



Winter SKYWARN Spotter Program

National Weather Service
Gray, ME

Presented By:

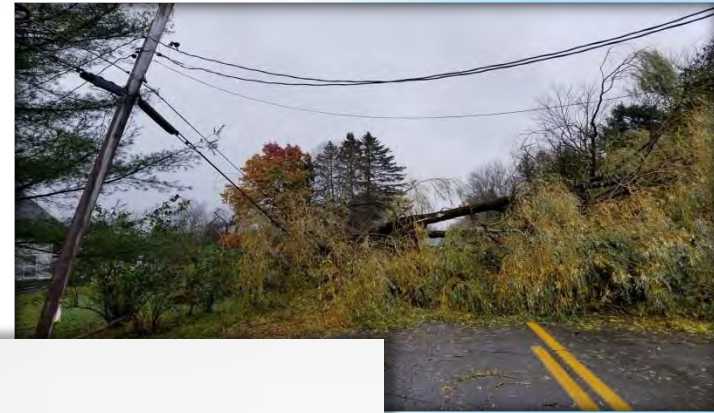
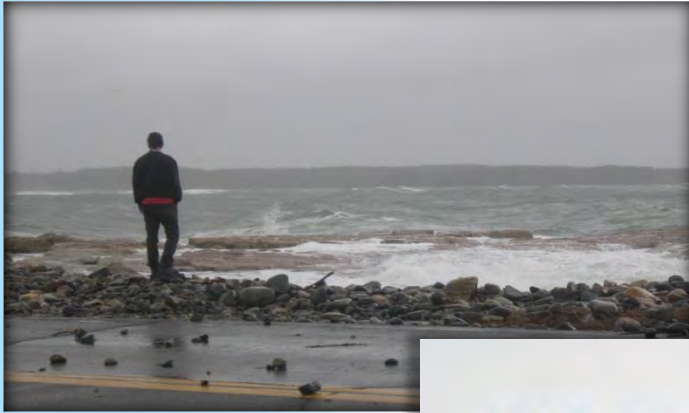
Mike Cempa

Lead Meteorologist



Overview

- Why do We Need Spotters?
- National Weather Service Watch/Warning Process
- Winter Weather Patterns and Seasonal Snowfall
- Precipitation Types and What Causes them
- Blowing Snow
- Coastal Erosion
- Ice Jams
- Measuring Winter Weather Phenomenon
- What to Report & How
- CoCoRaHS
- Winter Driving Safety



NWS Mission

Provide weather, water, and climate data, forecasts and warnings for the protection of life and property and enhancement of the national economy.

NWS Vision

A Weather-Ready Nation: Society is prepared for and responds to weather-dependent events.

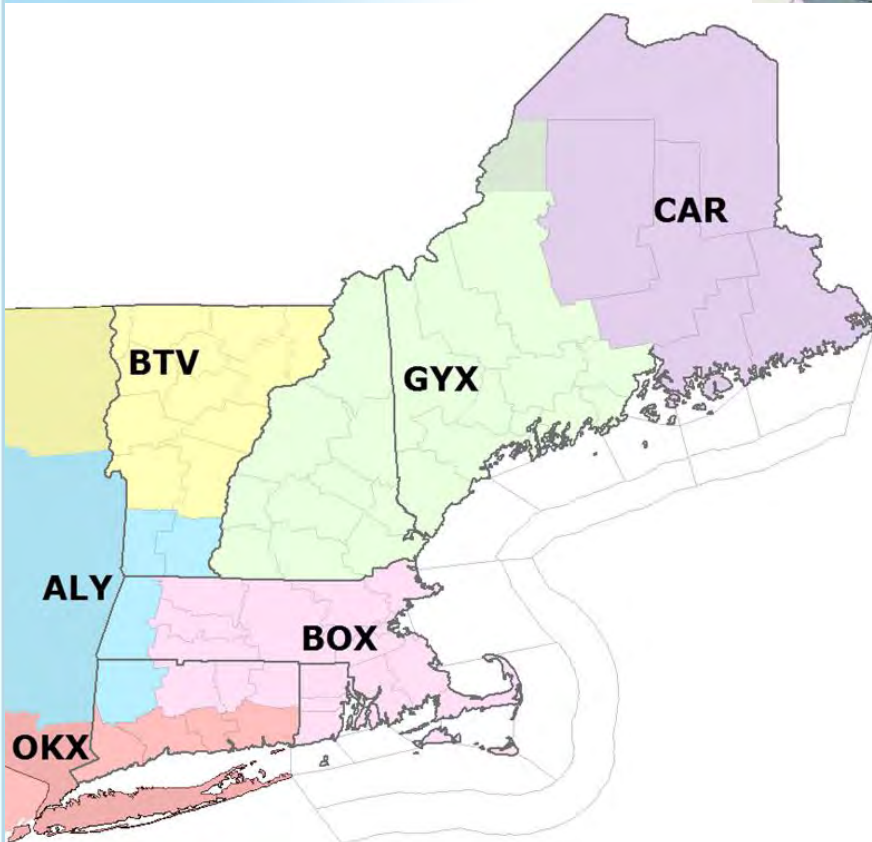




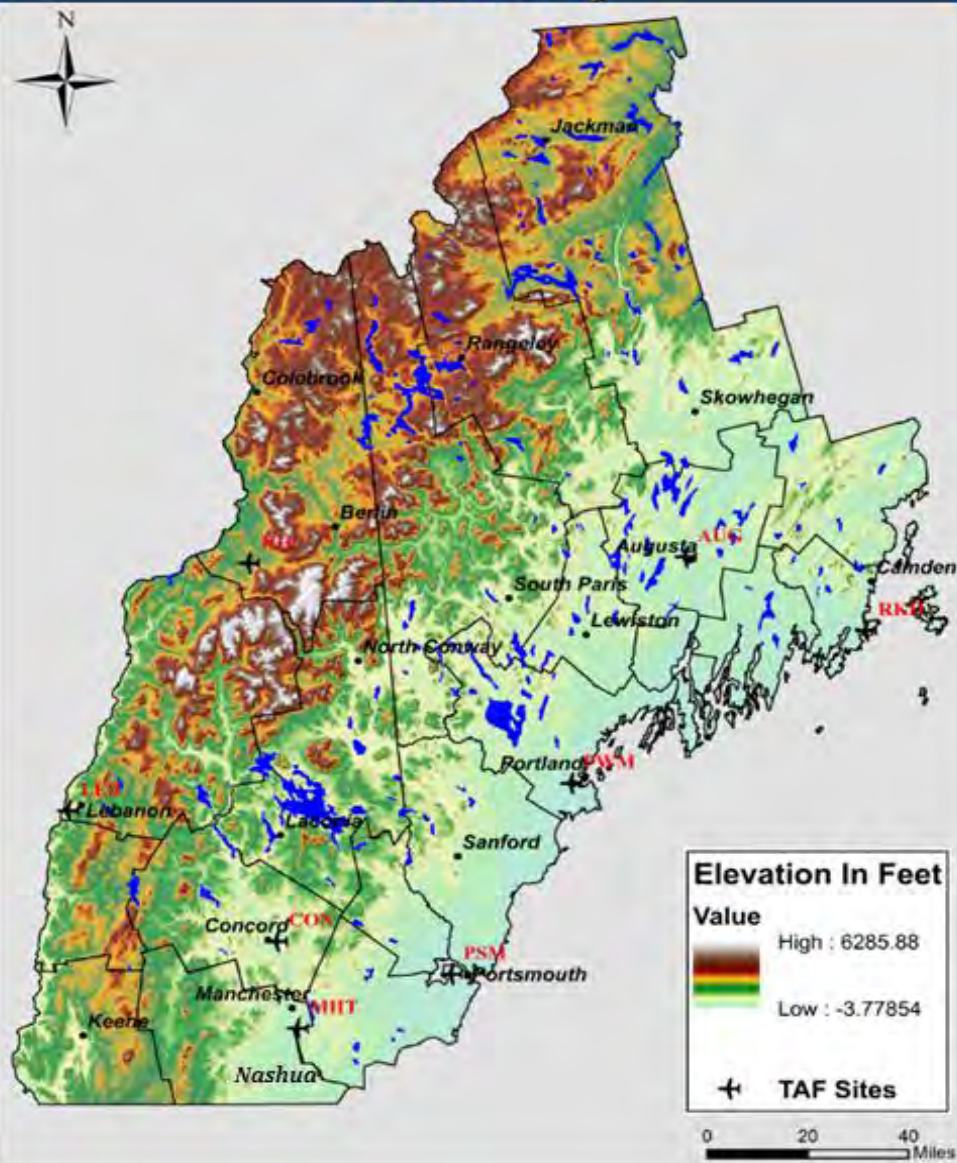
With 122 Weather Forecast Offices, 13 River Forecast Centers, nine National Centers, and other support offices, the NWS collects and analyzes more than 76 billion observations and releases about 1.5 million forecasts and 50,000 warnings each year. Forecasters build their forecasts with observations from surface stations, weather balloon readings and satellite data that feed numerical weather, water and climate models whose output is analyzed and scrutinized using individual scientific expertise. Forecasters communicate this information and potential impacts to the public, emergency managers, and other core partners to help make decisions that save lives and protect property.



NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION



NWS Gray



Our Area of Responsibility

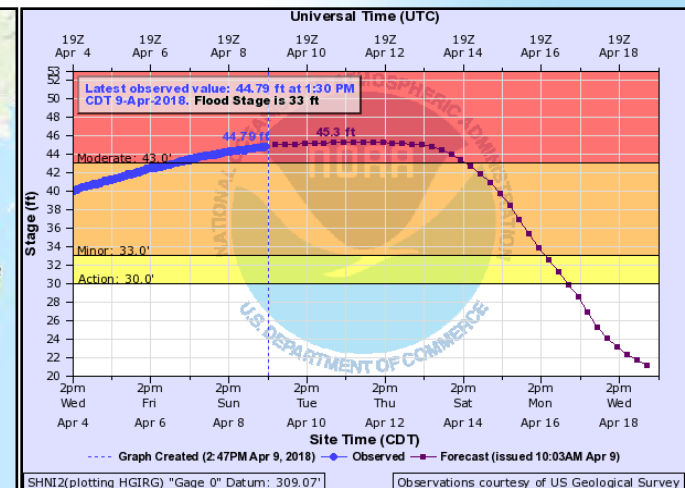
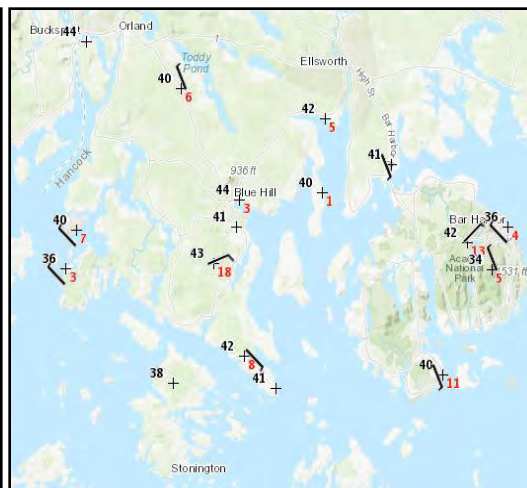
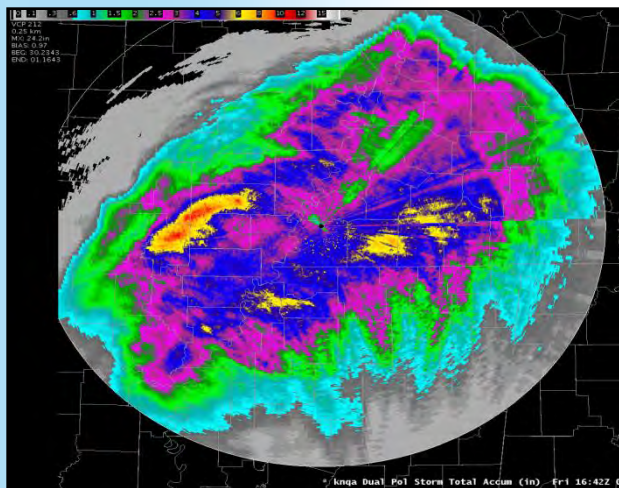
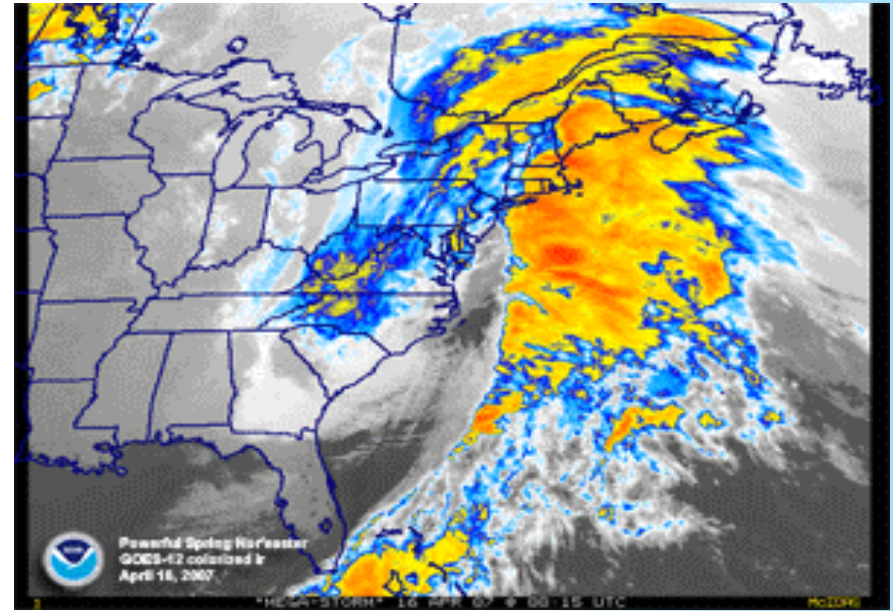
- Hazardous weather warnings, watches, and advisories
- 24/7 Decision support for various government agencies
- Aviation, Marine, Hydrology, Tropical, Winter, Severe & Fire Weather forecasts
- 7 day forecasts for public/media
- Storm damage surveys, storm reviews
- Data gathering and climate services

SKYWARN® spotters provide lifesaving information for all types of environmental hazards. However, the main responsibility of a spotter is to report severe local storms. More than 10,000 severe thunderstorms, 5,000 floods and 1,000 tornadoes occur in the U.S. during an average year. If that weren't enough, spotters are also trained on warning signs for snowfall, earthquakes, landslides, avalanches, volcanic ash fall, and coastal hazards such as tsunamis, water spouts and rip currents.

Since the program started in the 1960s, SKYWARN® information, coupled with Doppler radar technology, improved satellite data and other resources, has enabled NWS to issue more timely and accurate warnings for tornadoes, severe thunderstorms and flash floods.

SKYWARN® storm spotters form the Nation's first line of defense against severe weather. The efforts of these volunteers give communities the precious gift of time – seconds and minutes that can help save lives.



