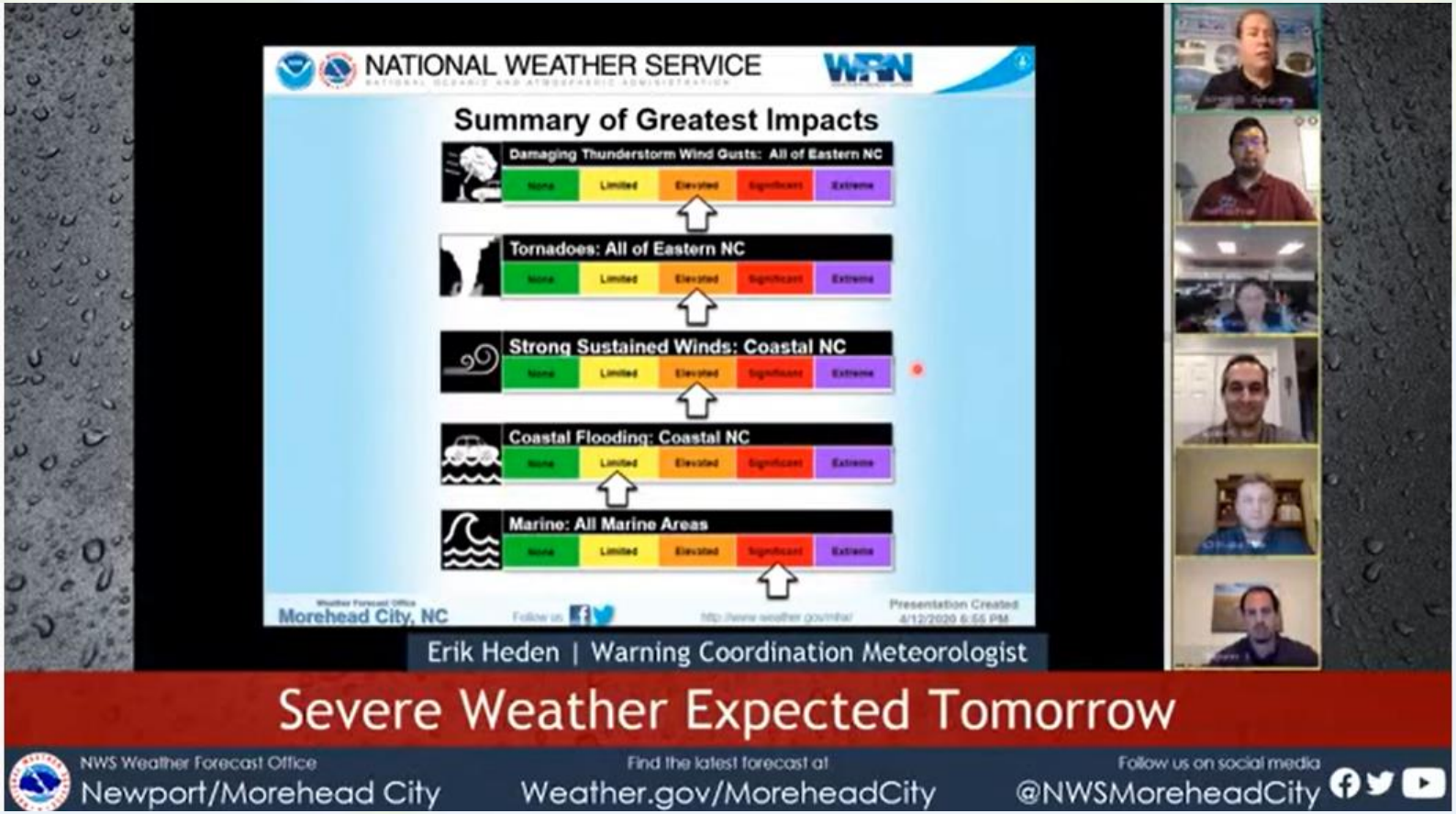


Hurricane Florence Impacts

Social Media

Search NWS Morehead City

April 2020 Example



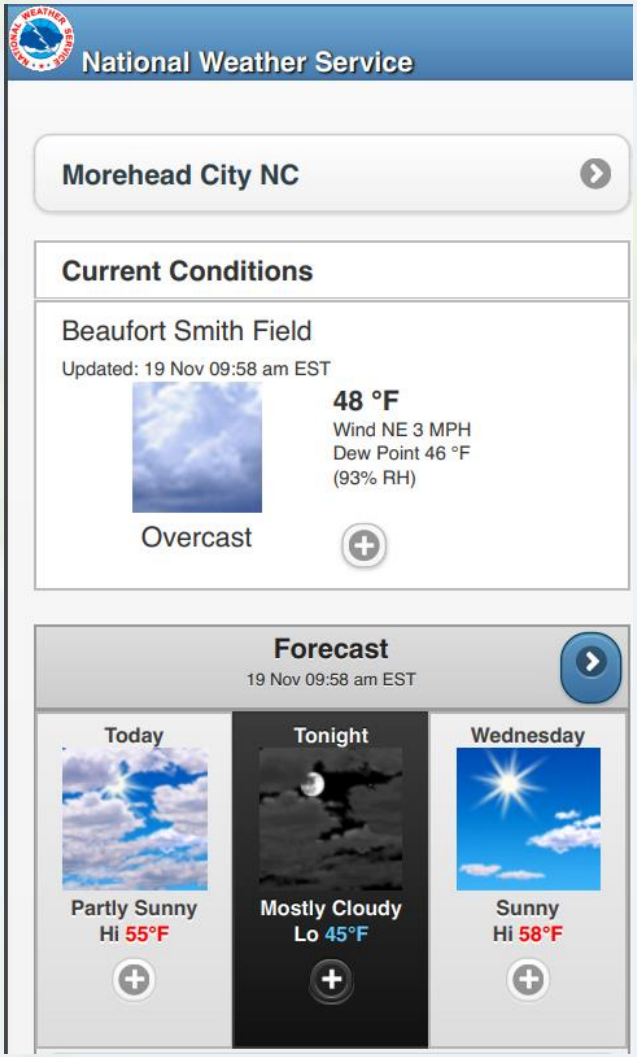
Mobile Forecasts

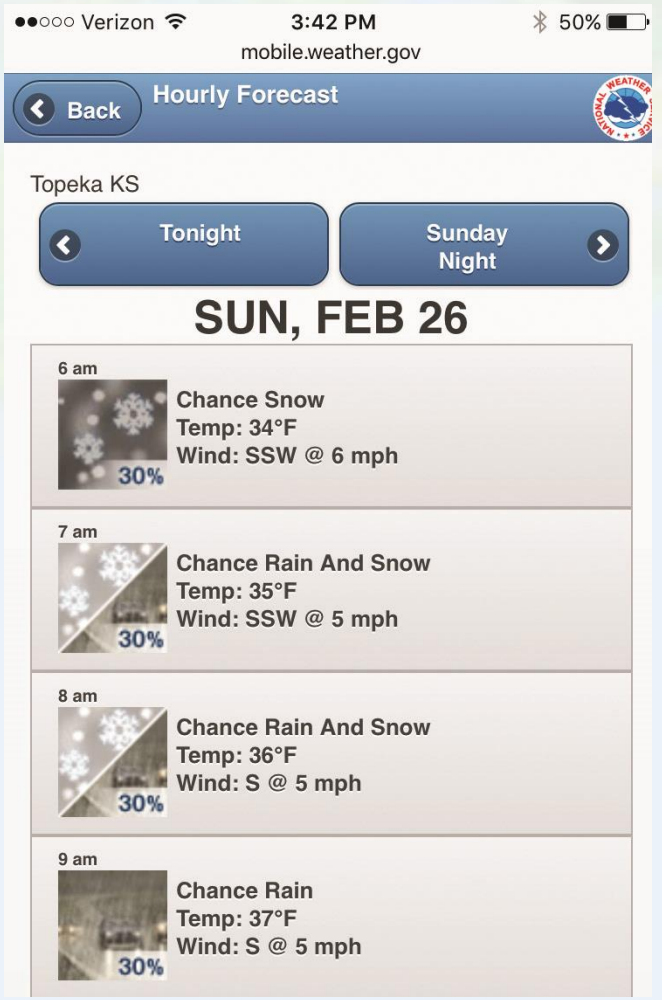
mobile.weather.gov

Quickly access hourly forecasts, radar, and more from your local office, ANYWHERE in the country

Can work like a weather "APP" by adding it to home screen

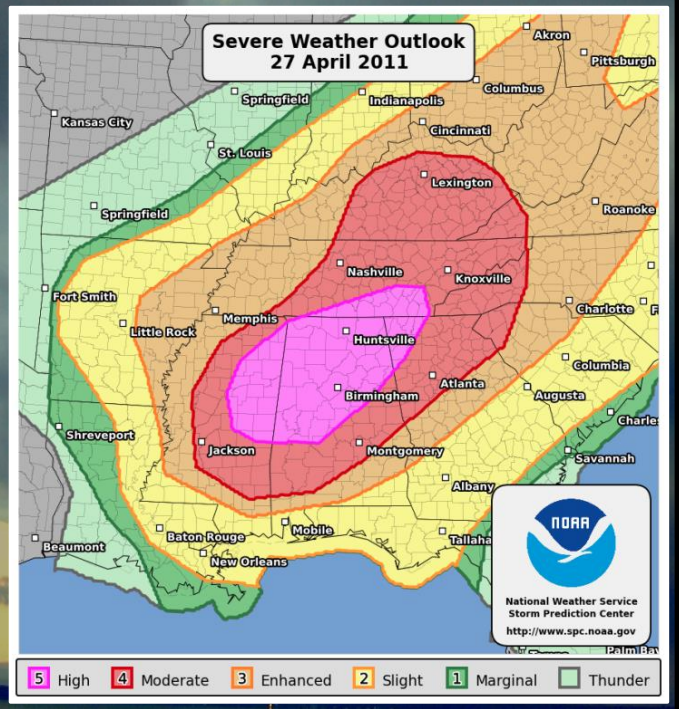
Also works on PCs





