



NOAA

**National
Weather
Service**

Weather: Observations, Storms, & More!

Ian Boatman

Meteorologist | NWS Wilmington, NC

ian.boatman@noaa.gov





About the National Weather Service (NWS)



Observations & Thunderstorm Basics



Severe Thunderstorm Hazards & Safety



2026 Hurricane Season Preview & Updates



Rip Currents & Reporting



But First! Quick Story...

- Tonight is a full circle moment for me...
- This is Ilicia Martin from Kennesaw, GA. She came to volunteer here during Summer 2013, 2014, and 2015, in between semesters in high school.





What Are the Odds?

- We met on campus at the University of Georgia in October 2015. We got married in May 2025.
- I started my job here at NWS Wilmington, NC in December 2019. I couldn't point out Topsail on a map at that time.
- She had to stay behind in Athens to become Dr. Ilicia Martin, DVM. She followed in the footsteps of her mother, Dr. Holly Ogburn-Martin, DVM.
- Who could ever guess that we would end up in Wilmington, and that I'm giving this talk to y'all tonight?! Thank you for playing a role in inspiring her!





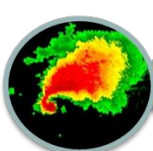
About the National Weather Service (NWS)

- The NWS is an agency within the National Oceanic and Atmospheric Administration (NOAA)
- NWS Wilmington, NC operates 24 hours/day, 7 days/week, and is 1 of 123 similar offices across the U.S. and its territories.
- Our mission: Provide weather, hydrologic, and climate forecasts and warnings for the U.S., its territories, adjacent waters, and ocean areas for the protection of life and property and enhancement of the national economy.





What Do We Do?



Highest Priority!
Warnings, Watches & Advisories for Hazardous Weather



7 Day Public Forecasts



5 Day Marine Forecasts



Aviation Forecasts



Fire Weather Forecasts



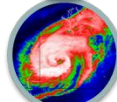
River Warnings



Beach/Rip Current Forecasts



Decision Support Services
(for core partners)



Tropical Cyclone Coordination



Climate Data



Upper-air Observations
**not at ILM*



Surface/Radar Observations



Community Outreach/Education

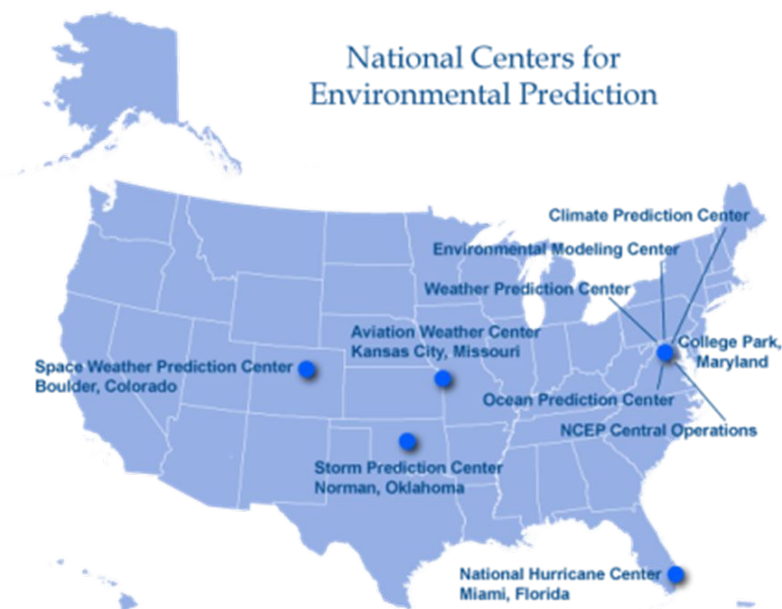
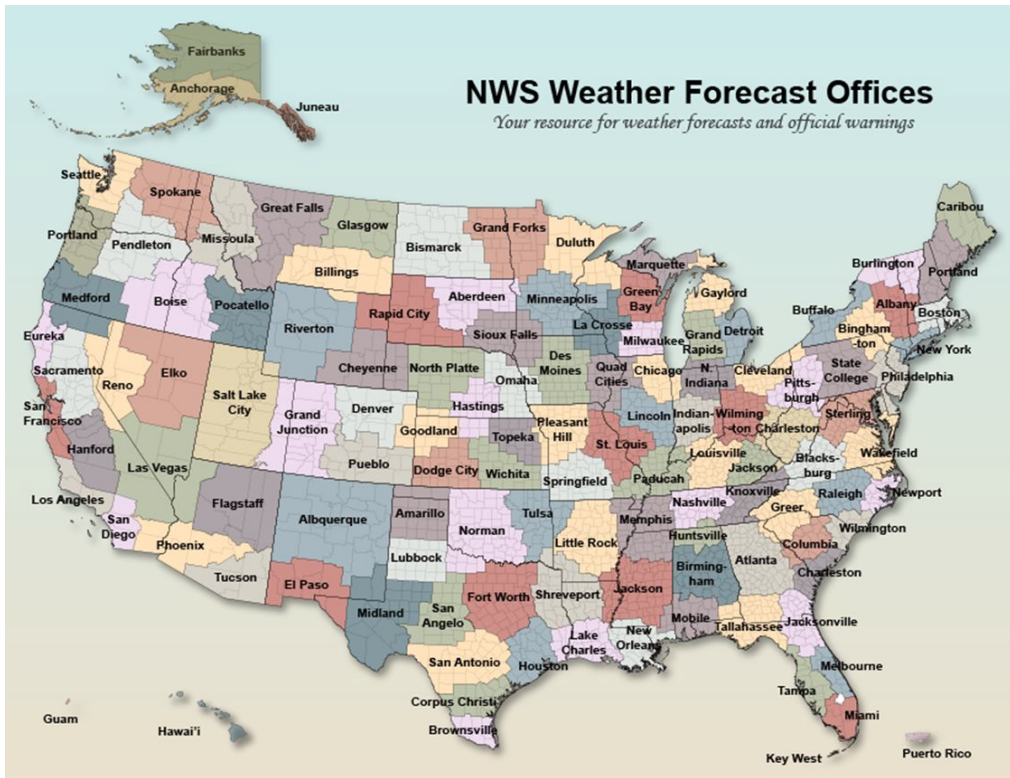