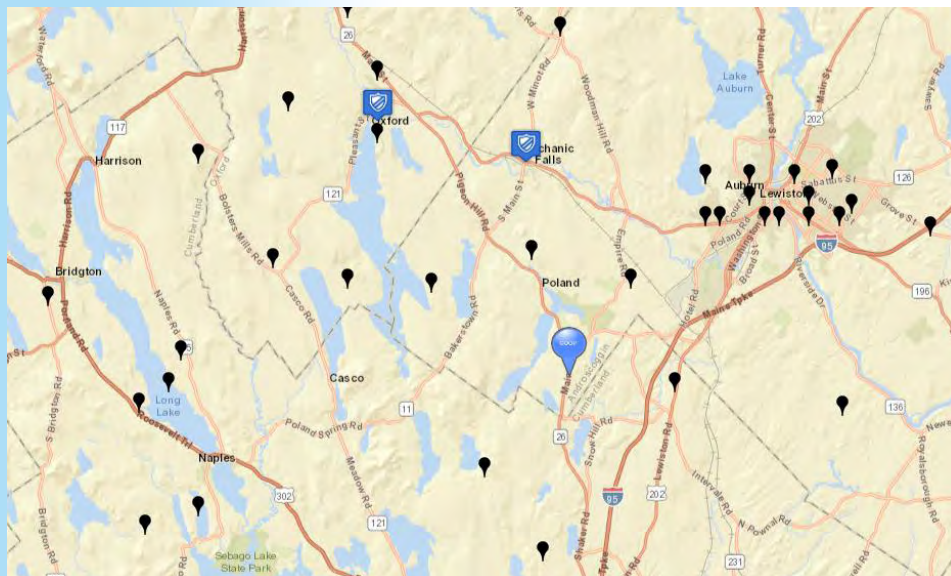
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The view from the weather spotter



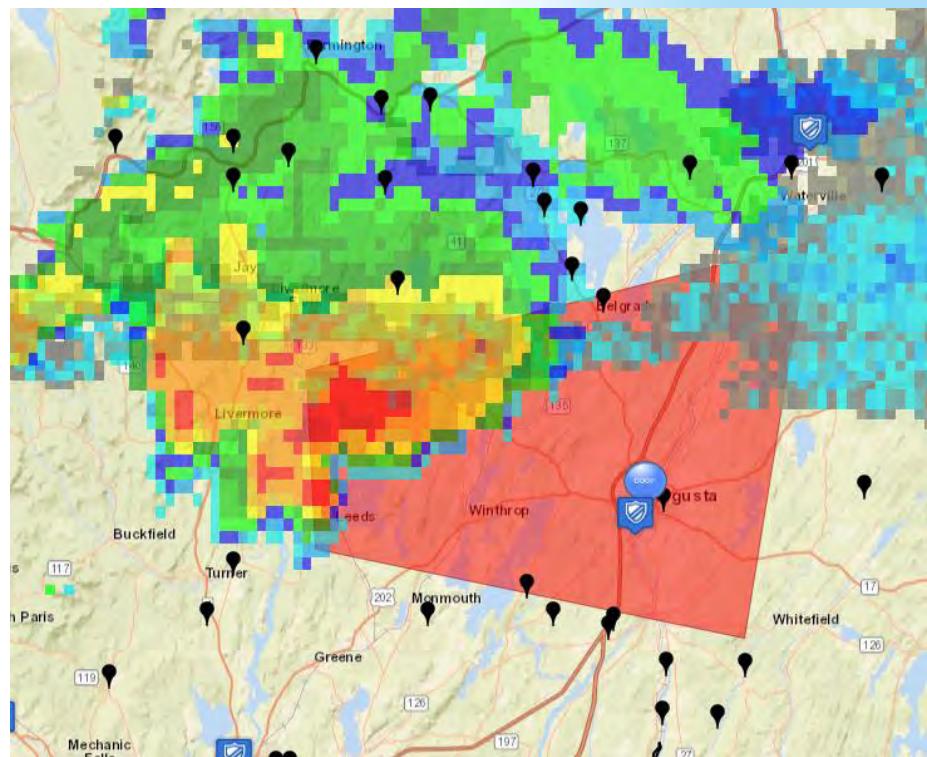
How the Program Works

- Once trained the weather spotter gets assigned a spotter # and certificate.
- Contact information is entered into our internal spotter database.



How the Program Works

- During active weather we activate our spotters and have them contact us with significant weather.
- We also directly contact spotters that we think have experienced significant weather.



What Do We Do With The Reports

- Most important; real time reports help us in our warning decision process
 - For example, spotter confirms 5" of snowfall
 - Report of heavier snowfall accumulation or heavy snowfall rates could prompt us to issue a warning product.



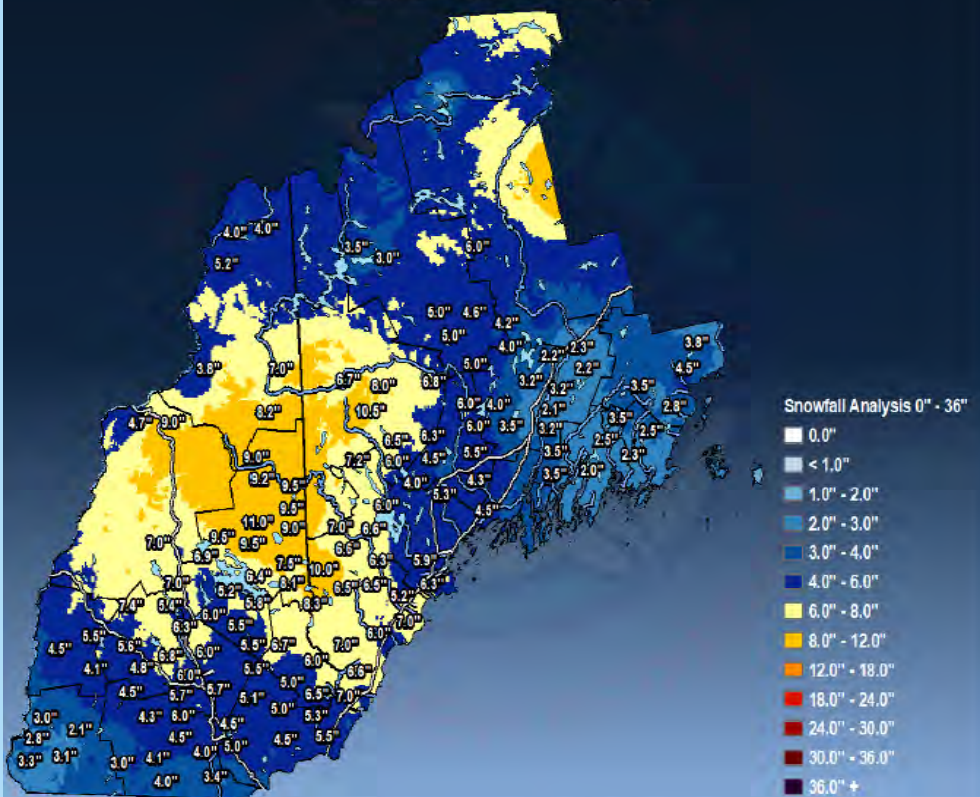
What We Do With The Reports

- Verification of our warnings and historical storm data reports.

National Weather Service Gray/Portland Maine

Snowfall Reports

Data Source: Regional Observations(PNS)



This is an experimental product. Care should be taken in using the data. Unofficial observations are plotted. Values at interpolated locations may not represent actual precipitation totals at that location.

*****STORM TOTAL SNOWFALL*****

LOCATION	STORM TOTAL SNOWFALL /INCHES/	TIME/DATE OF MEASUREMENT	COMMENTS
MAINE			
...Androscoggin County...			
1 W Leeds	6.0	545 AM 1/30	CoCoRaHS
2 W Leeds	6.0	1059 AM 1/30	CoCoRaHS
2 E Lewiston	5.5	653 AM 1/30	Trained Spotter
1 E Livermore Falls	5.0	700 AM 1/30	Co-Op Observer
1 WNW Auburn	4.5	700 AM 1/30	CoCoRaHS
Durham	4.3	700 AM 1/30	Co-Op Observer
Turner	4.0	700 AM 1/30	Co-Op Observer
Poland	4.0	700 AM 1/30	Co-Op Observer
1 ENE Lisbon Falls	3.8	846 AM 1/30	Trained Spotter
2 WNW Auburn	2.0	1008 PM 1/29	Trained Spotter
...Cumberland County...			
3 NNW Bridgton	7.2	700 AM 1/30	Co-Op Observer
1 SSW South Portland	6.3	956 AM 1/30	Trained Spotter
6 SSW Naples	6.0	900 AM 1/30	CoCoRaHS
1 N North Deering	5.9	909 AM 1/30	NWS Employee
1 E Yarmouth	5.8	1057 AM 1/30	CoCoRaHS
2 NE Scarborough	5.6	715 AM 1/30	CoCoRaHS
South Portland	5.6	739 AM 1/30	Social Media
3 SSE New Gloucester	5.3	1055 AM 1/30	CoCoRaHS
2 SSE New Gloucester	5.3	700 AM 1/30	CoCoRaHS
2 SSW Cumberland	5.0	709 AM 1/30	Trained Spotter
3 SSE Gorham	5.0	959 AM 1/30	Trained Spotter
3 WNW Falmouth	5.0	1058 AM 1/30	CoCoRaHS
Cumberland Center	4.9	713 AM 1/30	NWS Employee
Portland Jetport	4.8	714 AM 1/30	ASOS
Westbrook	4.8	744 AM 1/30	NWS Employee
3 WSW Falmouth	4.6	700 AM 1/30	CoCoRaHS

What We Do With the Reports

- Local Storm Reports are sent to the media and can be used in some cases for disaster declarations.

NWUS51 KGYX 201144
LSRGYX

PRELIMINARY LOCAL STORM REPORT
NATIONAL WEATHER SERVICE GRAY ME
643 AM EST SUN JAN 20 2019

..TIME...	...EVENT...	...CITY LOCATION...	...LAT.LON...
..DATE...	...MAG....	..COUNTY LOCATION..ST..	...SOURCE....
..REMARKS..			
0643 AM	SNOW	HOPE	44.27N 69.16W
01/20/2019	M7.5 INCH	KNOX	ME TRAINED SPOTTER

&&

EVENT NUMBER GYX1900552

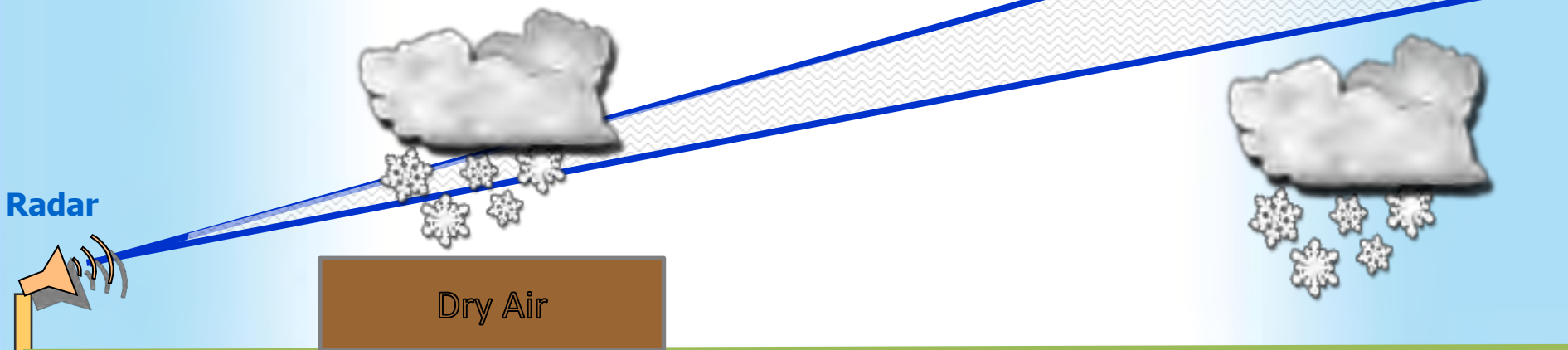
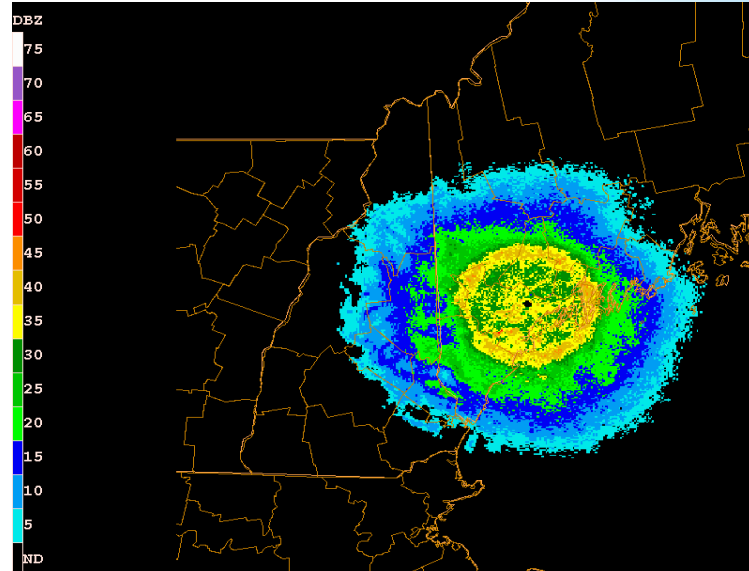
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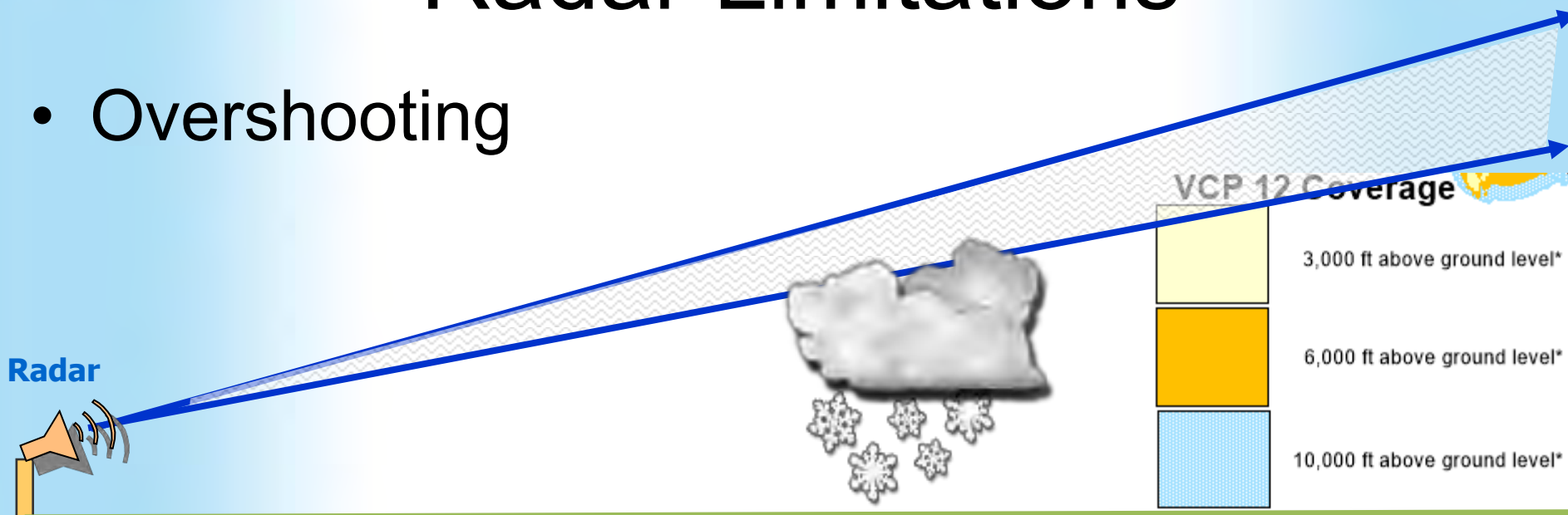
Radar Limitations

- Evaporation
- Bright Banding



Radar Limitations

- Overshooting











Watch/Warning Process

Day 4-7 Time-Frame

Hazardous Weather Outlook (HWO)

- **30% chance** or greater that local warning or advisory criteria will be met, the details will be included in the HWO.
- **Confidence** at this point can be **low** and again this is just an outlook.

Click a location below for detailed forecast.



[Watches, Warnings & Advisories](#)

[Gale Warning](#)

[Gale Watch](#)

Last Map Update: Tue, Oct. 16, 2018 at 3:26:15 pm EDT

Day 1-3 Time-Frame

Watch

- Issued 24 hours to as much as 72 hours in advance.
- Anytime there is a **50% chance** or greater that local warning criteria will be met or exceeded.
- **Confidence** at this point is **medium** and a watch means these conditions are possible.
- Examples include: **Winter Storm** Watches, **Wind Chill** Watches, etc.

Watch / Warning Process

Day 1-2 Time-Frame

Warning

- Issued 12 hours to as much as 36 hours in advance.
- Anytime there is a **80% chance** or greater that local warning criteria will be met.
- Potential for **life threatening conditions, confidence is high.**
- Examples include **Winter Storm** Warnings, **Blizzard** Warnings, **Wind Chill** Warnings.