Severe Weather Risk Categories

www.spc.noaa.gov



Outlines Where Severe Weather is Possible

Planning for Next 1 to 8 Days

General Thunderstorms or **Marginal Risk**

Isolated Severe Weather Possible

Slight Risk or **Enhanced Risk**

Some Severe Weather Expected

Severe Thunderstorm or Tornado Watch Likely

Moderate Risk

Severe Weather Likely - Big Outbreak Possible

High Risk

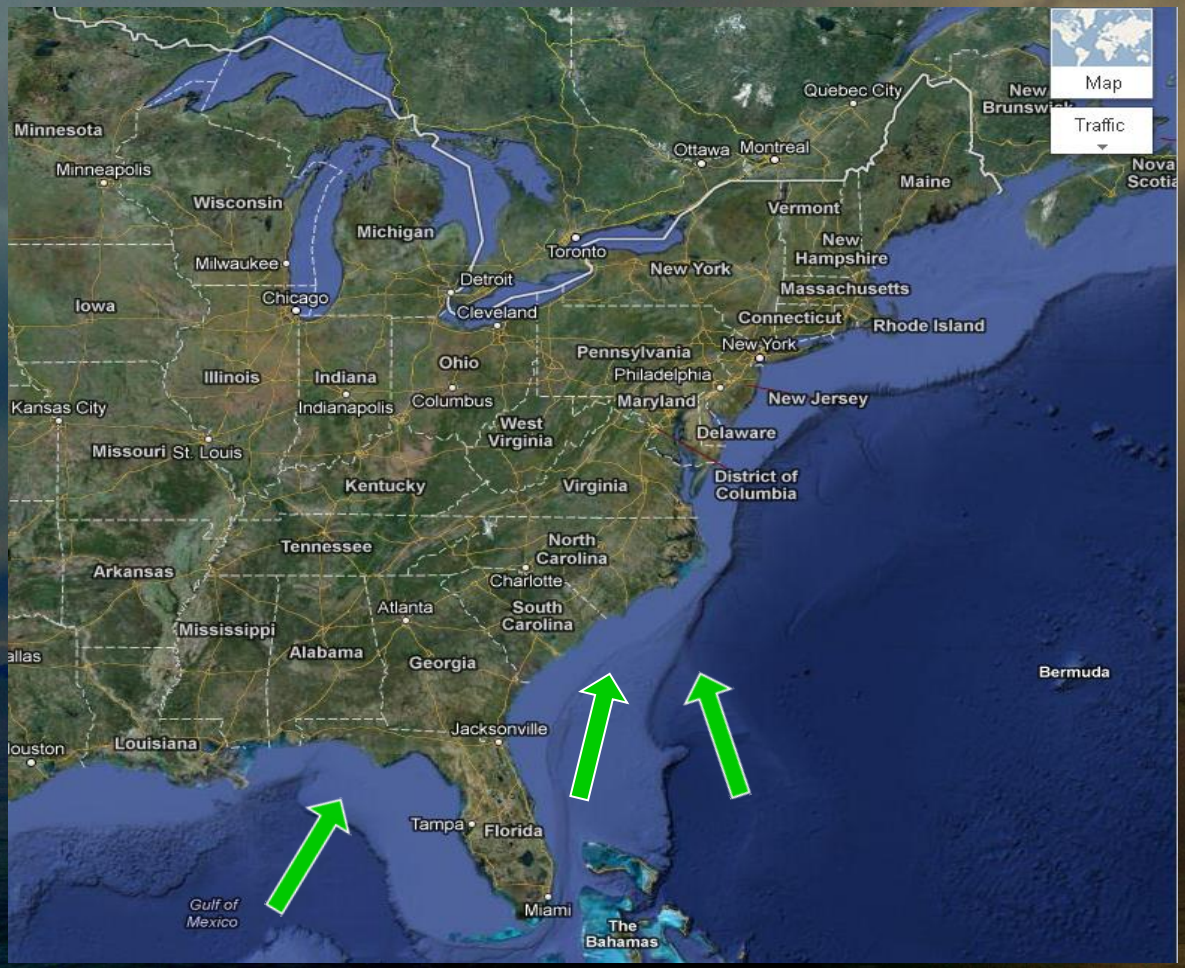
Major Outbreak Likely

What causes Thunderstorms?