Scientific Research





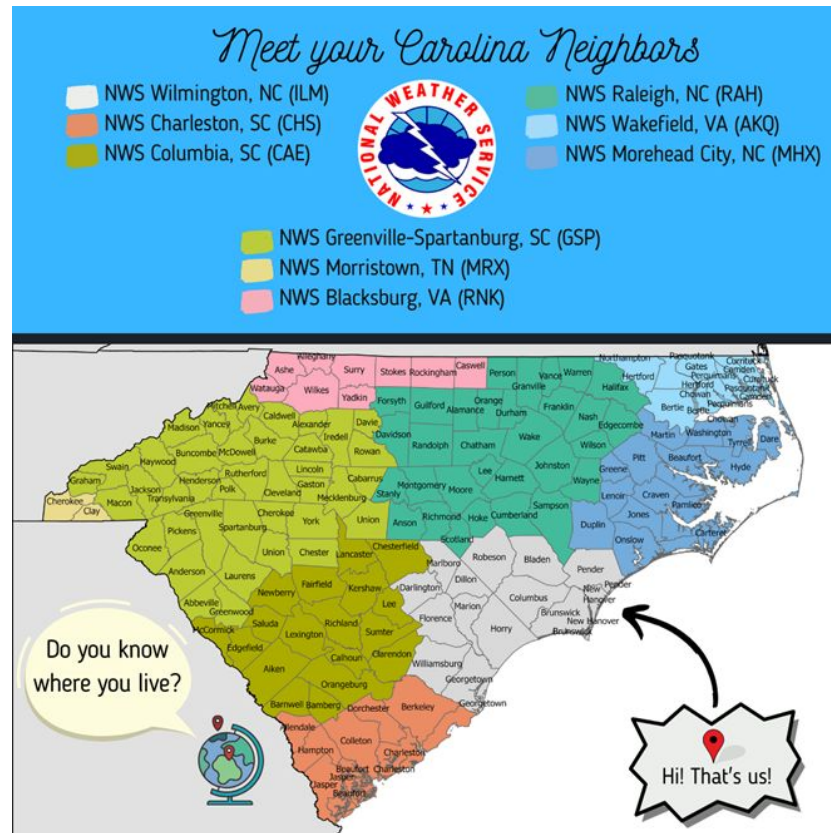
Weather Forecast Offices (WFOs) & National Centers





NWS Offices Across the Carolinas

- Fun fact: It takes 9 NWS offices to cover the Carolinas!
- We are in constant collaboration with each other to create a seamless weather observation and forecasting network for you!
- When in doubt: weather.gov/socialmedia





NWS Wilmington, NC County Warning Area (CWA)

- 122 Weather Forecast Offices (WFOs)
 - Wilmington, NC (ILM):
 - 14 counties (8 in northeast SC, 6 in southeast NC)
 - 4 “marine zones” (basically like their own counties)





NWS Wilmington, NC (ILM)





Surface Observations: Land & Sea

- There are many different types of land and ocean surface observations.
- The observations provide meteorologists with the current conditions, but over time, they are critical in determining the climate for a location or region.
- The first official weather observations in Wilmington were recorded in 1870 by the U.S. Signal Corps, at present day Floriana Italian Restaurant in downtown.





Atmospheric Observations: Radiosondes

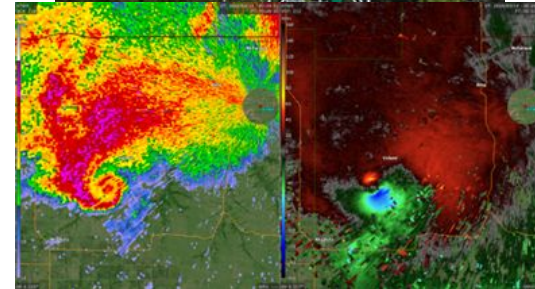
- A weather balloon consists of a heavy-duty balloon, a string, a parachute, and a radiosonde (the instrument that measures all the atmospheric parameters).
- Balloons are released twice a day, sometimes three times if bad weather is expected.
- There are over 900 locations worldwide that release weather balloons **at the same time (!!!)**, including 92 across the U.S. by the NWS.
- The typical balloon flight lasts 2 hours, can rise up to 100,000 ft (~20 miles), and can drift as far as 125 miles away.





Weather Surveillance Doppler Radar

- Did you know that the word “radar” is actually an acronym?
 - **R**adio **D**etection **a**nd **R**anging
- Doppler radar is designed to detect targets made of *water*, and is quite good at sensing things like severe thunderstorms and tornadoes.
 - Although, it can also detect other things, like birds!
- The radar works similarly to echolocation with bats, dolphins, and whales.

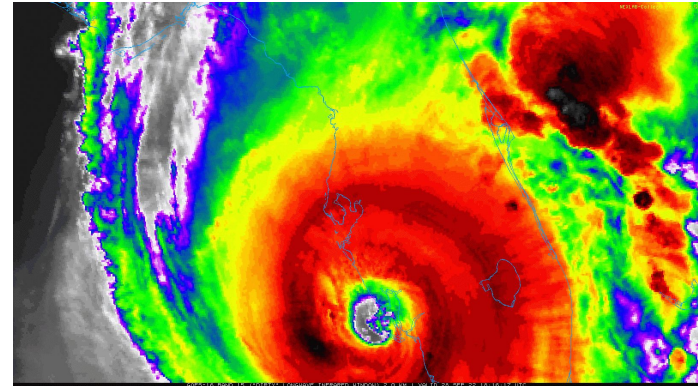




Polar Orbiting & Geosynchronous Satellites

- These satellites allow the NWS to monitor weather conditions around the clock.
- You might be most familiar with the Geostationary Operational Environmental Satellite (GOES).
 - We have two of these (GOES-East and GOES-West) that monitor the U.S. at all times.