Day 1-2 Time-Frame

Advisory

- Issued 12 hours to as much as 36 hours in advance.
- Anytime there is **an 80% chance** or greater that local advisory criteria will be met or exceeded.
- More of a **nuisance, confidence is high.**
- Examples include **Winter Weather** Advisory, and **Wind Chill** Advisories.

Day 1 Time-Frame

Snow Squall Warning

- Issued now up to 45 minutes.
- Issued when a snow squall is observed on radar/satellite.
- Life threatening conditions occurring or about to occur, confidence is high.

Special Weather Statement

- Issued 1-6 hours in advance.
- Black ice formation, intense snowbands

Winter Hazards

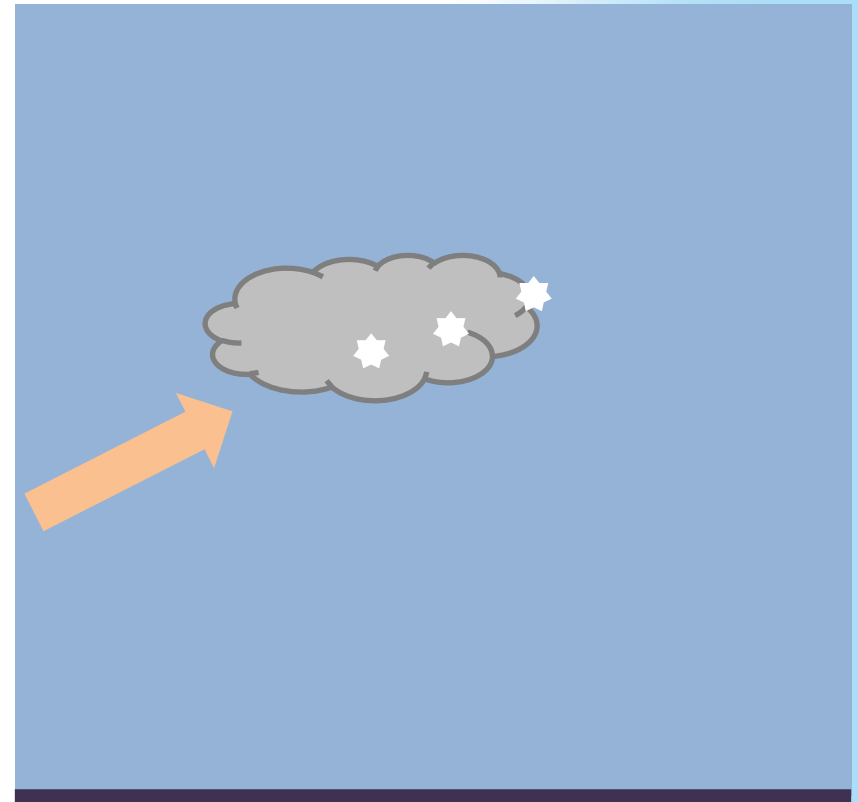
- Heavy Snow
- Ice (Sleet & Freezing Rain)
- Extreme Cold
- High Winds
- Coastal Erosion
- Coastal Flooding
- High Surf
- Ice Jams





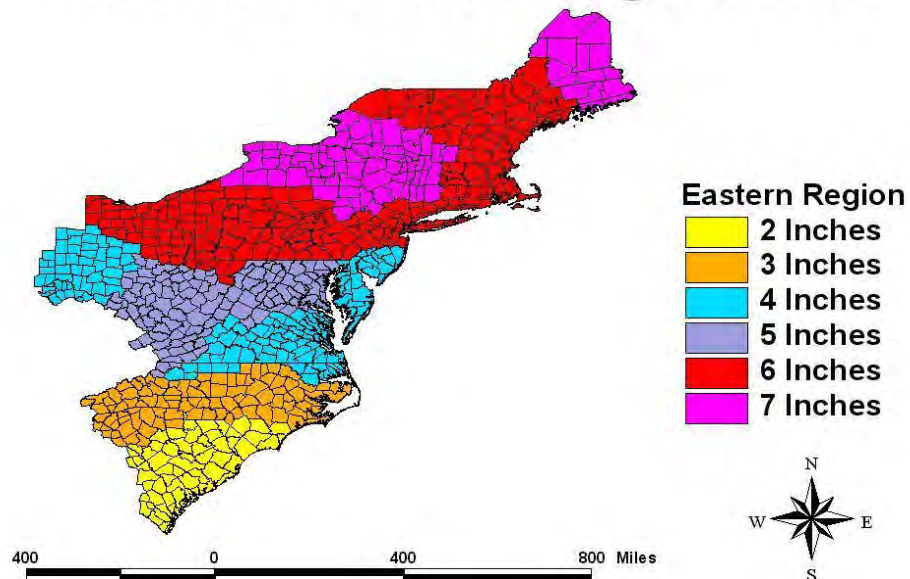
Winter Hazards: SNOW

- Snow forms when moisture in the air freezes directly into flakes
 - Water goes from gas to solid state
- Snow is primarily a travel hazard
- Can accumulate heavily enough to snap tree limbs
- BLIZZARD – combination of heavy snow and strong winds
 - Whiteout conditions, drifting

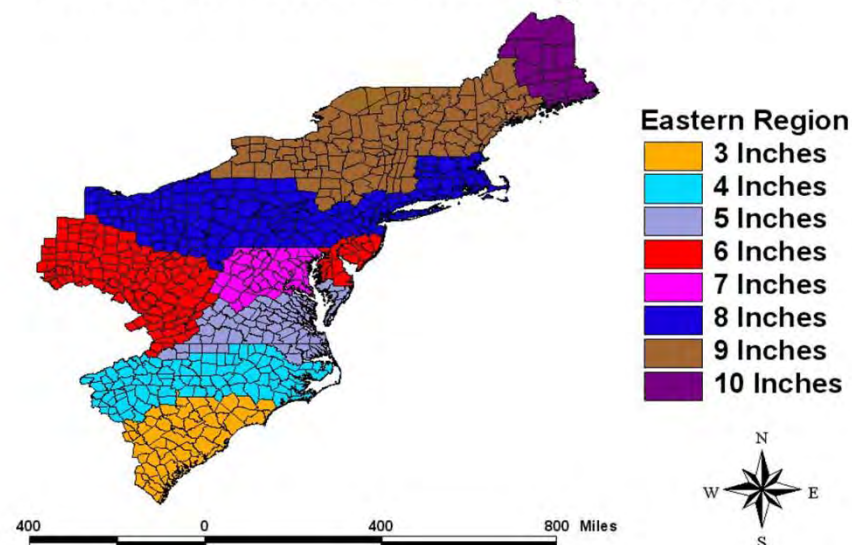


Winter Storm Warning

12 HR Snow Warning Criteria



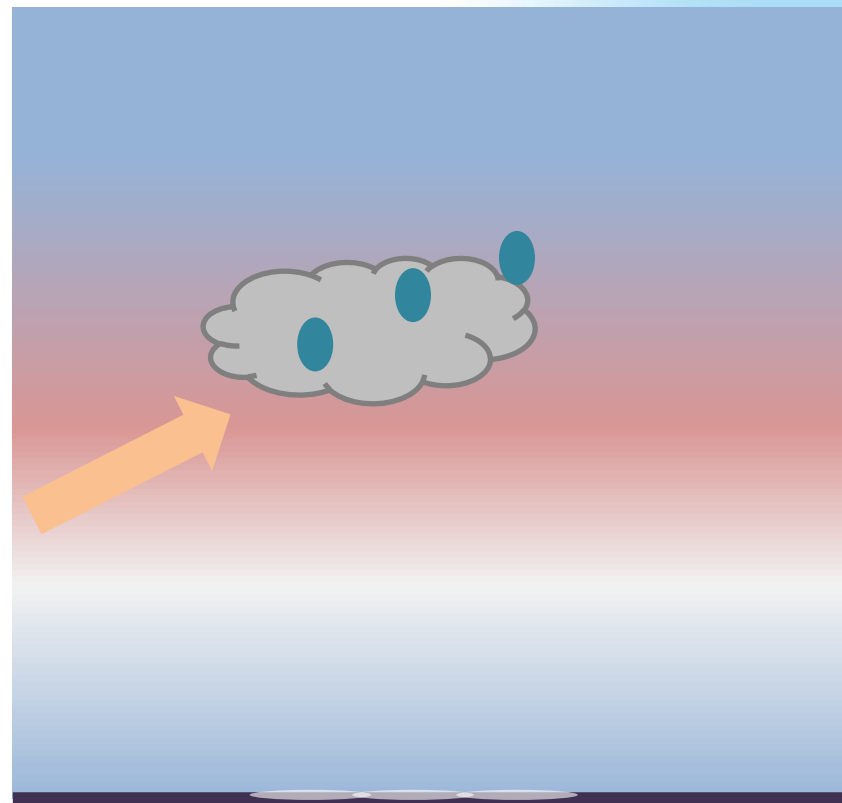
24 HR Snow Warning Criteria





Winter Hazards: FREEZING RAIN

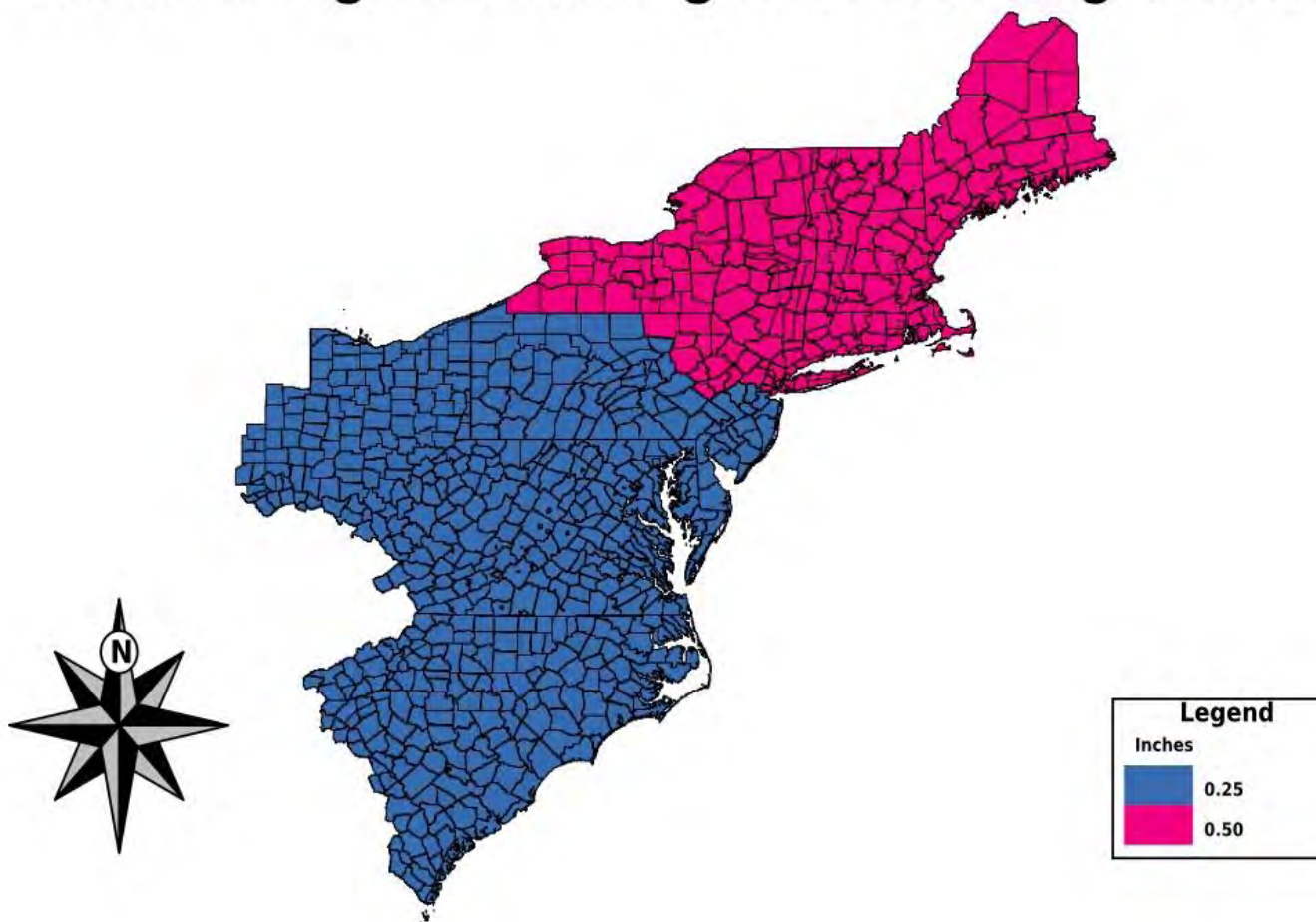
- Freezing rain falls when liquid rain falls into a subfreezing air mass
 - Rain freezes into ice on cold surfaces
- Freezing rain is a serious travel hazard
 - Extremely low traction on roads
- Can accumulate heavily enough to snap tree limbs
 - Ice storms a threat to infrastructure





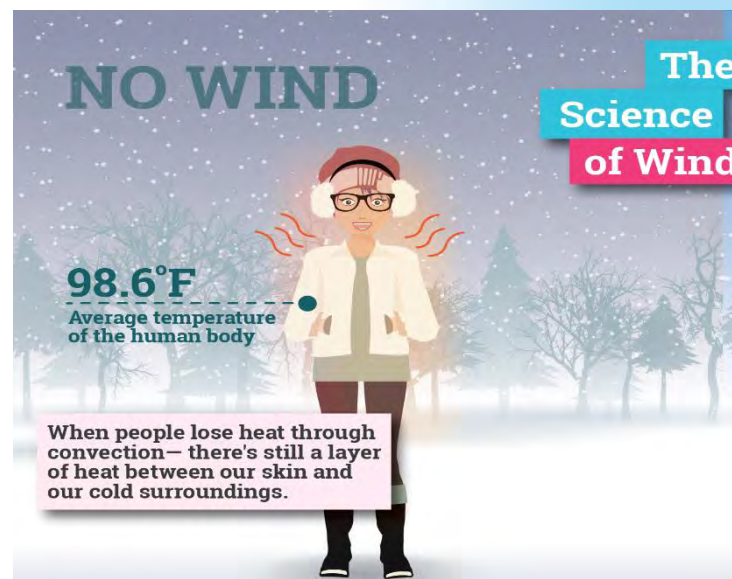
Ice Storm Warning

Eastern Region Freezing Rain Warning Criteria



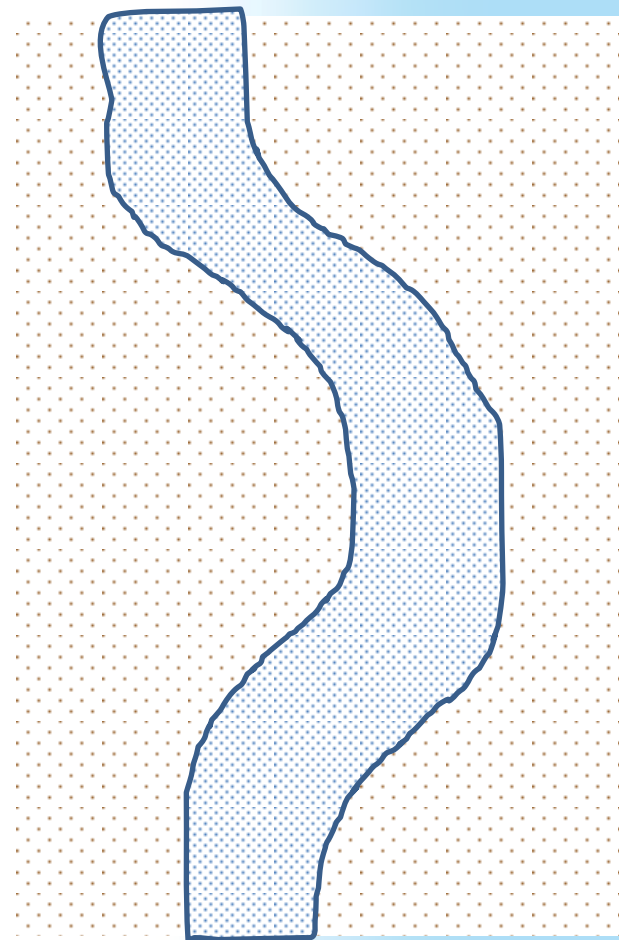
Winter Hazards: COLD AND WIND

- Extreme cold can be life threatening
 - Frost bite, hypothermia, death
- Strong winds can cause destruction
 - Tree damage, power lines, structures
 - WIND ADVISORY: 46-57 mph
 - HIGH WIND WARNING: 58+ mph
- Combination of cold and wind produces wind chill
 - “Feels like” temperature magnifies the effect of cold
 - WIND CHILL ADVISORY: Wind chill -20 to -30°F
 - WIND CHILL WARNING: Wind chill -30°F or colder