- Moisture
- Instability
- Lift
- Think of it like a recipe. You need all three of these to be complete.

What causes Thunderstorms- Moisture

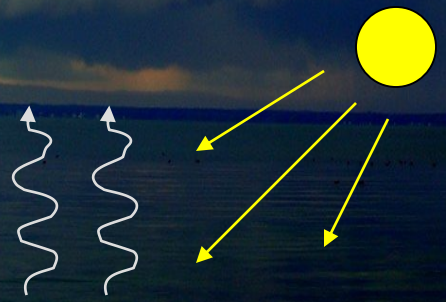
- Sources of moisture can include the Atlantic Ocean or Gulf of Mexico



What causes Thunderstorms- Instability

Cold air versus Warm air

- Warm air is lighter than cold air. If air is warmer than its surroundings, it will rise.
- The greater the difference between the surface (very warm) and aloft (very cold), the greater the instability.



Daytime heating is one way to warm up the lowest layer of the atmosphere.

Sun heats ground. Ground heats the air above.

What causes Thunderstorms- Instability

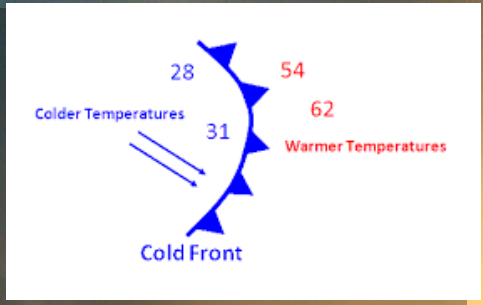
Soda Bottle Example

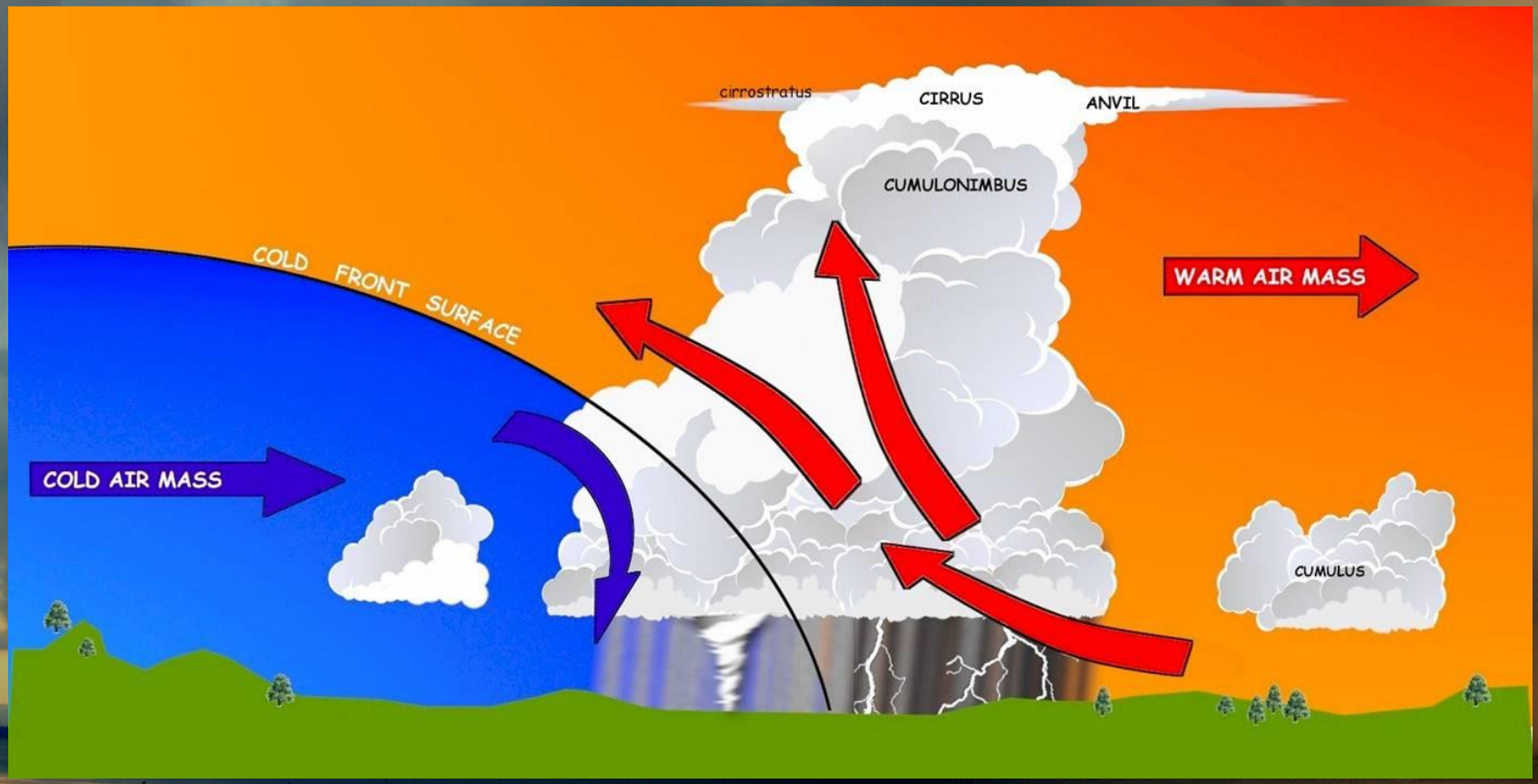
The coke is the moisture.

The bubbles are the instability.

Nothing happens at this point, because you are lacking the last ingredient.