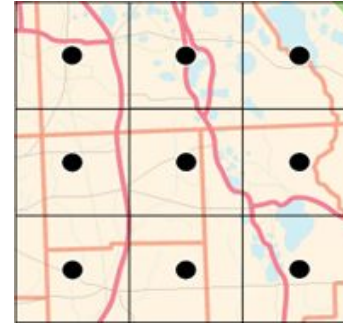
Hurricane Ian nearing
landfall over SW Florida,
28 September 2022



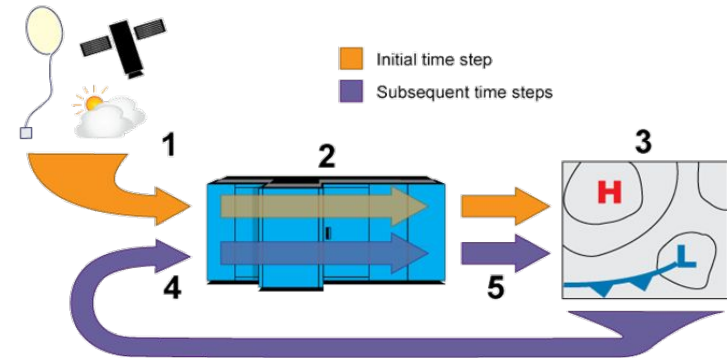


The Forecast Process: Weather Models

- Supercomputers are required to run weather forecast models.
- Observations from across the globe are “assimilated” into a grid.
- From the initial observations, complicated meteorological equations are solved at each point in the grid in 1-, 3-, or 6-hourly time steps.



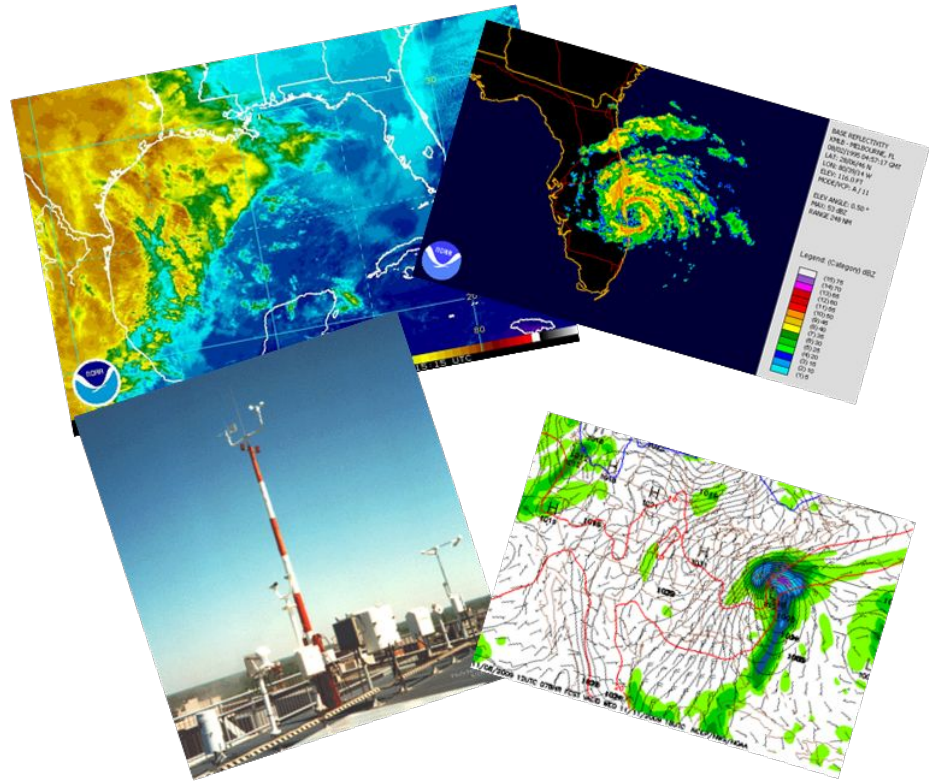
$$\left(\nabla_p^2 + \frac{f_0^2}{\sigma} \frac{\partial^2}{\partial p^2} \right) \omega = -\frac{f_0}{\sigma} \frac{\partial}{\partial p} [-\mathbf{V}_g \cdot \nabla_p (\zeta_g + f)] - \frac{R_d}{\sigma p} \nabla_p^2 (-\mathbf{V}_g \cdot \nabla_p T)$$





The Forecast & Warning Process

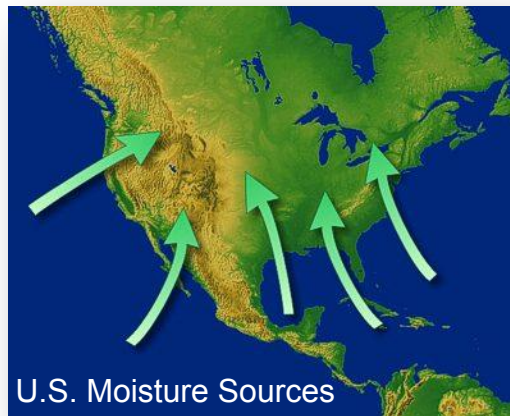
- All observations and model data are used by NWS meteorologists to issue a variety of forecasts.
- The data is also used to save lives and property during critical weather events (tornadoes, hurricanes, blizzards, etc.).
- All of these data are equally important. We simply could not do our jobs without any of it!