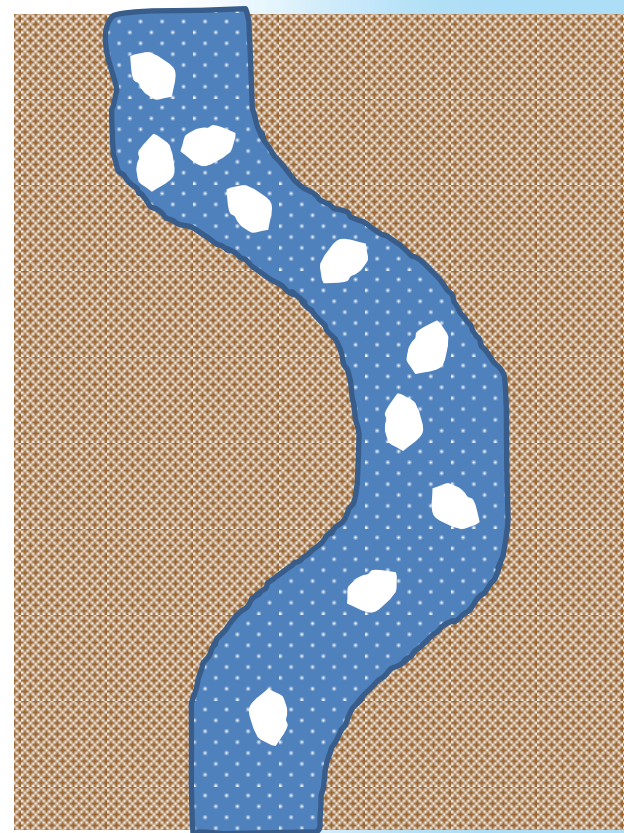
Winter Hazards: FLOODING

- Flooding occurs when water rises into areas it normally does not flow
 - Drowning, water damage, destruction
 - FLASH FLOOD WARNING: rapid water rises
 - RIVER FLOOD WARNING: specific river overflowing banks
- Snow melt often magnifies flooding threat
 - Warm rain falls onto deep, melting snow pack
- Ice jams can cause rapid, unpredictable river rises
 - River ice breaks up from increased flow
 - Ice chunks collect at choke points and can temporarily prevent river flow
 - Flooding occurs upstream of the ice jam



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River Ice

- It all begins with the formation of “frazil” ice.





River Ice

- Frazil ice collects into ice pans or pancake ice



River Ice

- Ice pans collect and freeze together to form a continuous ice sheet.





The river ice that forms can be can be very thick...



Ice Jams

- Ice cover strengthens through the winter, then starts to rot in spring.
- Runoff from a heavy rainfall or a significant snowmelt can help raise river levels.
- As river rises, ice lifts, breaks up, and move downstream.
- This is known as a *break up jam*.





Break up Jams

- Often have the most significant impacts
- Occur during periods of thaw, generally in spring
- Need river rises of 1.5 to 3 times the thickness of the ice to cause break up.



Break up jams

- Often form quickly
- Backwater from jams may cause upstream flooding
- Jam failure may cause downstream flooding and erosion
- Ice can be transported out of the channel to cause damage



Historical Ice Jam Areas



Leaflet | ESRI shaded relief, NHDPlus v2, Map data © OpenStreetMap contributors, CC-BY-SA, Imagery © Mapbox

Ice Jam Safety

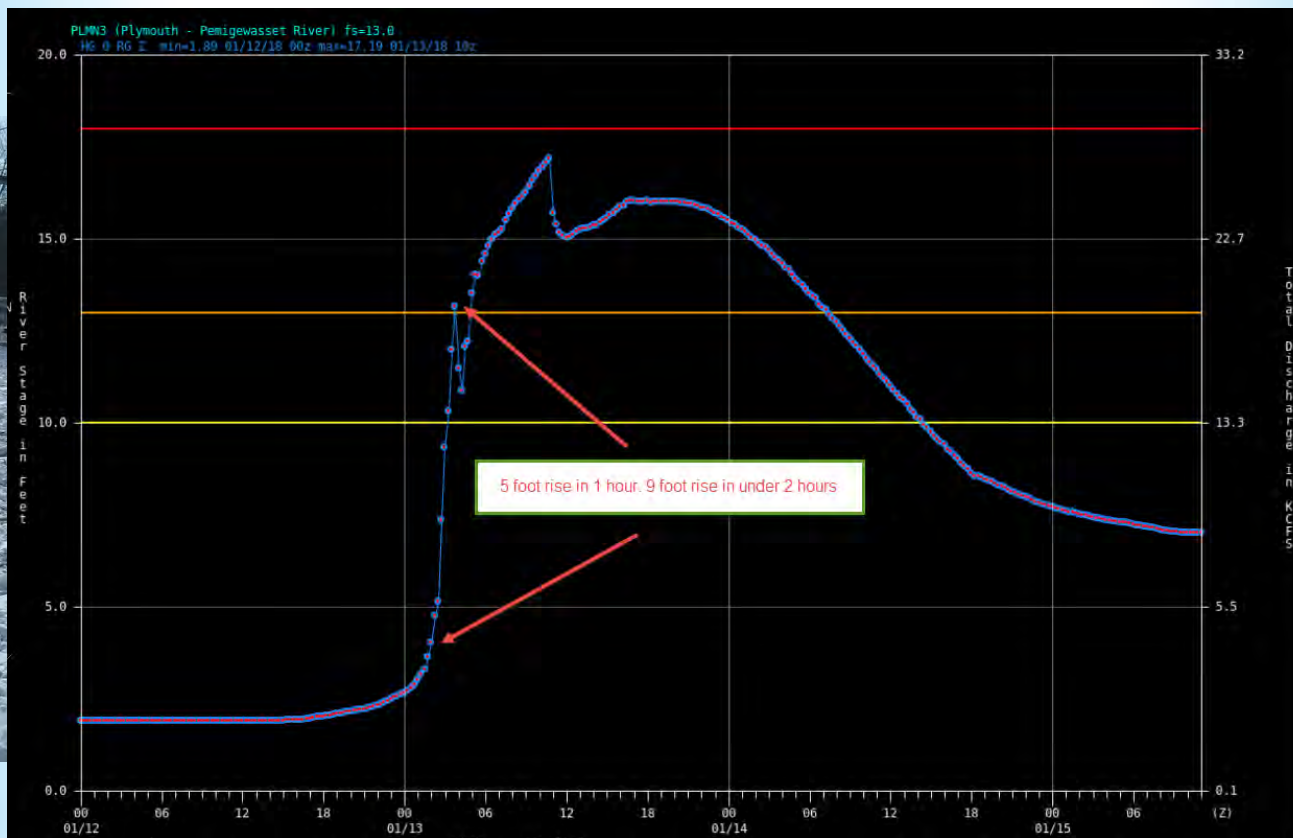
- Be prepared
 - Know where flooding may occur
 - Know at least 2 evacuation routes to reach higher ground
 - Have an emergency kit ready
- Stay informed
 - Flood watch; know what conditions are favorable
 - TV, radio, NWS Weather Radio
 - Social media, NWS and other web sites

Ice Jam Safety

- Take action
 - Obey all emergency personnel
 - Evacuate immediately if you are told to do so
 - Turn around, don't drown
 - Stay away from ice jams and ice-jam affected areas. **NEVER** climb on an ice jam!



Ice Jams at Plymouth, NH



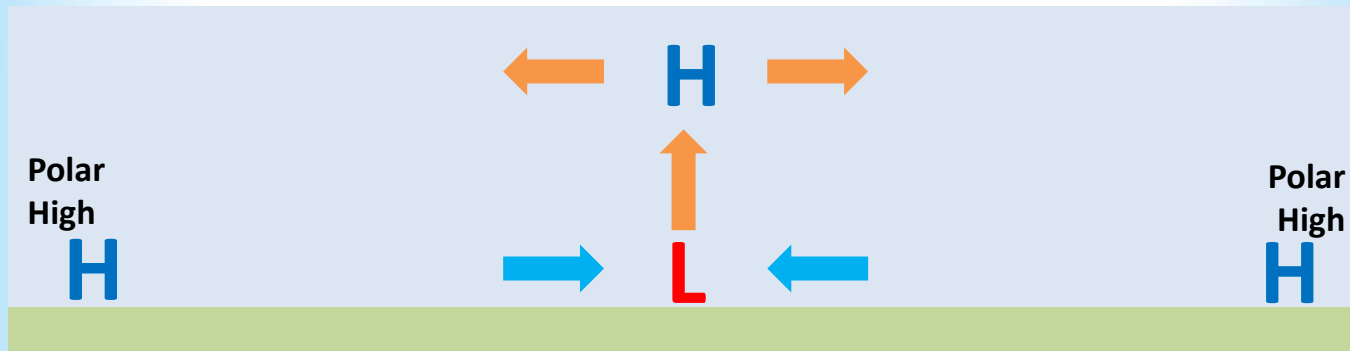
Drivers of Weather: Sun

- The sun is the chief driver of all weather on Earth
- Sun warms air near ground level daily
- Intensity varies by sun angle (latitude, season)
- Weather is the movement of this heat around the globe



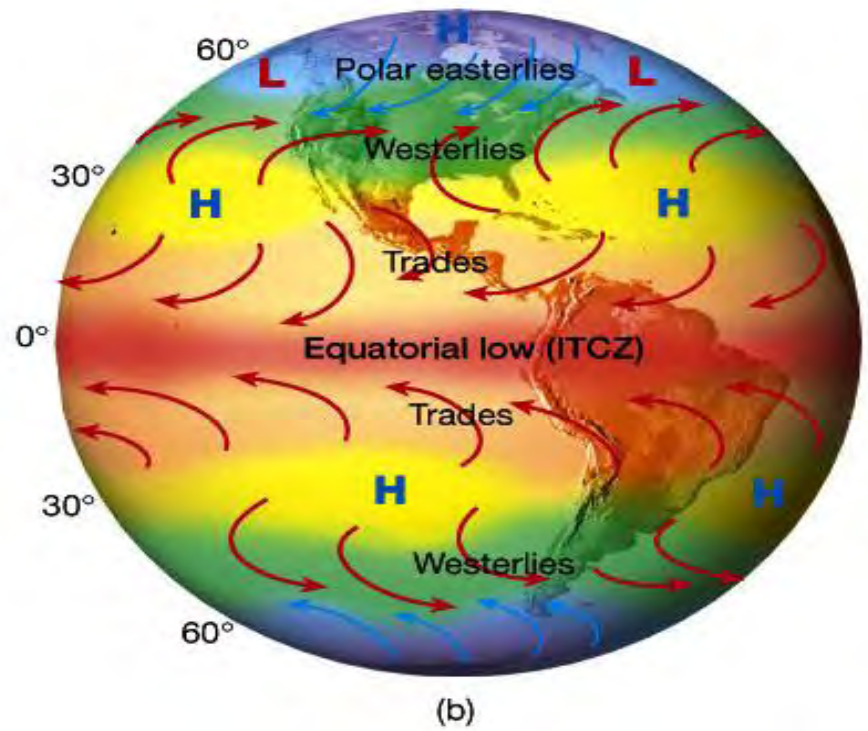
Drivers of Weather: Global Circulation Patterns

- Global Circulation Patterns
 - Earth warms up fastest closer to the equator
 - Cools down fastest at the poles
 - Heat balance
 - BUT Earth rotates...



Drivers of Weather: Global Circulation Patterns

- Earth's rotation causes wind to turn
 - To the right in N Hemisphere
 - To the left in S Hemisphere
- Sets up 3 “cells”
 - NE trade winds
 - Westerlies
 - Polar easterlies



The Westerlies

- Prevailing westerly flow in mid latitudes
 - Warm air escapes the tropics
 - Cold air is unleashed from the poles
 - Low pressure systems form where these meet
- Jet stream drives storm track
 - Frequent storms (“Nor’easters”)
 - Provides large portion of New England precipitation

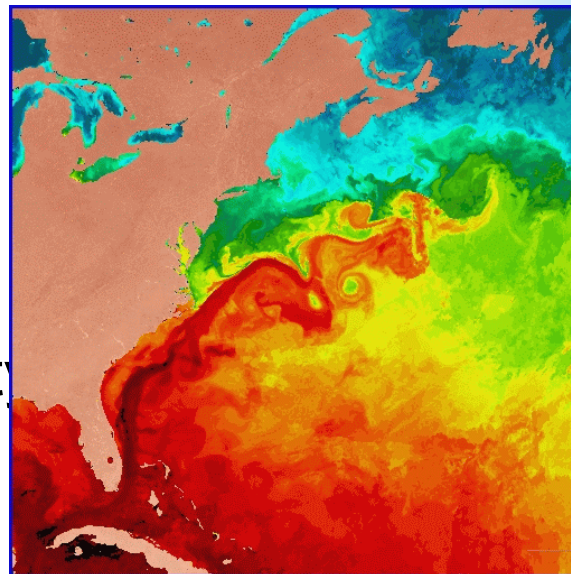


Drivers of Winter Weather



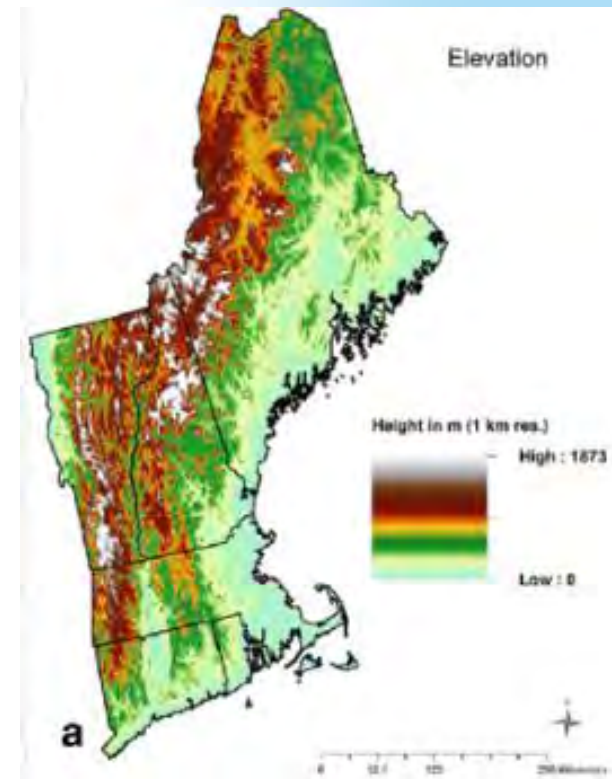
Drivers of Weather: Atlantic Ocean

- Large source of nearby moisture
 - Moderates temperature extremes
 - Primary source of moisture for rain and snow
- Gulf Stream
 - Warm ocean current moving northeastward
 - Affects track and intensity of storm systems