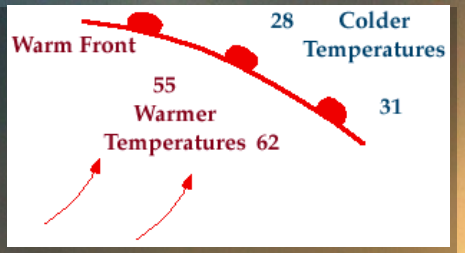
Lifting Mechanisms
Cold Front

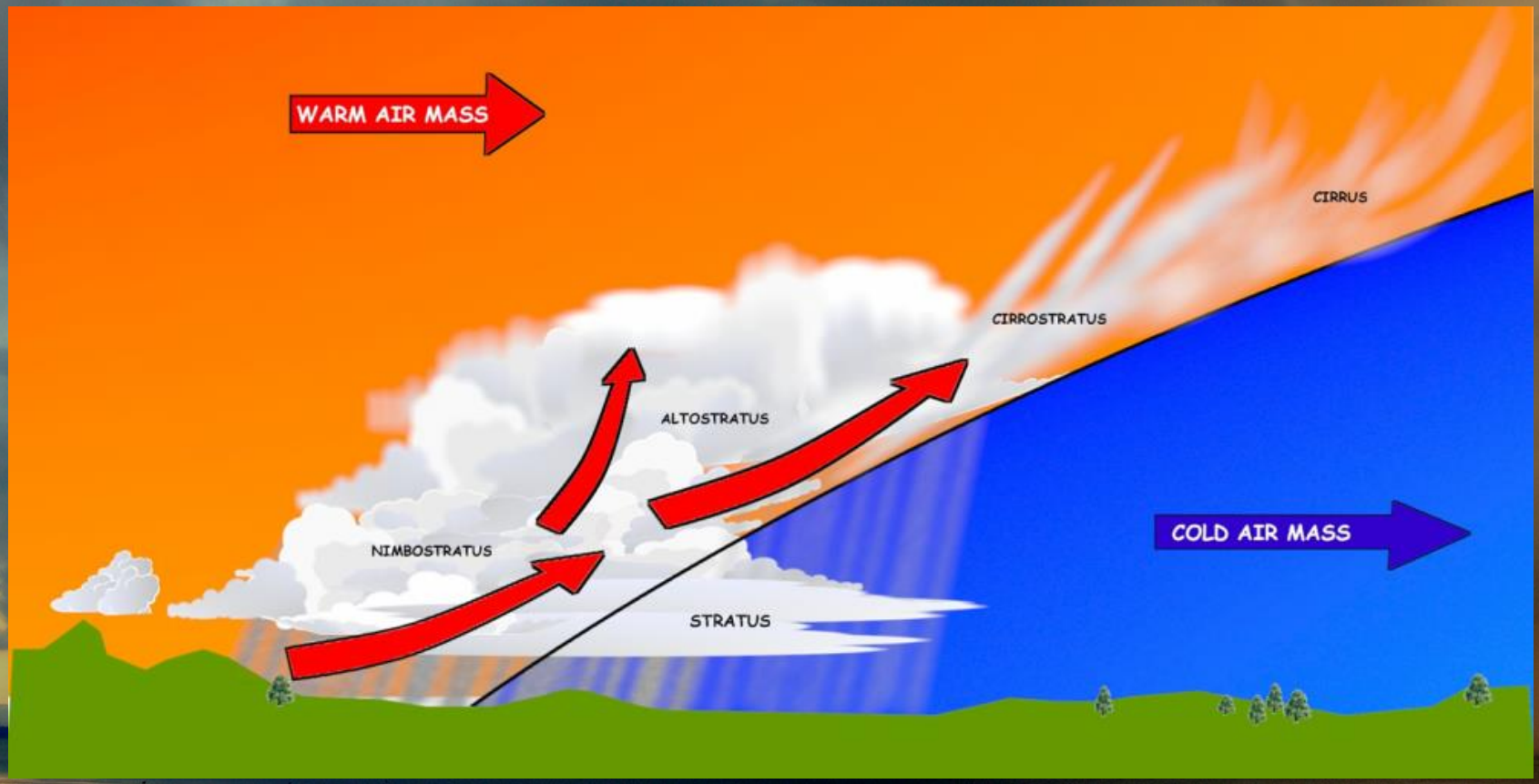




Colder air is denser than the warm air ahead of the front. The warmer air is forced to rise up. If the air is unstable, it will keep rising. Cold fronts often initiate lines of showers and thunderstorms.

Lifting Mechanisms
Warm Front





Again, the colder air is denser than the warm air. As the warm air encounters the cold air, it is forced to rise up and over. If the air is unstable, showers and thunderstorms can form.

How do I make my report?

Call the Spotter Hotline:

REPORTS ONLY!

REPORTS ONLY!

1-800-889-6889

Note: This is specific to Eastern NC. Outside the area follow future info sent to you!

This is a special number only for spotters and rings directly to us!

1. **Who you are: Trained Skywarn Spotter**
2. **What you saw (funnel cloud etc.)**
3. **Where you saw it (Newport).**
4. **When you saw it (6:45 P.M.) or 5 minutes ago, etc.**

REMEMBER…Spotters can help save lives by…Making their reports!

REPORTS ONLY!

Email US!!!

REPORTS ONLY!

Wxobs.mhx@noaa.gov

Note: This is specific to Eastern NC. Outside the area follow future info sent to you!

1. Who you are: Trained Skywarn Spotter.
2. What you saw (large trees down. More than a few. 70 mph winds estimated)
3. Where you saw it (1 mile east of Beaufort)
4. When you Saw it (2:35 PM)

Types of Thunderstorms

Single Cell	Multicell Cluster	Multicell Line "Squall Line"	Supercell
Weak updraft (non-severe or severe)	Moderate updraft (non-severe or severe)	Moderate updraft (non-severe or severe)	Intense updraft (Always severe) Mesocyclone - Rotating updraft
Slight threat	*Moderate threat*	*Moderate threat*	*High threat*

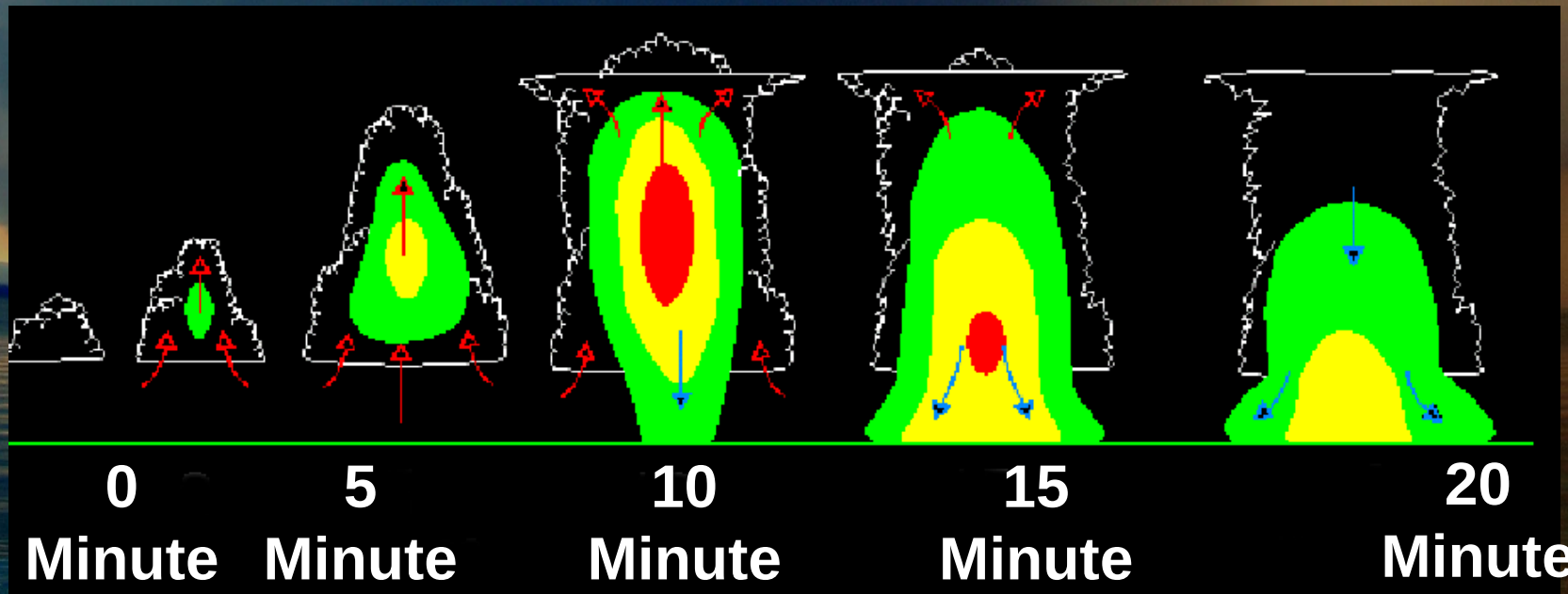



SINGLE CELL STORM

- Notice the cloud is towering and shows a bubbly nature (we have some instability).
- Also notice the cloud is in the vertical (straight up and down), and does not tilt.
- Being straight in the vertical will reduce the storm's chance of lasting a long time

Single Cell Summary…The most elusive of thunderstorms!