Thunderstorm Ingredients

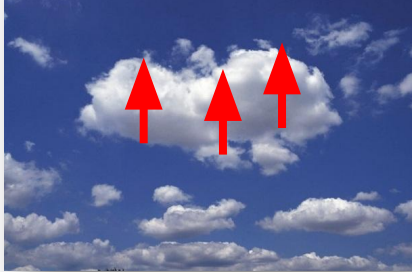
- Lifting mechanism
 - Cold front
 - Seabreeze
 - Mountain
- Instability
- Moisture





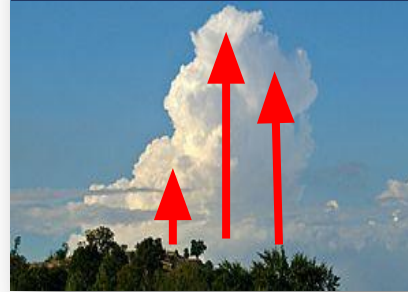
Thunderstorm Life Cycle

Cumulus Stage



- Weak updrafts (rising air)
- No precipitation
- Not all cumulus clouds reach to the next stage

Towering Cumulus Stage



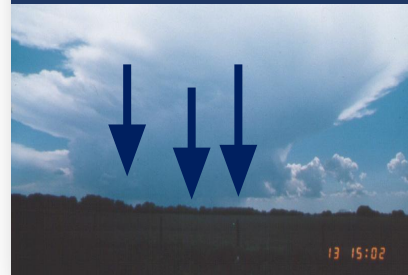
- Stronger updrafts
- If the instability is limited, then downdrafts could occur with precipitation (showers)

Mature Stage



- Updrafts (rising air) & downdrafts (sinking air)
- Severe weather most likely here, especially if the updrafts are very strong

Dissipating Stage



- Mostly downdrafts
- Severe weather risk is ending quickly
- The storm will "rain itself out," leaving debris clouds behind



Severe Weather Definitions

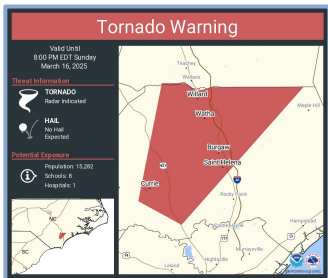
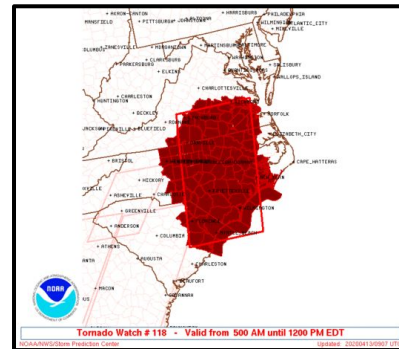


Severe Thunderstorm

Thunderstorm that produces 1+” diameter hail and/or winds $\geq$ 58 mph

Severe Thunderstorm/Tornado Watch

Conditions are favorable for adverse weather within the next several hours → “watch” for possible severe storms



Severe Thunderstorm/Tornado Warning

Adverse weather is imminent, or already occurring → take cover to remain safe, especially interior room on lowest floor





Severe Weather Definitions



Funnel Cloud

Violently rotating column of air that extends from the base of the thunderstorm cloud and is **not in contact with the ground.**

Tornado

Violently rotating column of air that extends from the base of the thunderstorm cloud and is **in contact with the ground.**



Microburst

Localized column of air sinking within a storm that can cause damage in an area less than 2.5 miles in diameter.



Thunderstorm Dangers



National Oceanic and
Atmospheric Administration
U.S. Department of Commerce

National Weather Service

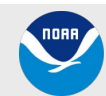


Lightning: Most Common Thunderstorm Hazard

- 50,000°F (5x hotter than the surface of the sun!!)
- Globally, there are 1.4 billion lightning strikes per year.
- Lightning strikes can occur many miles away from the heavy rain.
- We don't issue any warnings just for lightning.



When Thunder Roars – Go Indoors!!!!





Lightning: Myth vs. Fact



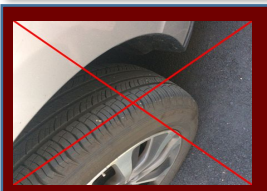
“Lightning is only attracted to metal!”

- Lightning is more likely to strike tall objects (not always metal)
- Don't stand near tall objects!
- Don't *be* the tall object!



“Lightning only strikes directly below the rain/hail!”

- Lightning can strike 10+ miles from the core of a thunderstorm (“bolt from the blue”)
- You are in danger if you can hear thunder.
- Wait 30 minutes from the last rumble of thunder before going back outside.



“Tires protect you from lightning!”

- The metal car frame can redirect lightning around the car, so don't touch metal surfaces.
- Tires do not keep you safe!



“You are 100% safe in a house!”

- While a house or 4-walled building is a safe place, you need to avoid electrical wiring and plumbing.
- Don't be “connected” to your house (playing with your phone on the charger, taking a shower, doing dishes, etc.)





Hail: Costliest Thunderstorm Hazard



- Vivian, SD – July 23, 2010
- 8 inch diameter
- 1 pound 15 ounces
- 18.62 inch circumference





Flooding: #1 Thunderstorm-Related Killer

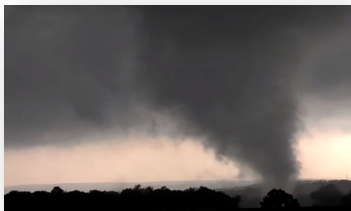


- ☒ **Never drive through flooded roads!**
- ☐ Never go near drainage ditches
- ☐ Be especially cautious at night



Tornadoes: The Enhanced Fujita (EF) Scale

EF Scale	Wind Speed	% Occurrence	% Deaths	Time/Path Length
EF-0 & EF-1	≤ 110 mph	75%	5%	~10 mins / < 3 mi
EF-2 & EF-3	111 - 165 mph	23%	25%	20+ mins / 15+ mi
EF-4 & EF-5	166 - 200+ mph	2%	70%	1+ hour / 50+ mi





Take Shelter When Severe Weather Threatens



Know Where to Go

When Sheltering from a Tornado



If you have no basement, move to an interior room with no windows.

Top floor rooms DO NOT protect you.

Exterior rooms and rooms with windows DO NOT protect you.

NO PLACE OUTSIDE is safe from a tornado.