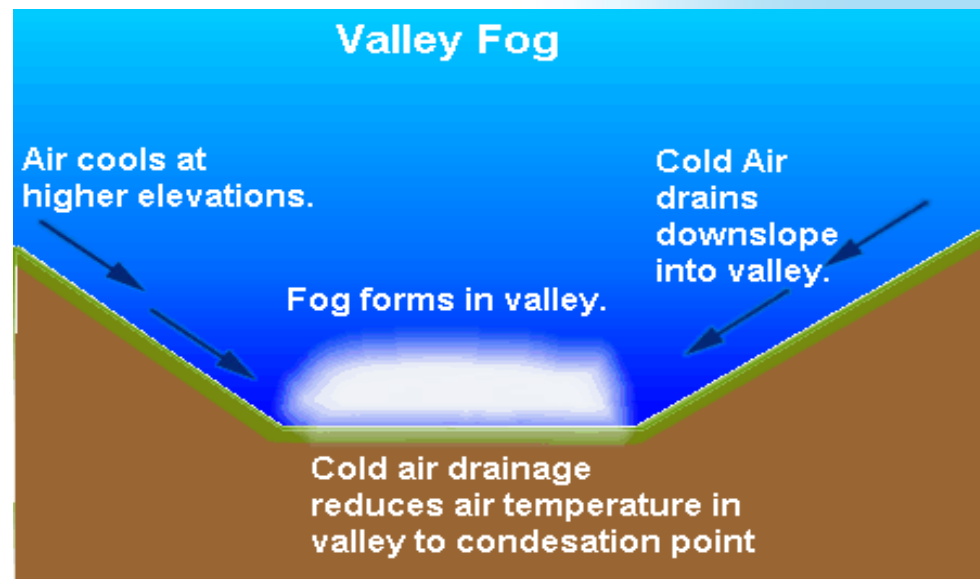
Drivers of Weather: Mountains

- Mountain ranges can block air flow
 - Cold, dense air piles up against the mountains
 - Blocked air masses can be diverted by the terrain
- “Cold Air Damming”
 - East/Northeast wind traps cold air over the coastal plain
 - Warm/Moist air may move in over the top, causing freezing rain, sleet, or snow



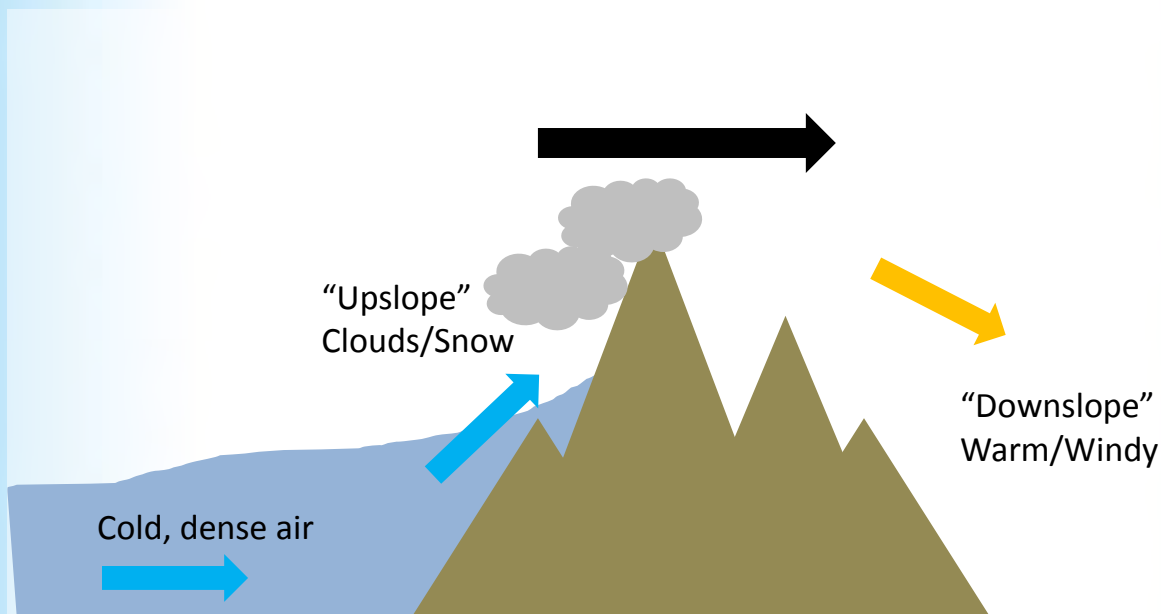
New England Weather: Valley Cooling

- Sun
 - Lack of sun at night allows air near ground to cool
 - Calm winds as air stagnates
 - May lead to fog
 - Cold valleys can experience icing



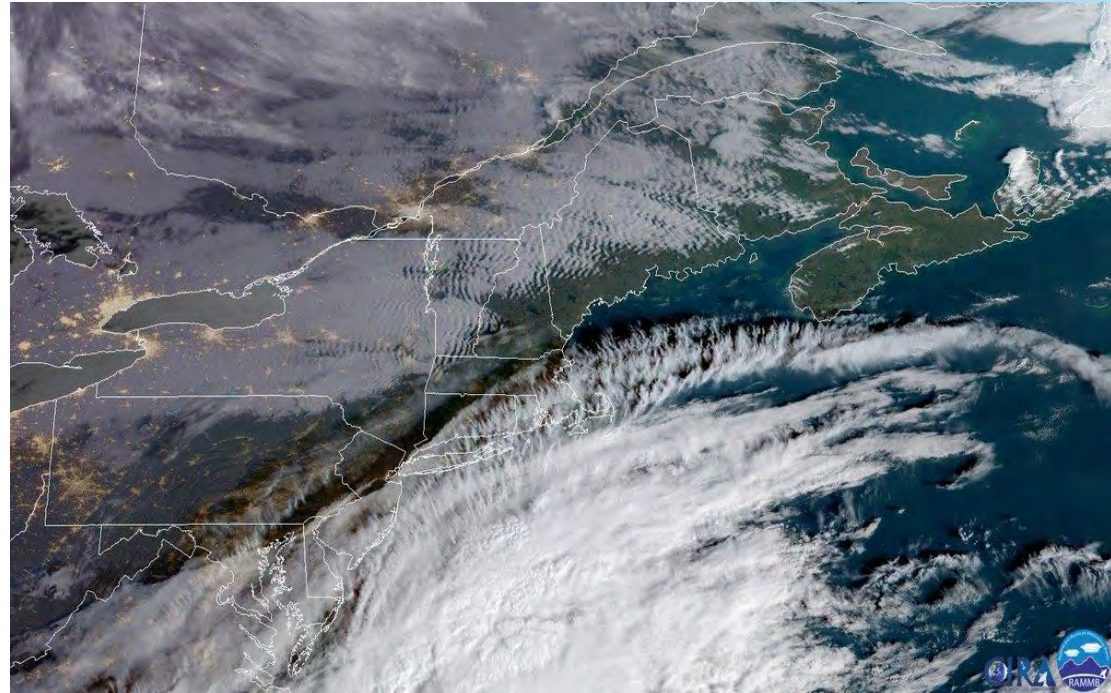
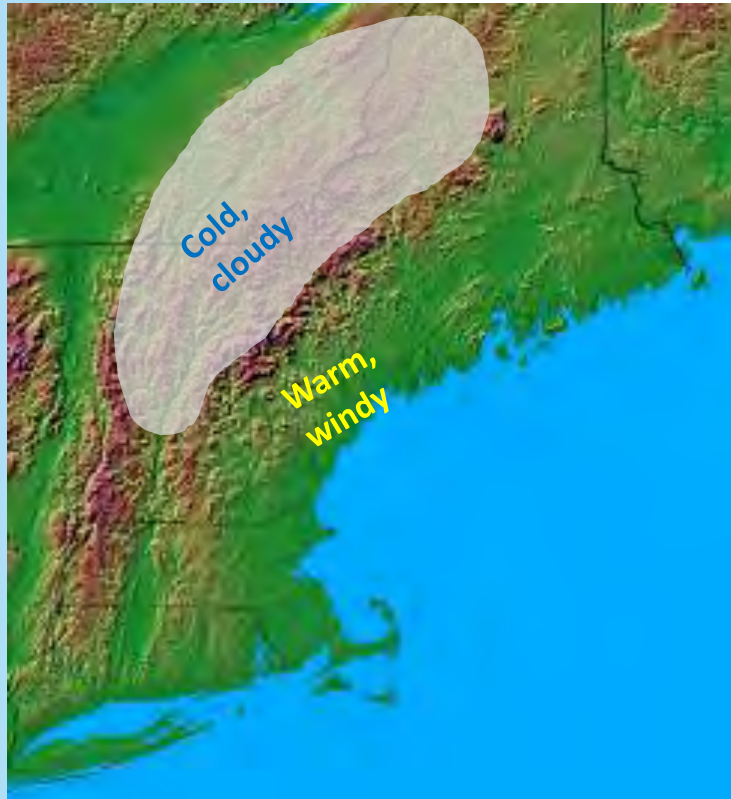


New England Weather: Mountain Effects



New England Weather: Mountain Effects

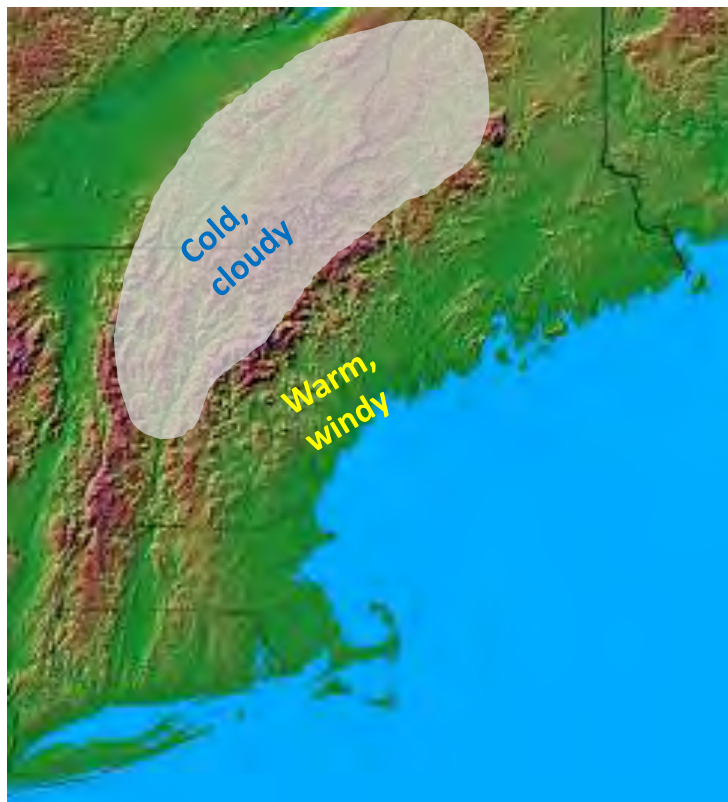
“Northwest Flow”





New England Weather: Mountain Effects

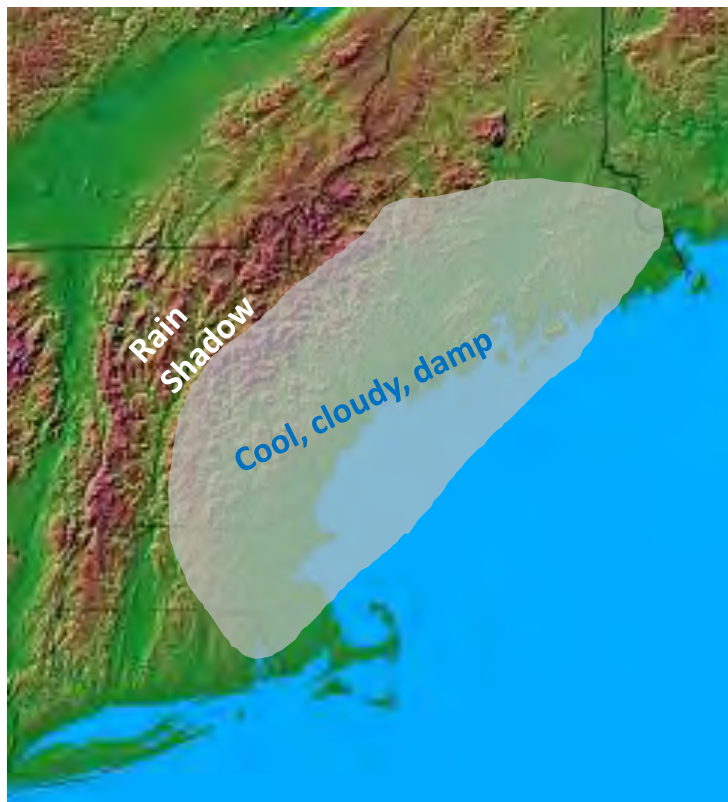
“Northwest Flow”





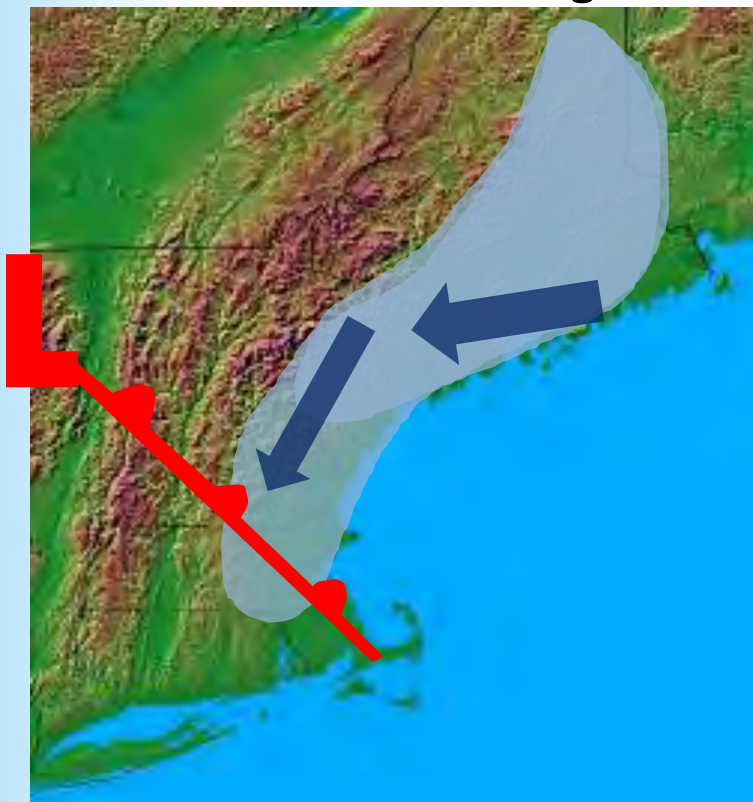
New England Weather: Mountain Effects

Southeast Flow



New England Weather: Mountain Effects

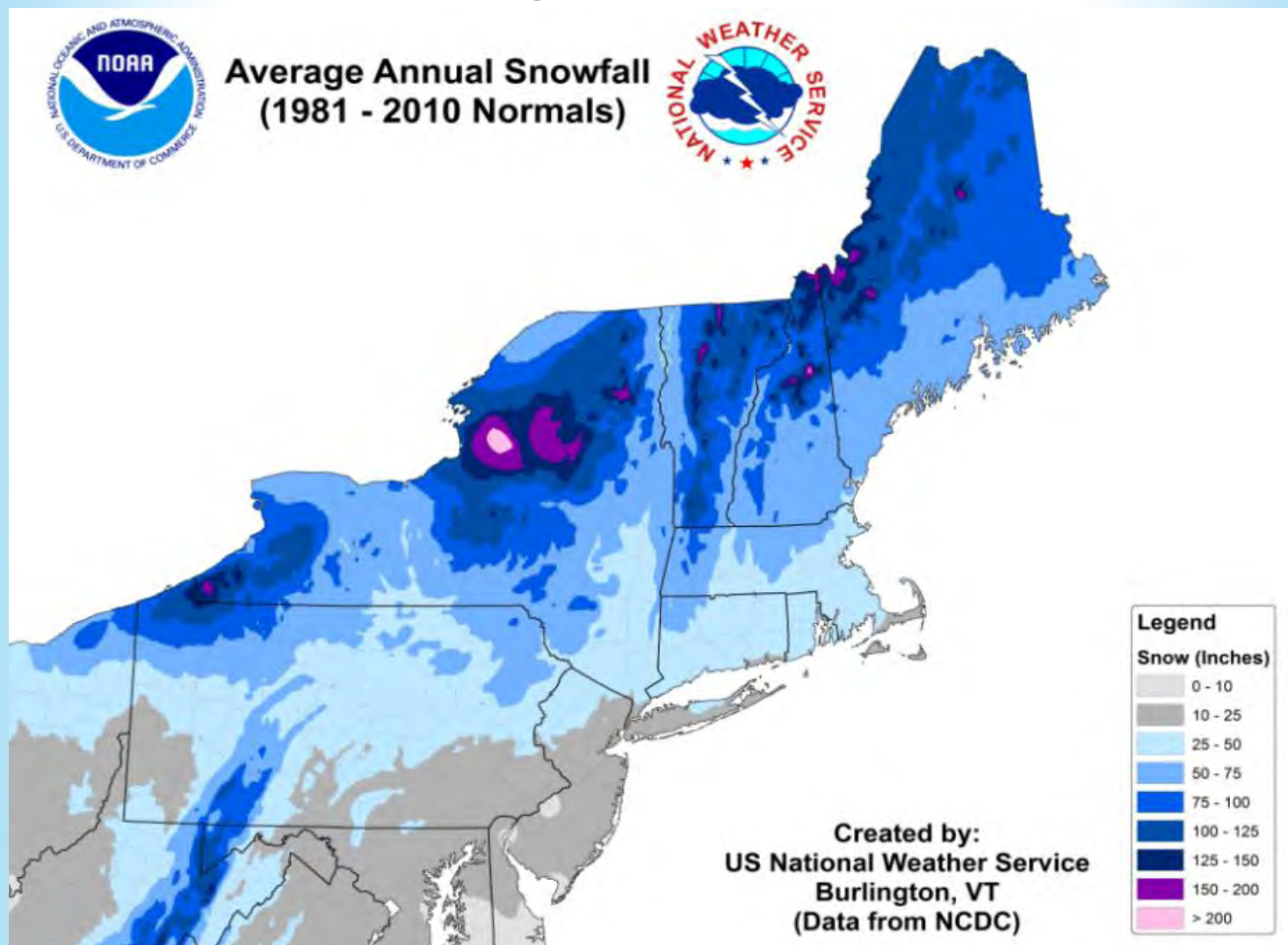
Cold Air Damming



- Cold E/NE wind
 - Blocked by mountains
 - Cold, dense air piles up and gets shoved southward
 - Storm systems may send warm, moist air up and over this cold air
 - Snow, sleet, freezing rain