- The norm is …isolated downbursts...small hail...and heavy rain.
- Storm is generally disorganized in nature.
- Low degree or predictability of severe events. (Pulse storms)
- Tornado potential is low. Possible intersection of boundaries or cell mergers.



Report Any Size Hail!!

- Actual Size of the Hail is ALWAYS Recommended. However, storm spotters use these common terms for conveying hail reports to the NWS. Following is a list of the most common terms and the accompanying conversion to hail sizes:

Pea	¼ inch	Egg	2 inches
Penny	¾ inch	Tennis Ball	2 ½ inches
Quarter	1 inch	Baseball	2 ¾ inches
Half Dollar	1 ¼ inches	Grapefruit	4 inches
Walnut	1 ½ inches	Softball	4 ½ inches
Golf ball	1 ¾ inches		

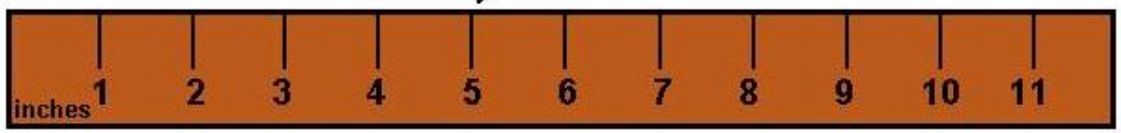
Nickel sized hail is considered 0.88 of an inch

Please do NOT report hail as marble size!!

I've got hail the size of quarters!

The diameter of this enormous hailstone is measured to be over 5 inches!

Use hail estimation cards, rulers, calipers or loose change to measure hail.

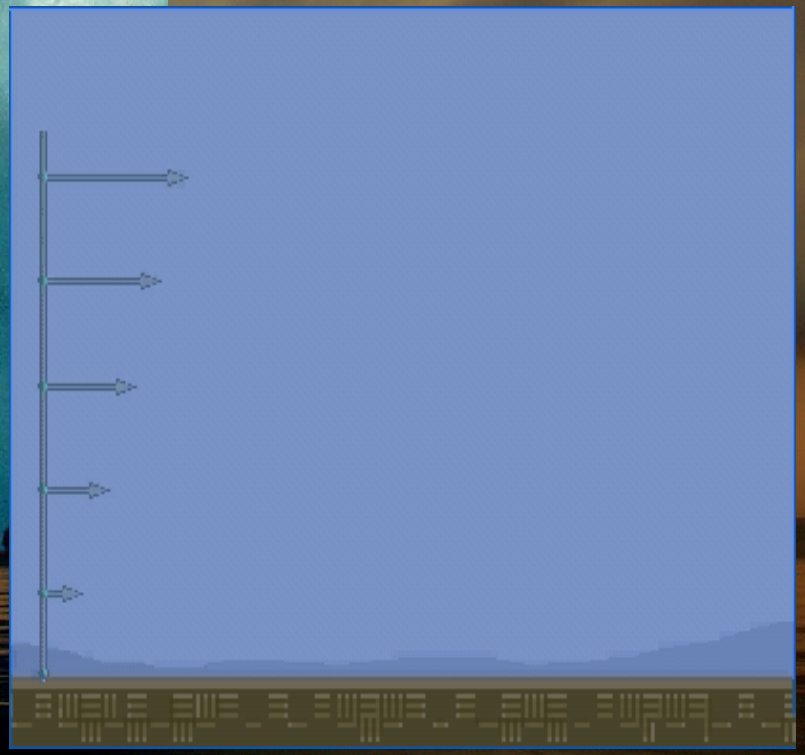


Hail Summary

- Report any size hail
- Make sure to give the size of the largest stone
- An example would be, we are getting nickel size hail but a few are as large as a quarter
- Don’t use marbles to report size!

Multi-cell Storm Clusters & Lines

If there is moderate wind shear the storms tilt and can organize into multi-cell clusters or lines



Stronger shear means a greater risk for severe storms

FLASH FLOODING

- Multi-cells can “train” over an area producing flash flooding

Flash Flooding…

- Significant = something never or rarely seen
- Ideally, we want to know “before” it gets really bad.
- Example, roads are becoming covered with water, my stream is rising fast and approaching bankfull.
- We want to know, how deep is the water? Compare it to a car, up to the tires, up to the doors, the roof, etc.
- Are roads washed out, impassable ?

Have A Rain Gauge?

Rainfall Reports extremely useful

- Rainfall reports help us confirm how the radar is doing with estimation.
- Knowing how much rain has fallen, gives us a good idea of the potential for flooding.
- Rainfall amounts of **2" or greater in 24 hours** or rainfall amounts of **2" in an hour or less** are MOST important.
- Think about CoCoRaHS.

How can I join the network?

Five easy steps

Simply sign-up on the CoCoRaHS web page: www.cocorahs.org

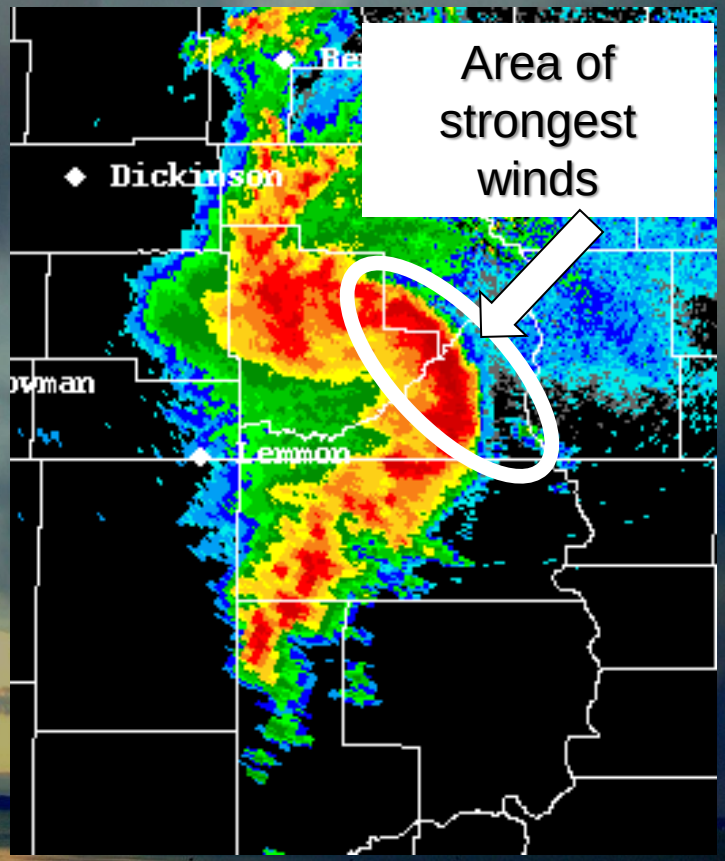
Obtain a 4” plastic rain gauge

View the on-line “training slide show” or attend a training session

Set-up the gauge in a “good” location in your yard

Start observing precipitation and report on-line daily

Squall lines and multicell storms occasionally develop the appearance of a "bow echo".