Quickly move to your basement and bring your emergency supply kit.



weather.gov/tornado



National Oceanic and
Atmospheric Administration
U.S. Department of Commerce

National Weather Service



What To Do After a Storm

Check the forecast
to make sure the
threat has ended

Contact loved ones
by text or social media

Listen to local officials

Use flashlights, not candles

Watch for debris or downed
powerlines

After the Storm



weather.gov/tornado





2026 Hurricane Season Update



2026 Atlantic Tropical Cyclone Names

~~Arthur~~

Bertha

Cristobal

Dolly

Edouard

Fay

Gonzalo

Hanna

Isaias

Josephine

Kyle

Leah

Marco

Nana

Omar

Paulette

Rene

Sally

Teddy

Vicky

Wilfred

Be prepared: visit hurricanes.gov and follow NOAA's @NWS and @NHC_Atlantic on X.

May 2026





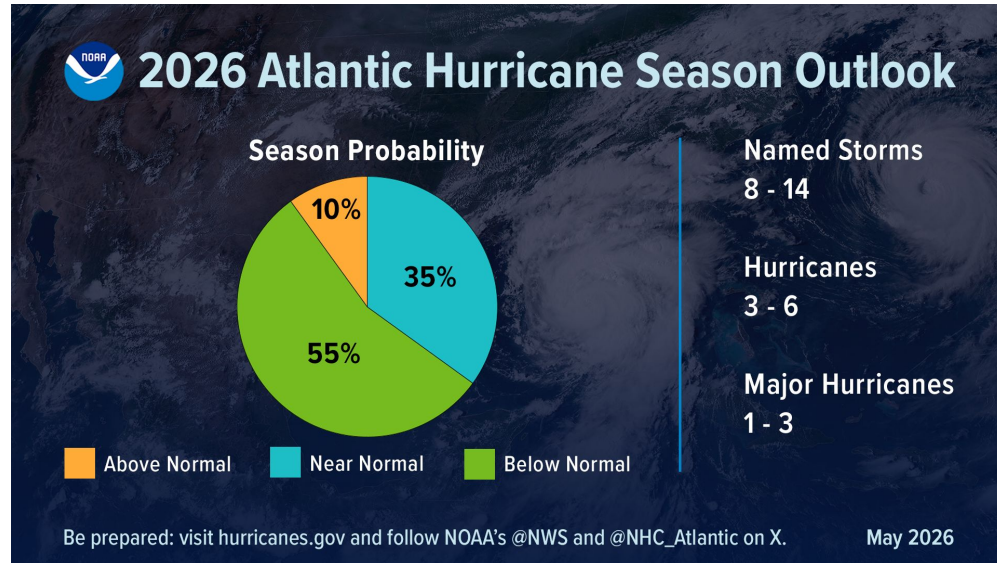
Nothing Out There at the Moment!





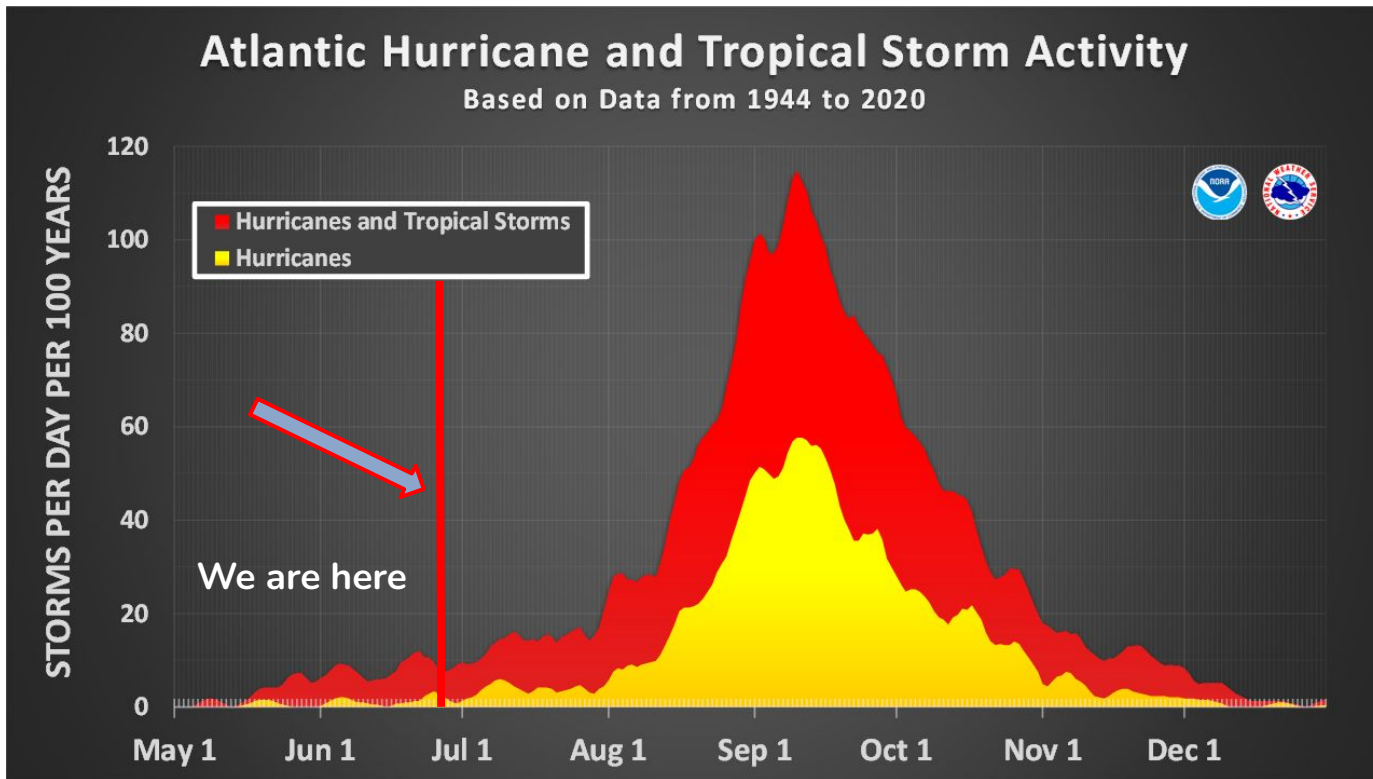
How the Forecast is Looking...