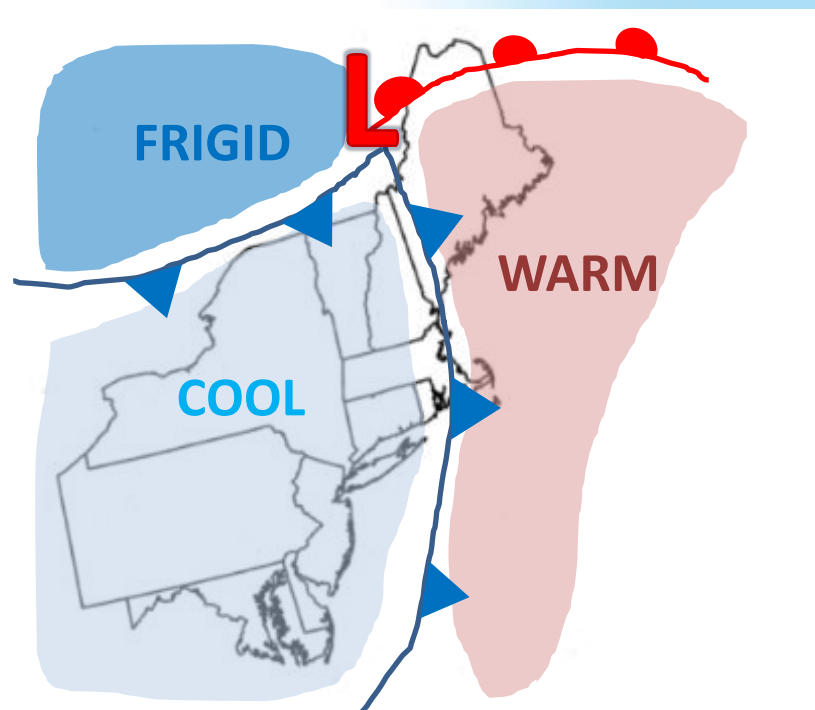


Yearly Snowfall



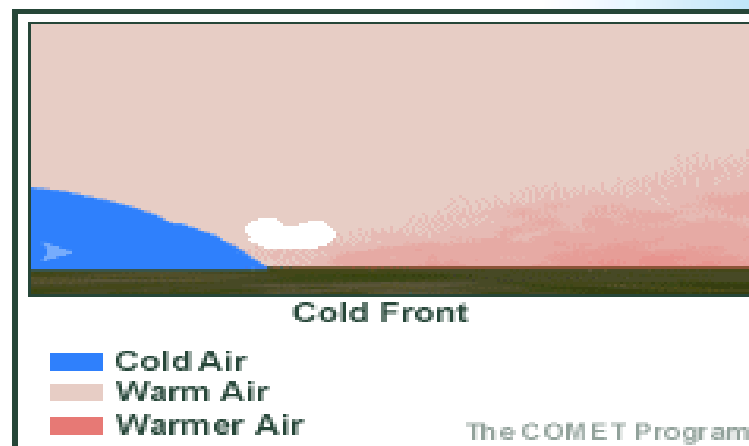
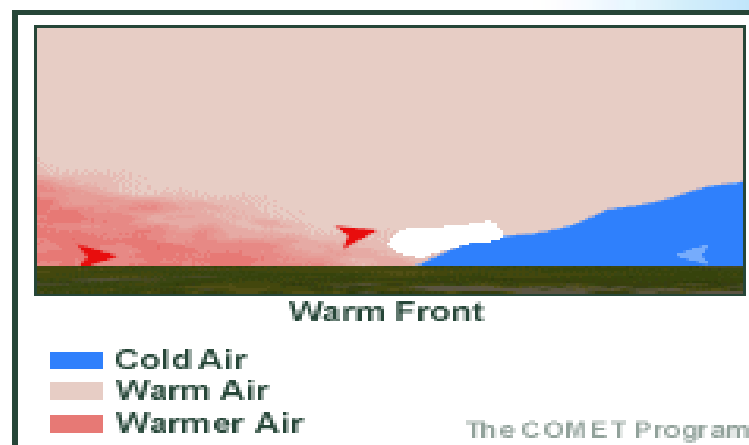
Types of Fronts

- New England a land of many fronts
 - Warm, cold, stationary
 - Occluded – decaying/reorganization
 - Coastal – maritime/continental
 - Backdoor – Cool, moist, from the east
 - Sea breeze – Daily in Spring/Summer
 - Arctic – Intense cold from Arctic
 - Air mass “chilling” in Arctic region
 - Passing storm pulls Arctic air southward
 - Snow squalls possible



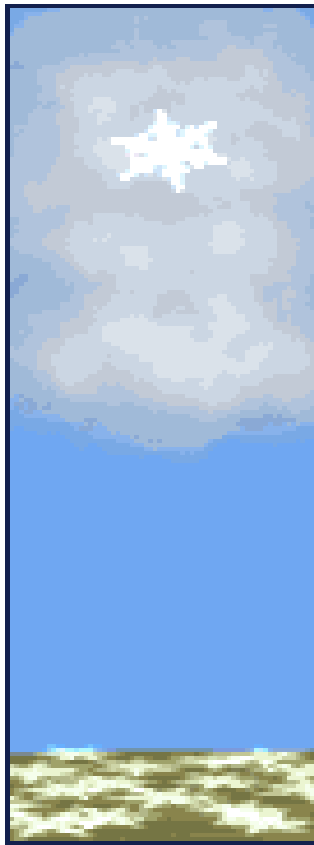
Frontal Systems

- Warm front
 - Warm air moving into colder air
 - Cold air is dense and hard to move
 - Light to moderate precip and low ceilings
- Cold front
 - Cold air moving into warm air
 - Cold air easily pushes away the warm air
 - More intense but brief precip, thunderstorms



Precipitation Types

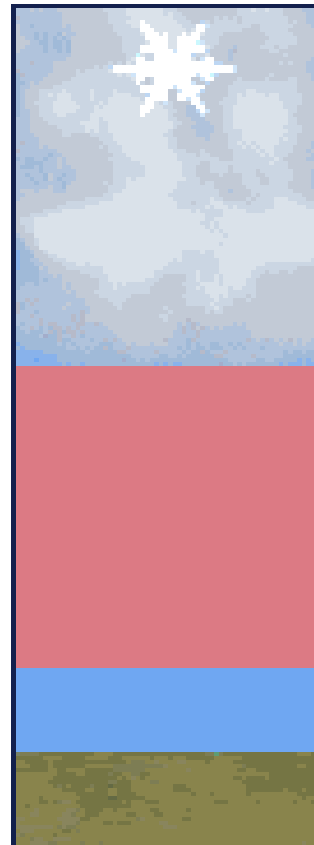
Snow



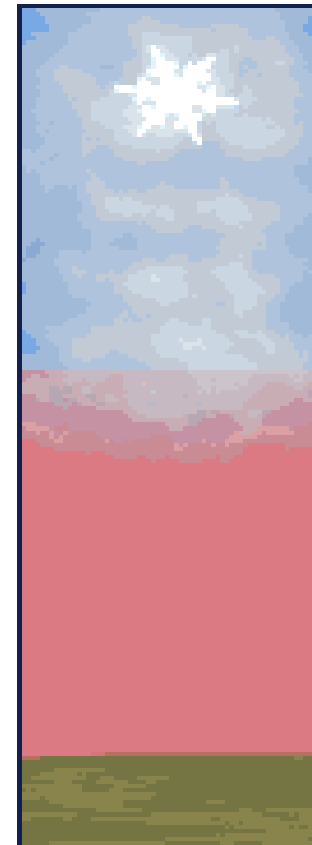
Sleet





Freezing Rain



Rain

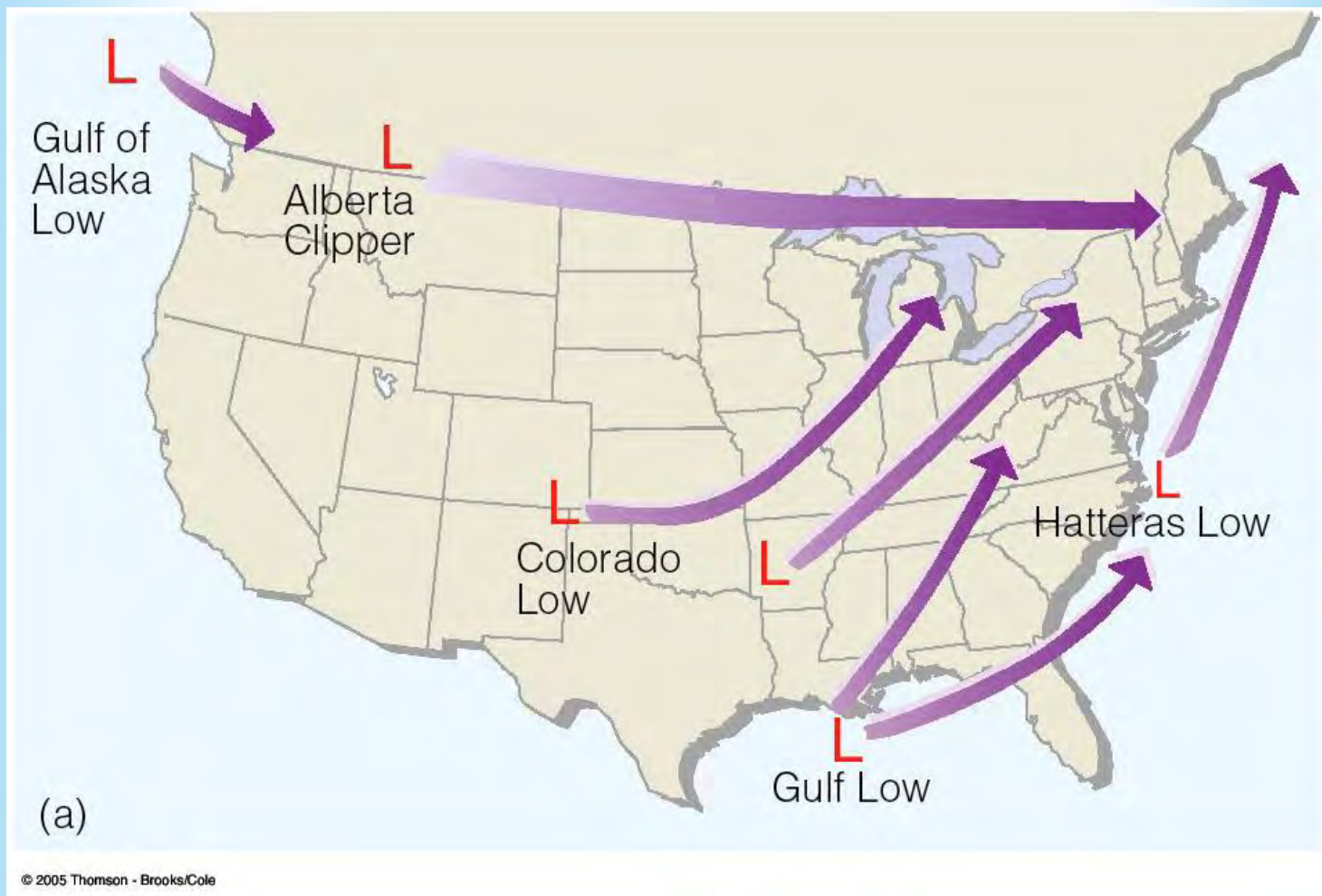


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The COMET Program



U.S. Storm Tracks



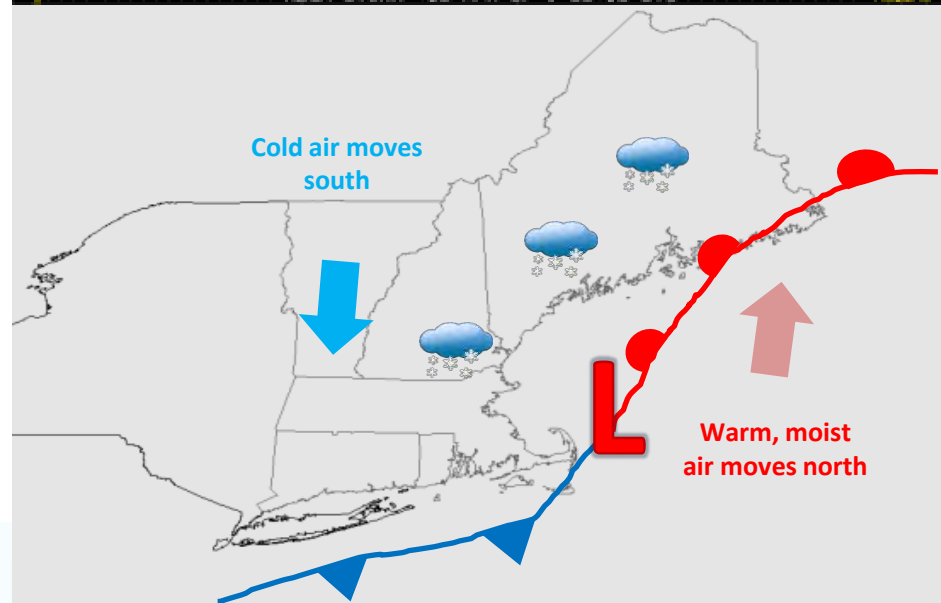
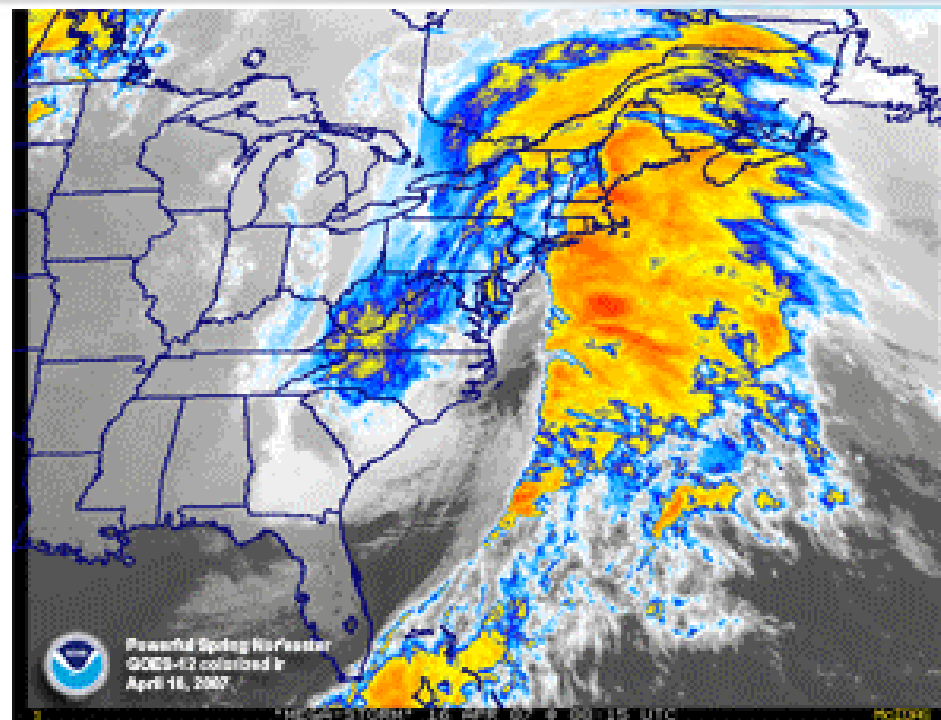
Storm Types