Bow echoes are usually associated with an axis of enhanced winds that create straight-line wind damage at the surface.

Shelf Cloud

Leading edge of gust front

Harkers Island, NC May 30, 2017

This storm produced wind gusts as high as 82 MPH at Fort Macon

Microburst in Canada

Wind Damage…

- Damage? Trees, power lines, etc.
- How many trees down?
- How big are the branches?
- Was the tree dead already?

- If it was a very strong wind, do you have any damage to buildings (ie windows blown out, roofs blown off, etc.)
- Can you estimate the wind speed?

How do I make my report?

http://www.facebook.com/NWSMoreheadCity

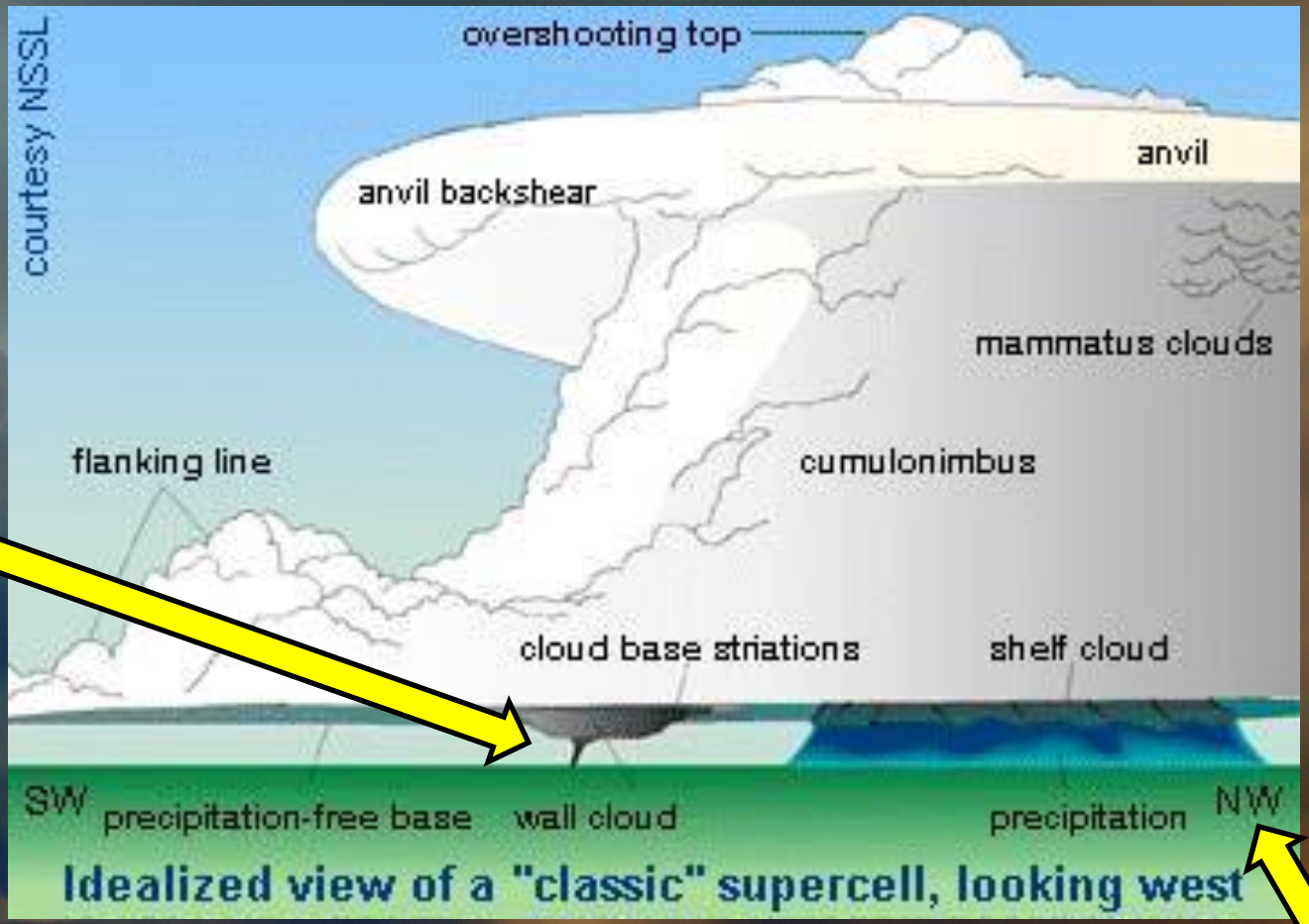
Be sure to identify yourself as a trained spotter!

Post a picture to our wall!

1. **Who you are: Trained Skywarn Spotter**
2. **What you saw (quarter size hail. Hail lasted 5 minutes)**
3. **Where you saw it (North Towanda)**
4. **When you saw it (12:45 PM.)**