- We are expecting a below average hurricane season.
 - Why? El Niño!
 - El Niño = more wind shear in the Atlantic and Gulf = usually less hurricane activity
- Tropical Storm Arthur was the first named storm of the season. We'll see what happens from there...
- **DO NOT** let your guard down. Always be prepared. It only takes one. [Click here](#) to see our hurricane preparedness guide.





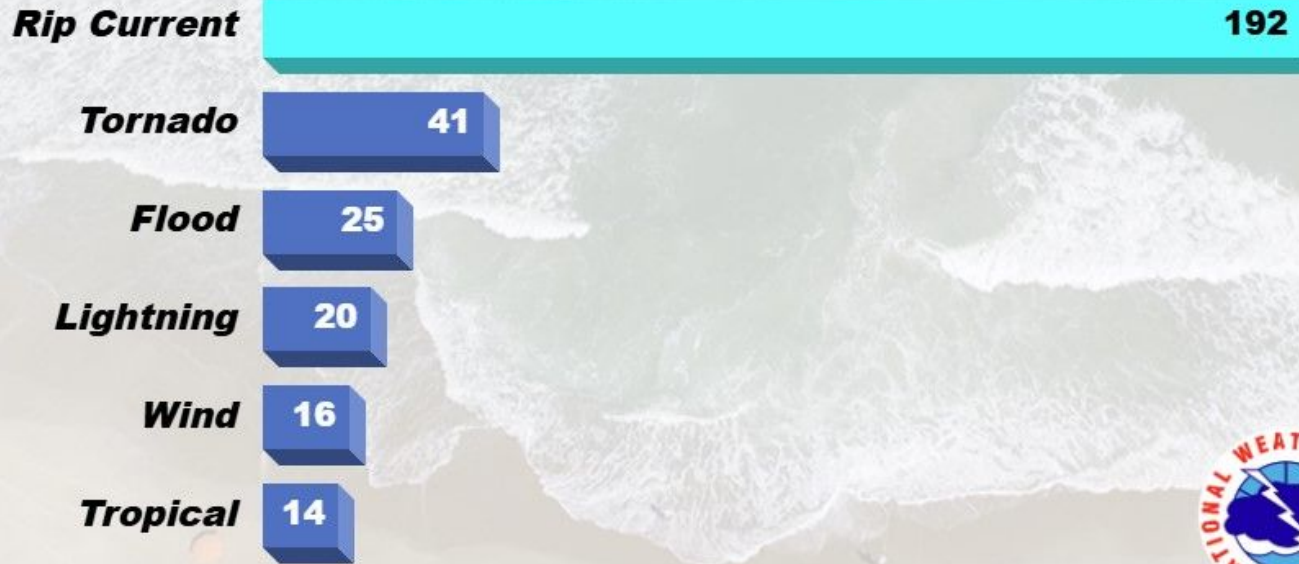
Long Season Ahead...





Beach Hazards: Rip Currents

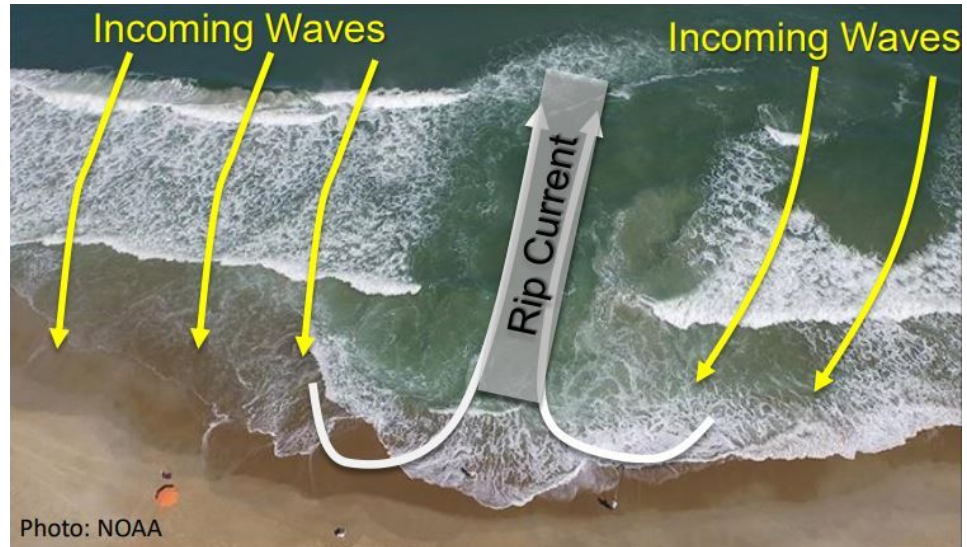
Coastal Carolinas Weather Fatalities 2000-2024





What Are Rip Currents?

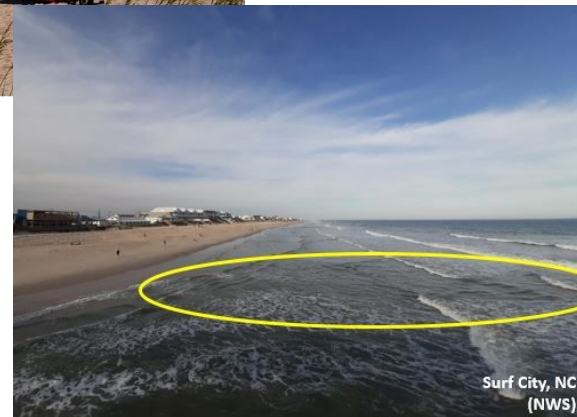
- Rip currents are strong, channelized currents of water that flow back into the ocean from the shoreline. They typically form at breaks in the sandbars, and near structures such as jetties and piers.
- Rip currents *do not* pull people under the water; they pull people away from shore.
- Rip currents typically move at 1-2 feet/second, but have been measured as fast at 8 feet/second... **faster than an Olympic swimmer!**