- **Storm Types**

- **Coastal Storms, Nor'easter (Big Heavy Snows)**
- **Alberta Clippers (Small Light Snows)**
- **Overrunning (Saint Lawrence Track)**
- **Northwest Flow (Canadian Maritime Low)**

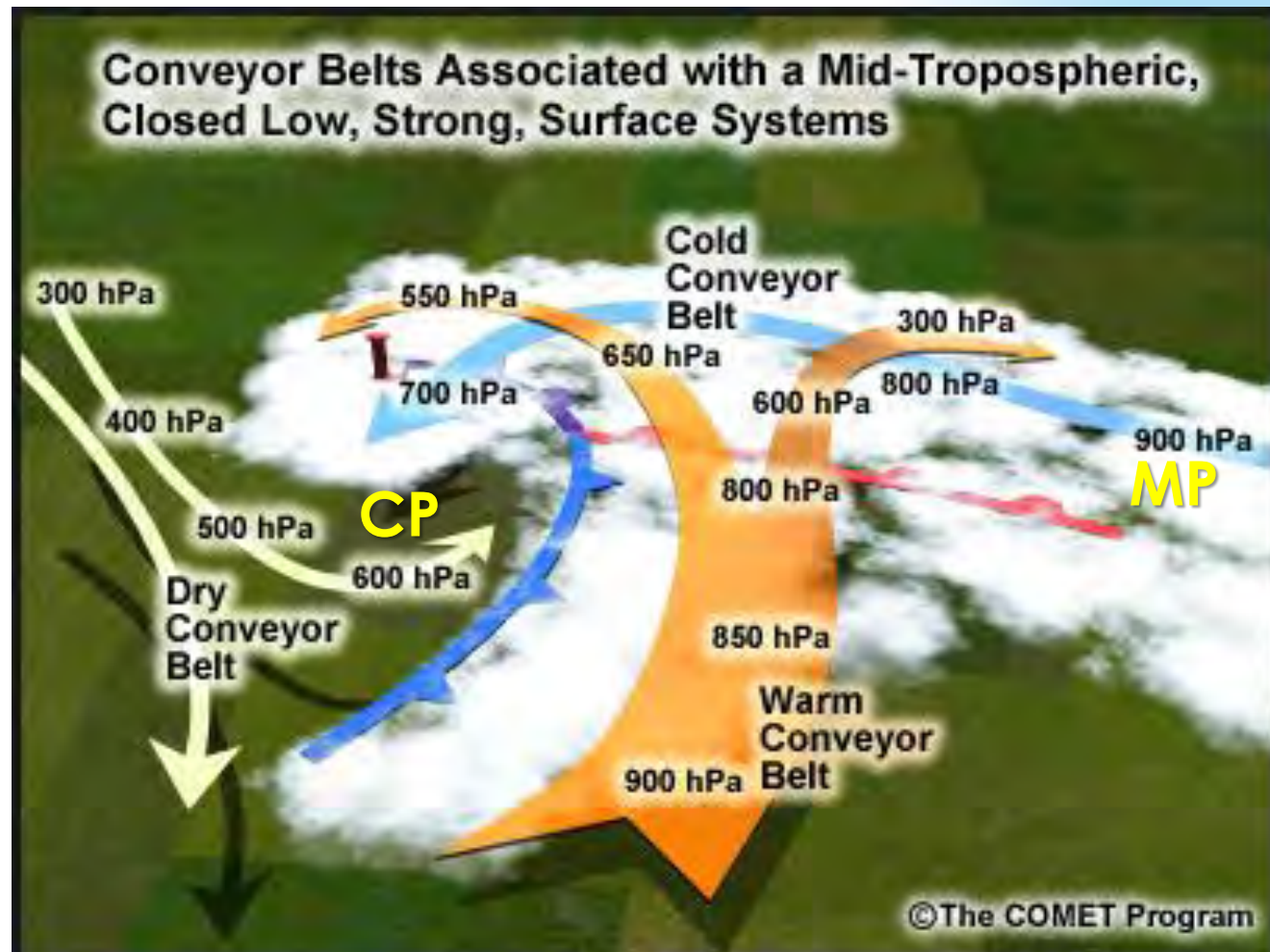
Coastal Storms

- Help maintain Earth's heat balance
 - Warm, moist air surges north from the tropics
 - Cold air moves south from the polar regions
- Prevailing northeast wind on the landward side of the track gives these storms their unofficial name
- <https://www.youtube.com/watch?v=7FII4glAsRM>



Storm Structure

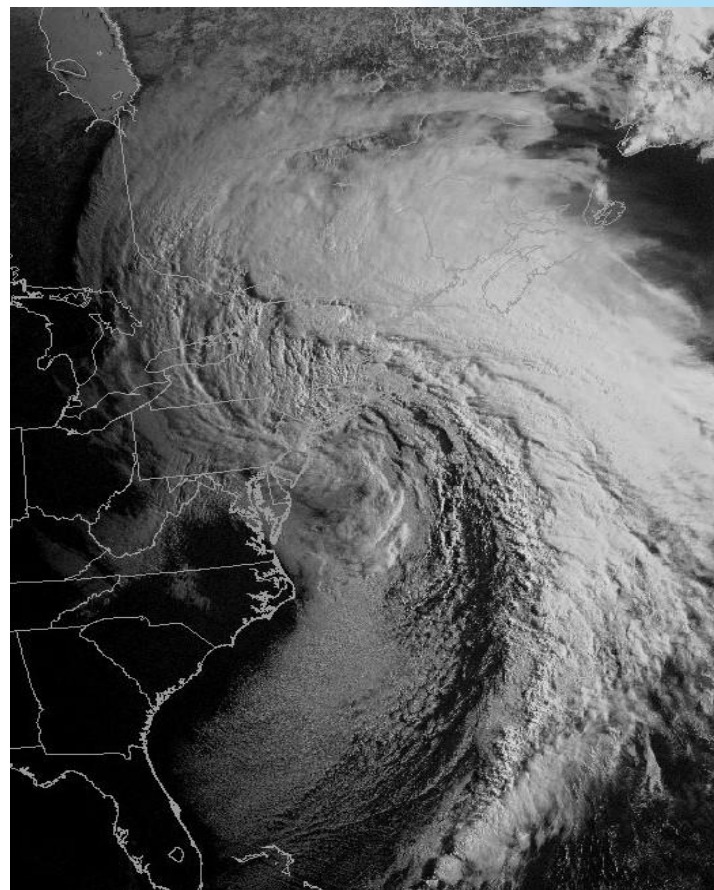
- Key concept is that air moves through different layers of the atmosphere.



MT

Coastal Storms

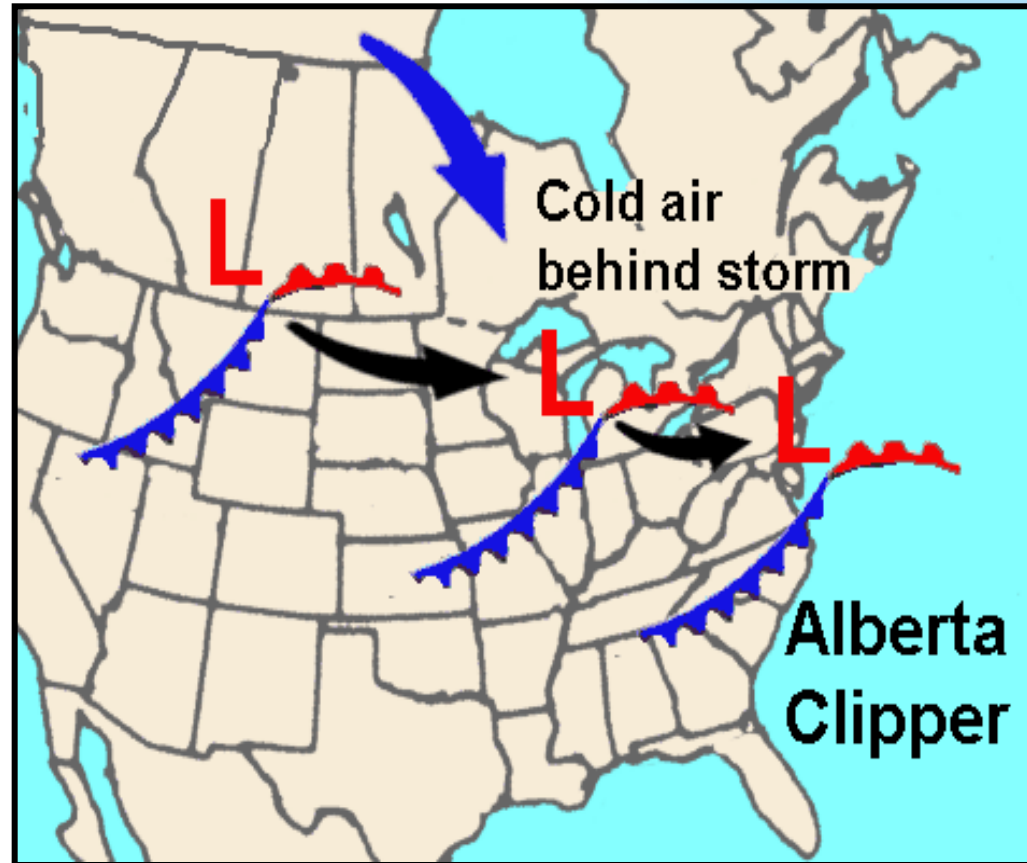
- Peak seasons are October through April, due to stronger temperature gradients (cold continental air vs warm and humid Atlantic air)
- Higher winter tides
- Create storm surge just like tropical storms do
- Much larger than tropical storms with larger areal impacts
- Longer and more prolonged wind fetch than tropical storms
- Can create much bigger waves than tropical storms



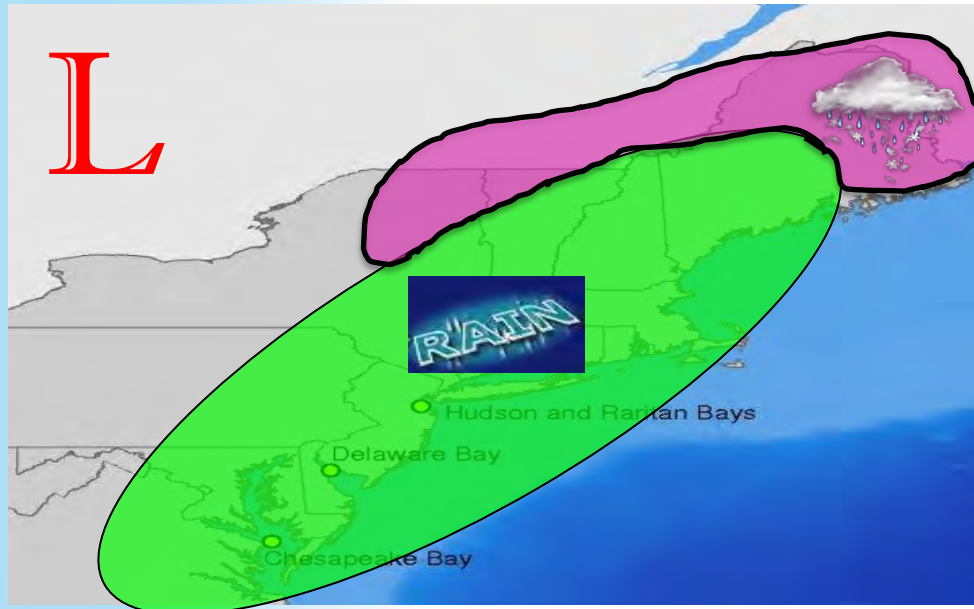
Alberta Clipper

- Landmass Storm

- Alberta Clippers originate over continental North America.
- Fast moving weak systems with limited moisture.
- Most common in January & February.
- Typically precipitation falls as snow.
- Snowfall amounts are light 4-6" and the snow has low water content (fluffy).
- Cold arctic air follows these systems.