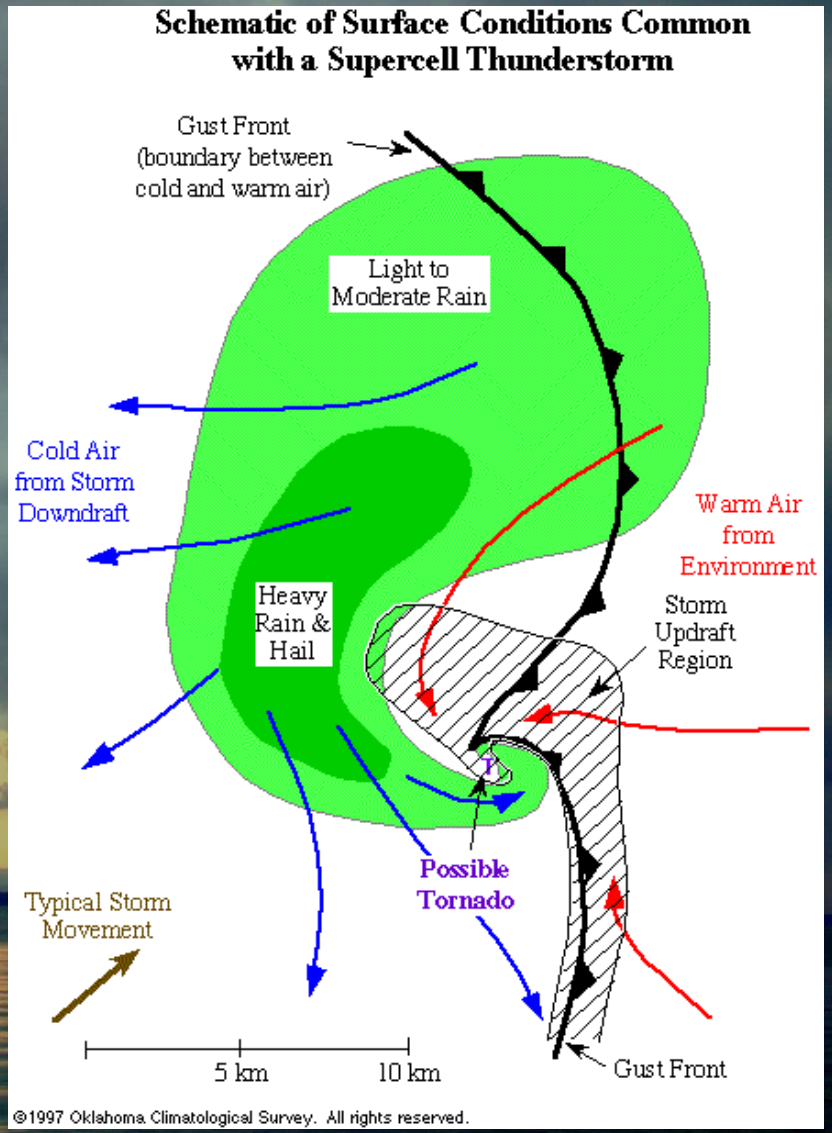
Supercells

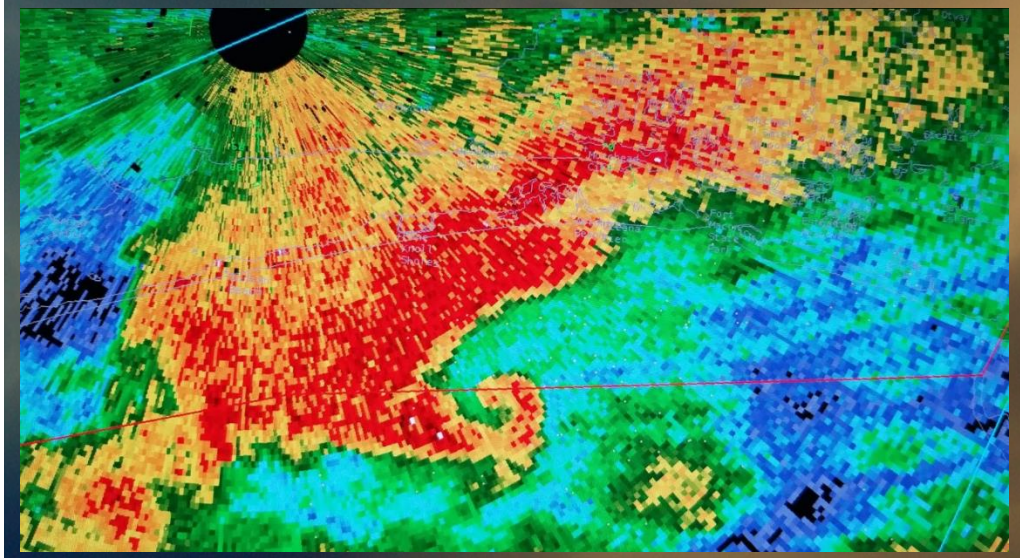
Most likely area for tornadoes and very strong updrafts (back side of storm).



Most likely area for stronger winds, rain, and hail (front side of storm).

Supercell from above, and on radar





Atlantic Beach EF-1 Tornado, November 13, 2018

"Hook Echo"

Tropical Tornadoes

- Landfalling or remnant systems
- Right front quadrant
- Leads to increase in fatalities and damage
- Majority or EF-0 or EF-1
- Often associated with rainbands
- Can occur day or night
- Often short lead time

Waterspouts

- Most common on summer mornings
- Can form from developing cumulus or thunderstorms
- Wind can reach 100 mph
- Difficult to detect on radar/difficult to warn for

Outer Banks waterspouts, August 2005

Tornadoes or Funnel Clouds…

- Do you have rotation?
- Does it extend to the ground?
- What is the damage like?
- Be clear about whether it is happening now or was it recently? Give a time.
- Is it over the water? Waterspout.

More Ways To Report
Twitter

Follow us
@NWSMoreheadCity

Example: @NWSMoreheadCity 1 Inch diameter hail in Cape Carteret at 4:25 pm

Funnel clouds? Hint: They are not rotating…

These are NOT funnel clouds. Don't be fooled by these non-rotating low hanging clouds (scud clouds)!!

The Enhanced Fujita Scale

Tornadoes are classified according to the intensity of *damage* they cause to objects

Scale	MPH	Expected Damage
EF0	65-85	Light
EF1	86 -109	Moderate
EF2	110-137	Considerable
EF3	138-167	Severe
EF4	168-199	Devastating
EF5	200-234	Incredible

EF3 Tornado Muhlenberg Cty, KY 2-5-08

How We Determine a Tornado

What Do We Do On These Storm Surveys?

The pattern of damage determines if it was a tornado NOT how much damage was caused.

Tornado damage often has a chaotic appearance, with larger uprooted trees often crossing each other.

Large Uprooted Trees In A Convergent Pattern (crossing each other)

We often look at larger uproots of trees to get a true idea of where the wind was blowing from. Smaller branches/snapped trees are not as helpful, as they may fail based on the tree itself and not where the wind was coming from.

Especially in our area, tornadoes AND microbursts can cause the same amount of damage.

We conduct surveys to find out exactly what happened. This helps us to improve our warnings for the future. This is also important for historical reference.

How We Determine a Microburst

What Do We Do On These Storm Surveys?

The pattern of damage determines if it was a tornado NOT how much damage was caused.

Large Uprooted Trees Flattened In A Similar Direction)

Microbursts can have wind speeds as high as 100 MPH!

Microburst damage often looks laid or flattened out. Larger uprooted trees point in the same direction, or a fan shaped (divergent pattern).

We use a compass, lined up with the trunk of an uprooted tree, to determine the wind direction.

We conduct surveys to find out exactly what happened. This helps us to improve our warnings for the future. This is also important for historical reference.

Spotter Quiz!

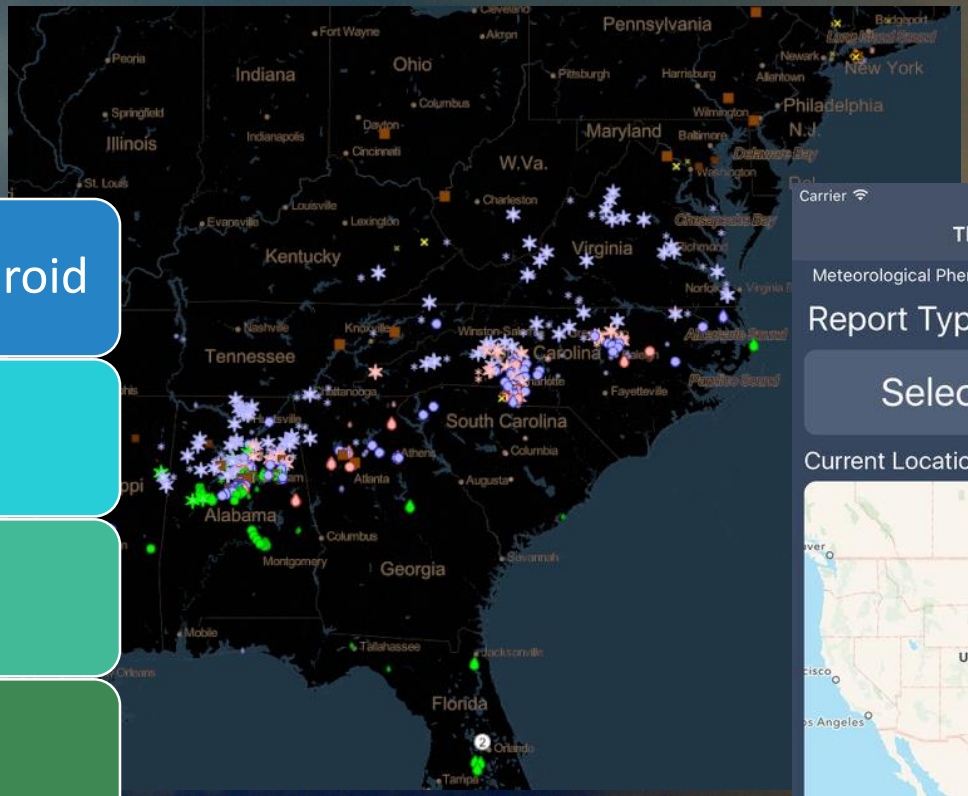
Tornado or funnel cloud?