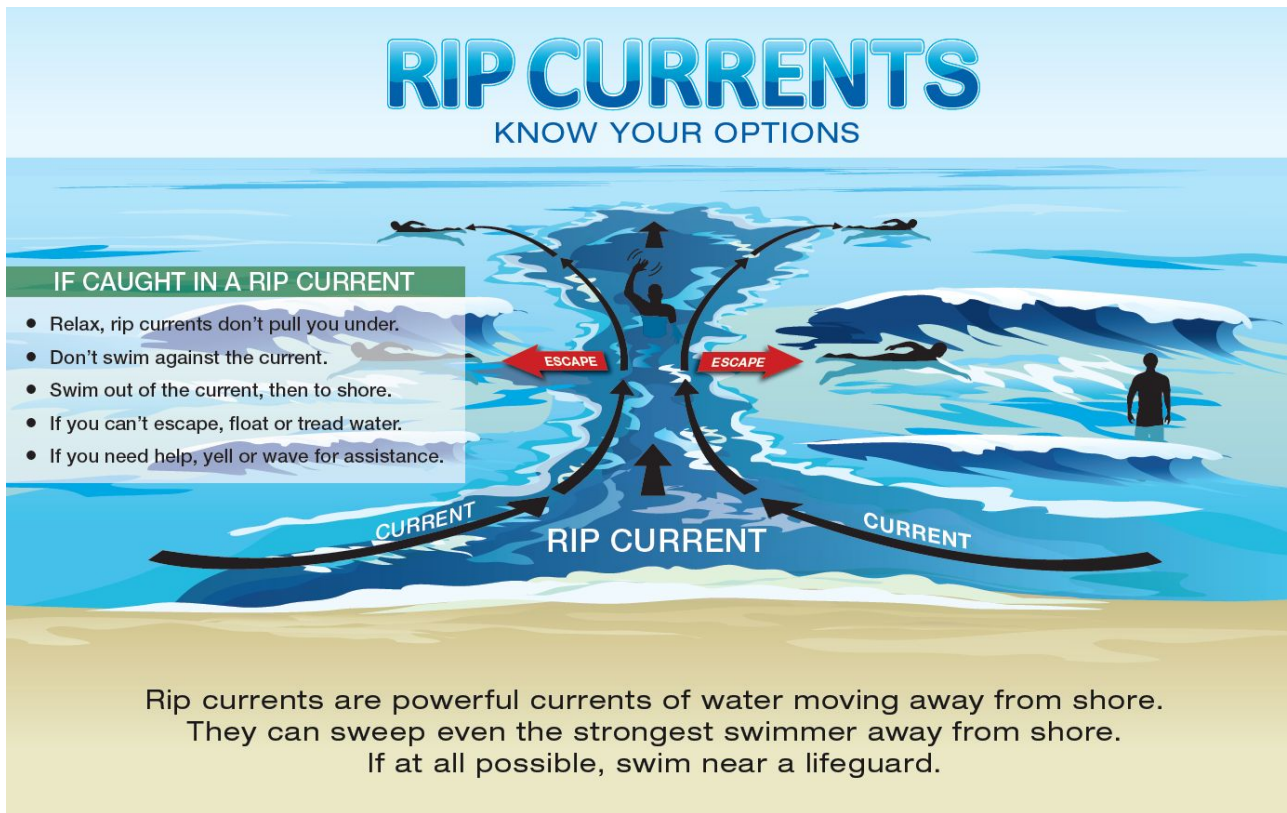
How Do You Spot a Rip Current?

- A narrow gap of darker, seemingly calmer, water between areas of breaking waves and whitewater.
- A channel of churning, choppy water.
- A difference in water color.
- A line of foam, seaweed, or debris moving seaward.





How Do You Survive a Rip Current?





Surf Zone Forecast (SRF)

- We provide a beach, surf, and rip current forecast from April 1 - October 31 ([weather.gov/beach/ilm](https://www.weather.gov/beach/ilm)).
- More information about this program can be found here:
<https://www.weather.gov/media/ilm/ILMSurfProductsGuide.pdf>
- Components of the SRF:
 - Rip Current Risk
 - Surf Height
 - Weather
 - UV Index
 - Water Temperature
 - Tides
 - Remarks: Longshore Currents
 - Extended Forecast

Surf Zone Forecast
National Weather Service Wilmington NC
1049 AM EDT Wed Aug 21 2024

NCZ106-220300-
Coastal Pender-
Including the beaches of Surf City and Topsail Beach
1049 AM EDT Wed Aug 21 2024

.REST OF TODAY...
Rip Current Risk*.....Low.
Surf Height.....2 to 3 feet.
Thunderstorm Potential**....None.
Waterspout Risk*.....None.
UV Index**.....Very High.
Water Temperature.....In the lower 80s.
Weather.....Sunny.
High Temperature.....Around 80.
Winds.....Northeast winds 10 to 15 mph.
Tides...
Topsail Inlet.....Low at 03:12 PM EDT.
Remarks.....None.

.THURSDAY...
Rip Current Risk*.....Low.
Surf Height.....1 to 2 feet.
Thunderstorm Potential**....None.
Waterspout Risk*.....None.
Weather.....Sunny.
High Temperature.....In the upper 70s.
Winds.....Northeast winds 10 to 15 mph.
Tides...
Topsail Inlet.....High at 10:00 AM EDT.
Low at 04:07 PM EDT.
Remarks.....None.

.EXTENDED...
.FRIDAY...Rip risk is moderate. Surf height 2 to 3 feet. Sunny.
Highs in the lower 80s. South winds around 5 mph.
.SATURDAY...Rip risk is low. Surf height 1 to 2 feet. Sunny.
Highs in the lower 80s. Southeast winds around 10 mph.
.SUNDAY...Rip risk is low. Surf height 1 to 2 feet. Mostly sunny.
Highs in the lower 80s. Southeast winds around 10 mph.





Staying Informed

Local Briefing Page



Daily 5-Day Weather Briefing for Northeast SC & Southeast NC

National Weather Service Wilmington, NC - Issued: 9:55 AM Wednesday February 4, 2026

Key Messages:

- A relatively weak storm system will bring rain through tonight.
- Some light freezing rain may occur on the backside of this system early Thursday morning, but no impacts are expected.
- Forecast dries out by midday Thursday, remaining that way through the weekend. Temperatures remain below seasonal norms.

NWS Wilmington, NC
Regional Alerts
Updated: Feb 4, 9:30 AM EST
[Winter Weather Advisory](#)
Affected Areas:
• Robeson; Bladen; Inland Pender

5-Day Regional Forecast

[Click Here for Your Detailed Forecast](#)

Today



Highs: 47° - 55°
Lows: 30° - 35°

Thursday



Highs: 39° - 42°
Lows: 22° - 28°

Friday



Highs: 49° - 53°
Lows: 30° - 36°

Saturday



Highs: 48° - 53°
Lows: 22° - 28°

Sunday



Highs: 47° - 53°
Lows: 29° - 36°

ISSUED DAILY BY: 11 AM

weather.gov/ilm/briefing

DO NOT USE AFTER: 9:00 AM Thursday February 5, 2026



National Oceanic and
Atmospheric Administration
U.S. Department of Commerce



[@nwsilmington](https://weather.gov/ilm)

National Weather Service
Wilmington, NC

<https://www.weather.gov/media/ilm/DssPacket.pdf>

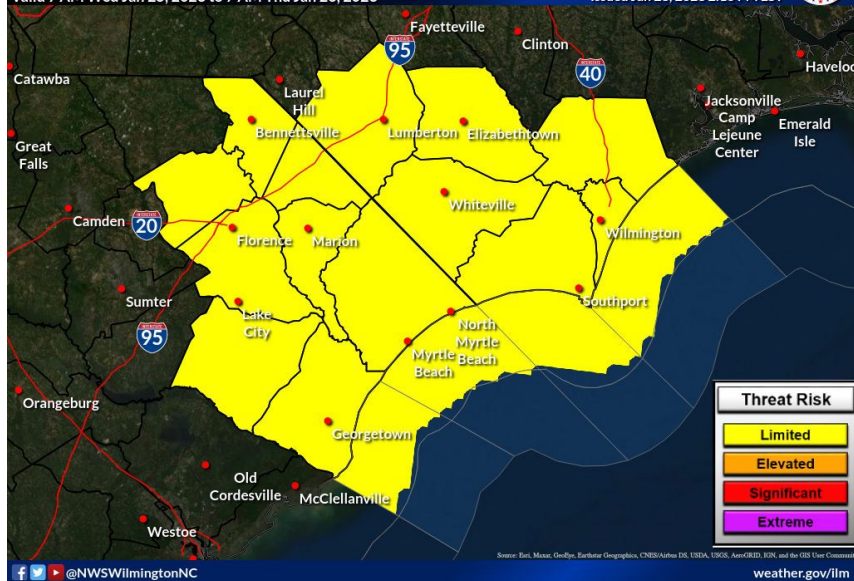
Local Graphical/Text Hazardous Weather Outlooks

Severe Thunderstorm Risk for Wed/Wed Night

Valid 7 AM Wed Jan 25, 2023 to 7 AM Thu Jan 26, 2023

Weather Forecast Office
Wilmington, NC

Issued Jan 23, 2023 2:10 PM EST



weather.gov/erh/ghwo?wfo=ilm



National Oceanic and
Atmospheric Administration
U.S. Department of Commerce

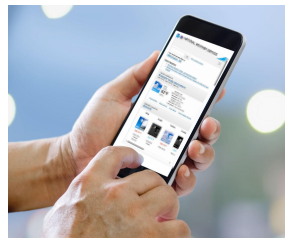
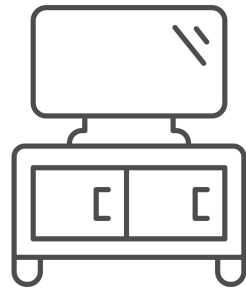
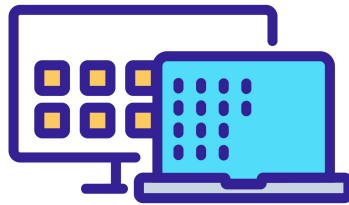
National Weather Service



Staying Informed

❖ Get updated forecasts:

- weather.gov/ilm
- @NWSWilmingtonNC
 - On Facebook, X, and Instagram
- NOAA Weather Radio
- Local Media





Links & Webpages of Interest

- NWS Wilmington, NC Webpage: <https://www.weather.gov/ilm>
 - Daily Weather Story: <https://www.weather.gov/ilm/weatherstory>
 - Latest Weather Briefing: <https://www.weather.gov/media/ilm/DssPacket.pdf>
- Which NWS Office Serves You: <https://www.weather.gov/socialmedia>
- Storm Prediction Center (SPC): <https://www.spc.noaa.gov/>
 - Custom SPC Outlooks: <https://www.spc.noaa.gov/partners/outlooks/>
 - SC SPC Outlooks: <https://www.spc.noaa.gov/partners/outlooks/state/SC/>
 - NC SPC Outlooks: <https://www.spc.noaa.gov/partners/outlooks/state/NC/>
 - Outlook Category Definitions: https://www.spc.noaa.gov/new/images/SPC_outlook_final_updated.png
- National Hurricane Center (NHC): <https://www.nhc.noaa.gov>
- Live Radar Imagery: <https://radar.weather.gov>
- Live Satellite Imagery: <https://www.star.nesdis.noaa.gov/GOES/>
- Beach, Surf, & Rip Current Forecast: <https://www.weather.gov/beach/ilm>
 - Local Surf Forecast Products Guide: <https://www.weather.gov/media/ilm/ILMSurfProductsGuide.pdf>
 - Carolinas Rip Current Awareness: <https://www.weather.gov/ilm/ripcurrents>
- Local Tropical Weather Page: <https://www.weather.gov/ilm/tropical>
 - Hurricane Preparedness Guide: arcg.is/9ymv1
- Build an Emergency Preparedness Kit: <https://www.ready.gov/kit>



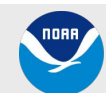


That's All I Got!

THANK YOU 😊

Email me if you have any questions:

ian.boatman@noaa.gov



National Oceanic and
Atmospheric Administration
U.S. Department of Commerce

National Weather Service