Tornado or funnel cloud?

Debris at the ground indicates that the circulation aloft has reached the ground… making this a TORNADO!

mPING

- Available on iOS and Android
- Reports sent to NWS
- Reports are anonymous
- Very easy to use
- Website: https://mping.nssl.noaa.gov



REMEMBER - Your reports are *critical* so that the NWS can issue *life saving* warnings!

Our Warning Objectives:

- Issue warnings *before* severe weather occurs.

- *Don't issue* warnings for *non*-severe events.

MORE REPORTS = CLEARER PICTURE OF HOW WELL WE ARE DOING WITH OUR WARNINGS.

Real time reports are *crucial*, but even reports received the next day are *extremely* helpful.

CALL US WITH YOUR REPORTS: 1-800-889-6889

MYTH:

The NWS is already aware of the ongoing severe weather, so why should I report it?

THE TRUTH:

Greene County
4/25/14
Credit: WNCT

DON'T ASSUME **that the NWS knows for certain that severe weather is occurring! (especially at night!)**

MAKE THOSE REPORTS!

CALL:1-800-889-6889

When Should You Contact Us? Review

- Tornado or Funnel cloud (confirm rotation)
- Hail (any size)
- Wind damage- trees down, structural
- Flooding (closed roads, streams close to bankfull)
- Heavy rainfall (amounts of 2 inch or more in 24 hours or 2 inches in less than an hour).

Reporting Procedures Summary

1. Toll Free Number: 1-800-889-6889
2. E-mail: wxobs.mhx@noaa.gov
3. Facebook 
4. Twitter or send them directly to us @NWSMoreheadCity 
5. CoCoRaHS

When Should You Not Call Us?

- Non severe report (remember you should have wind damage if you are reporting strong winds)
- Non specific report (heavy rain without a measurement, it's really windy, etc).
- To report lightning.

What Else To Report?
Year Round Spotter

- Snowfall – take a few measurements in an area away from tall objects and does not drift to get an average. **Report snowfall to us in the nearest tenth of an inch.**

7.1”, 2.2”, etc

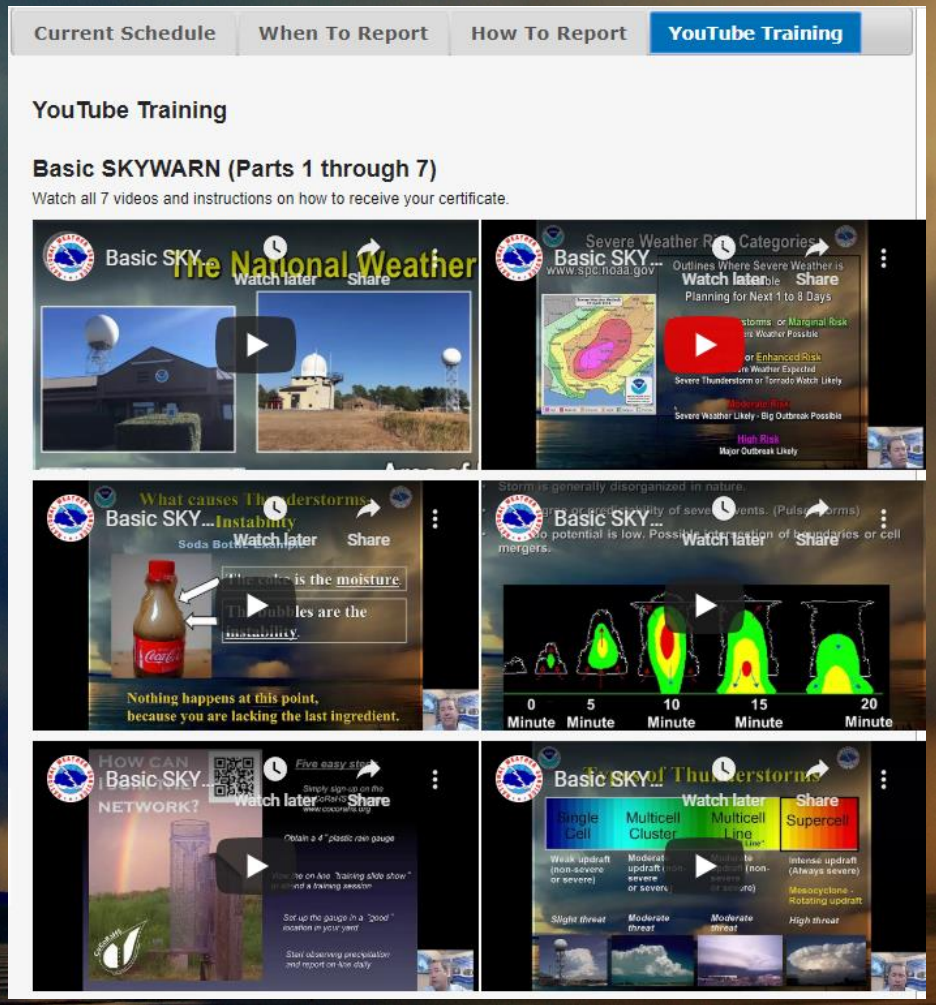
- Any accumulation of ice. What is it sticking to? Only the cars, only the sidewalks, etc. You can measure the thickness of the ice on branches (if you want). Just knowing the conditions though is the most important.

Future Classes

- We hold 4 SKYWARN classes throughout the year. **Basic Spring**, **Basic Winter**, Flood/Tropical SKYWARN, Advanced SKYWARN.
- We will **always** post future class information on our website **weather.gov/newport** at the top of the page. Also, we will post it on Facebook.
- Our goal is that you report to us year round (snow, hail, high winds, etc).

Keep Current

- Bookmark weather.gov/mhx/MHXSkywarn
- You can find YouTube training for both winter and spring skywarn
- You can also refresh yourself on when and how to report along with the current schedule



Thanks for Your Interest!

erik.heden@noaa.gov

www.weather.gov/newport