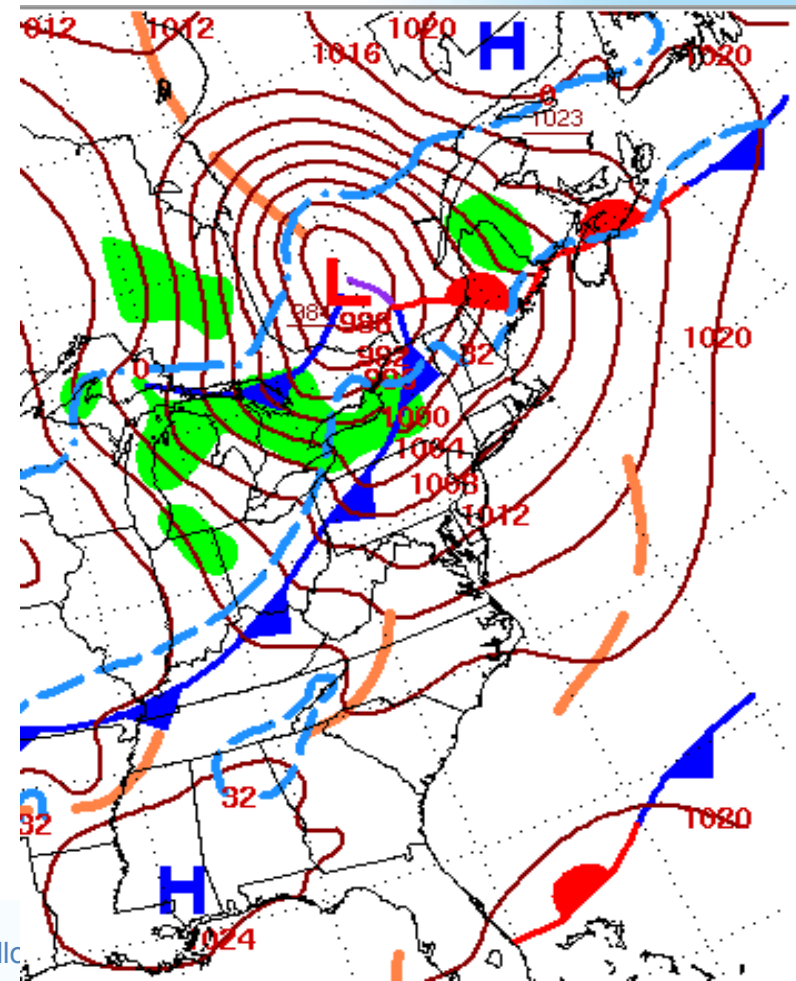


Overrunning Events



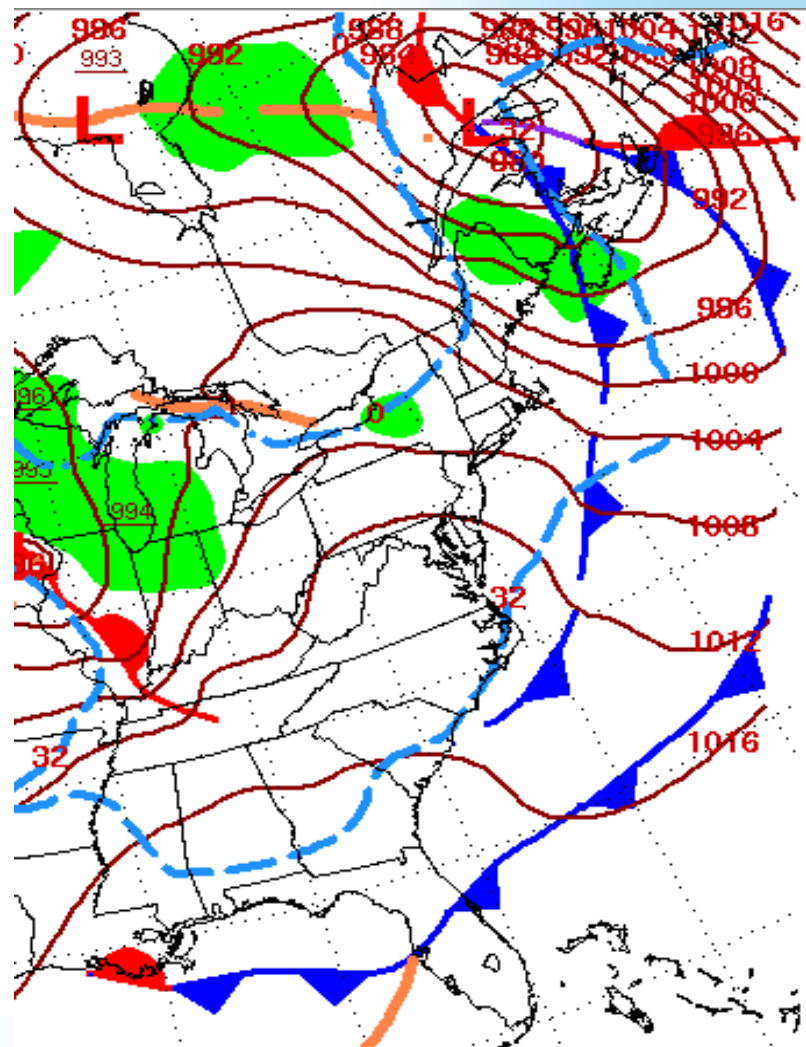
Overrunning Events

- Further inland storm center tracks will give greater chances for wet snow changing to sleet > freezing rain > rain.
- If the Low tracks to the west of New York expect snow changing to rain. Cold air usually follows behind these storms causing wet snowpack to freeze.
- These events bring strong southerly winds to the coast, and large southerly swells.



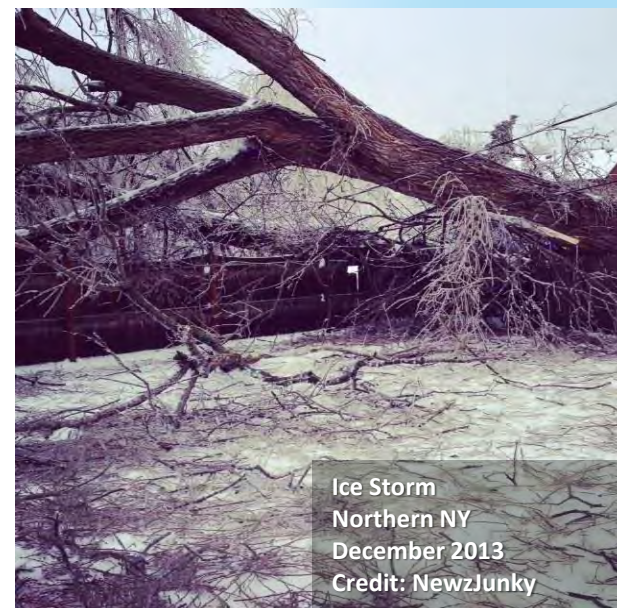
Northwest Flow

- Canadian Maritime Low
 - Surface low deepens over the Canadian Maritimes, establishing strong (cold) northwest winds over New England
 - Light snowfall activity continues (localized snowfall amounts)
 - Significant blowing and drifting of snow
 - Low wind chill values and some minor wind damage, choppy inner waters created by wind generated waves



Ice Storms

- Heavy weight brings down trees
- Power and communication lines come down
- Extended period of time without power, during extreme cold, could have huge consequences.



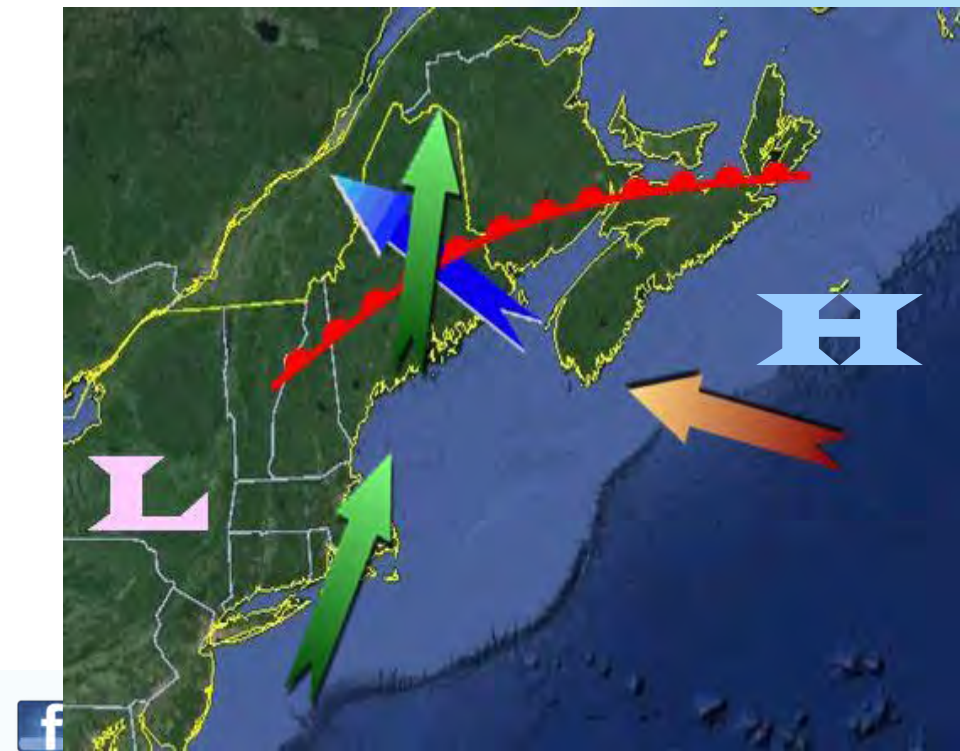
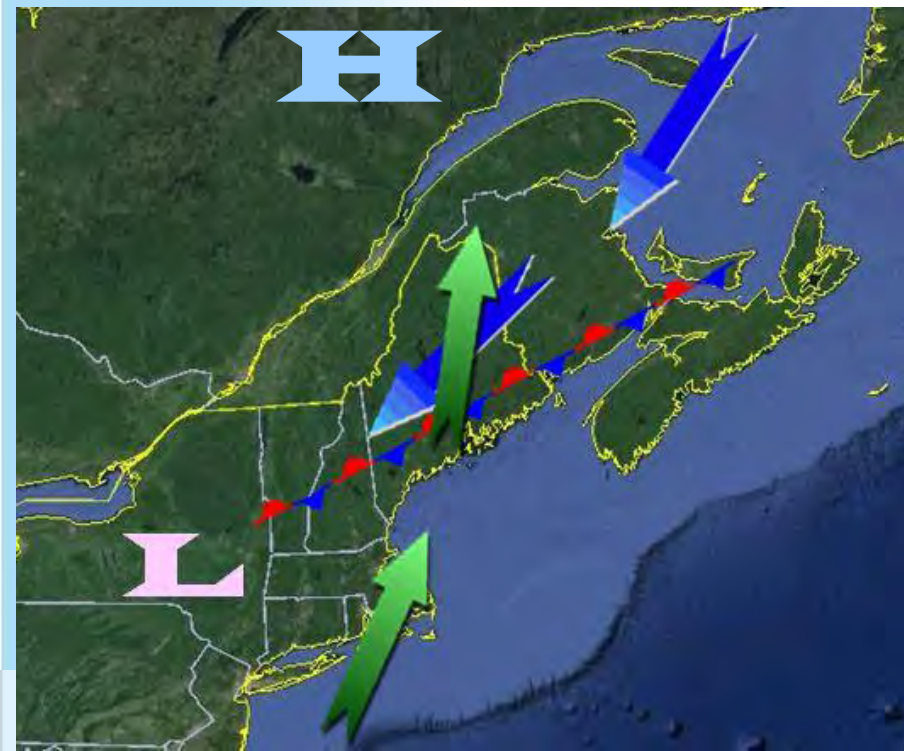
Ice Storms Patterns

Active Ice Storm

Cold air infusion in low levels
Warm air advection aloft
Sustained long duration icing

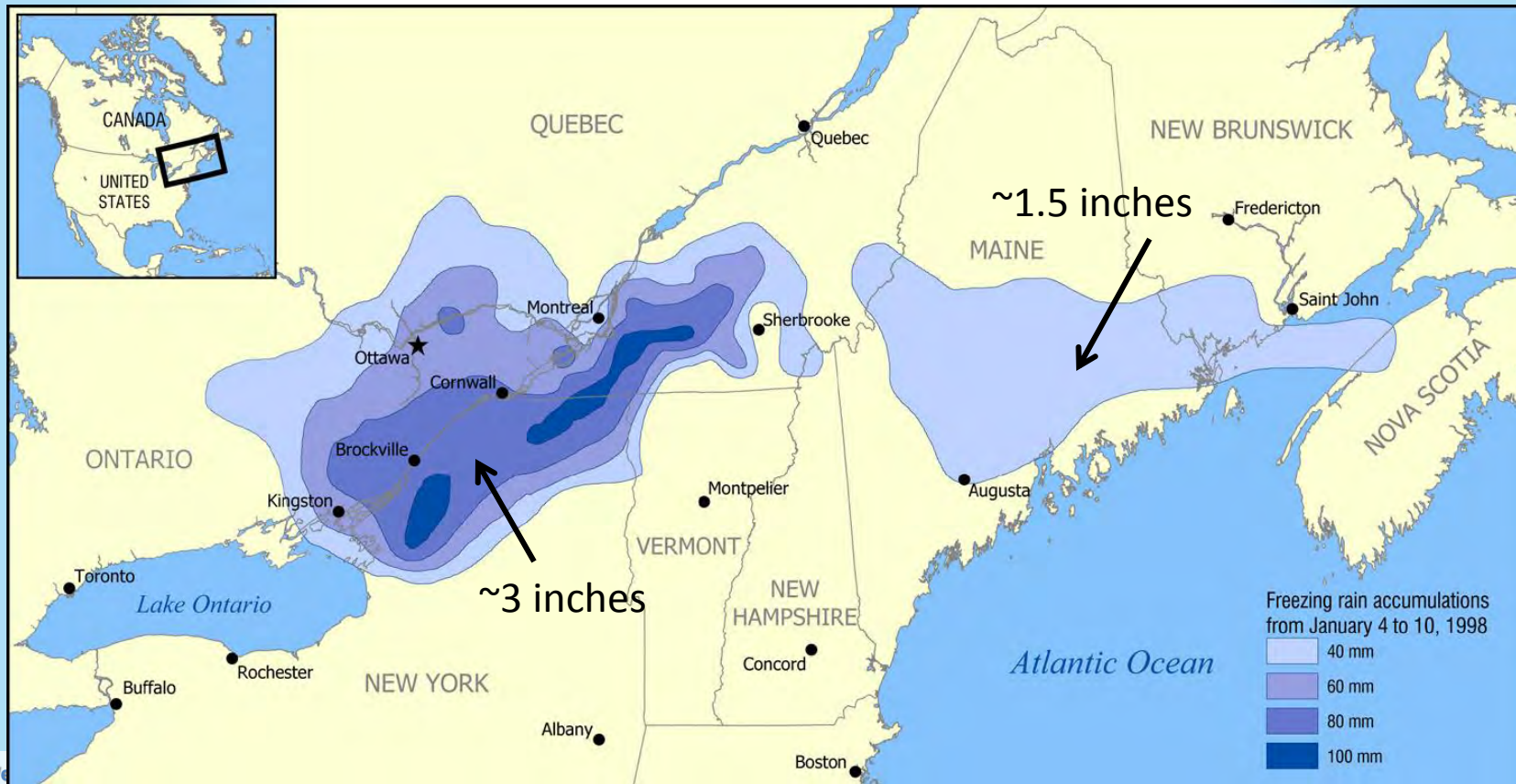
Passive Ice Storm

Cold air retreating from low levels
Warm advection all levels
(though more aggressive aloft)
Short duration icing



Ice Storm of 1998

- Ice storm struck Jan 5-9, 1998 leaving 5 people dead in state of Maine
- 80% of the state lost electrical service



Other Ice Storms in Recent Years

March 2008

Moderate to heavy icing from north central New England into New Brunswick.



December 2008

Interior New York state through interior New England.
1,700,000 without power during height of the storm.



December 2013

Vast icing event extending from the upper Midwest (Michigan) east across New York State, central New England and across Downeast Maine.



SNOW SQUALLS

Snow Squalls can be deadly if you are caught unaware.

The new NWS Snow Squall Warning will alert motorists to hazardous conditions.

For more information visit: weather.gov

817

Number of Fatalities

13 36 49 92 39 41 144 77 82 27



Winter Related Motor Vehicle Winter Related Aviation Winter from Wind Storm Data Tornado Rip Current Lightning Heat Hurricane Flood Cold

AMS journal Weather, Climate, and Society

Average number of fatalities per year from various meteorological hazards for the period 1996–2011.
Totals for all hazards except winter-related motor vehicle and winter-related aviation fatalities are from Storm Data.

Snow Squall Warning

Valid Until
7:15 AM EST Wednesday
November 14, 2018

Threat Information



Hazard

White out conditions in heavy blowing snow



Impact

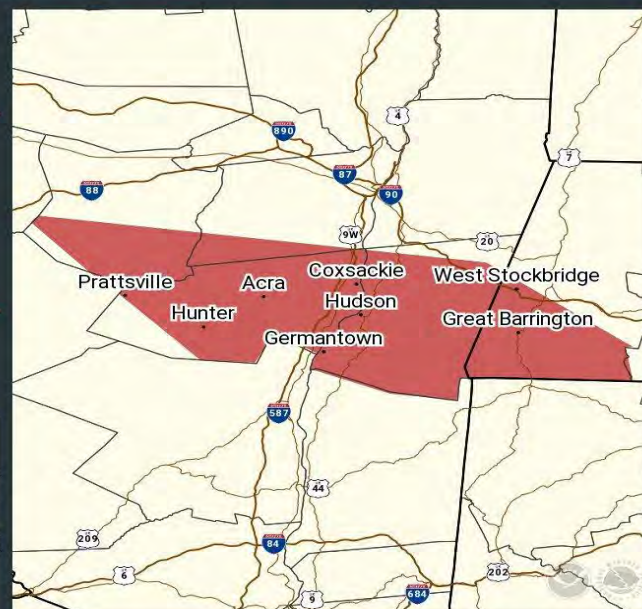
Dangerous life-threatening travel

Potential Exposure



Population: 118,683

Highways: I-87
I-90
US-7



HAZARD...Heavy snow and blowing snow.
Wind gusts up to 40 mph.

SOURCE...Radar indicated.

IMPACT...Dangerous life-threatening travel.

snow squall

An intense, but limited duration, period of moderate to heavy snowfall, accompanied by strong, gusty surface winds and possibly lightning. Snowfall rates may be significant.

WHAT CAN YOU DO

Try and safely exit the highway

Drive slowly

Increase your following distance



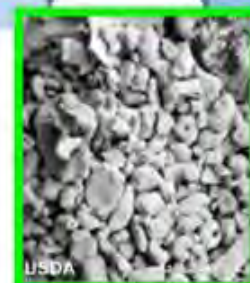
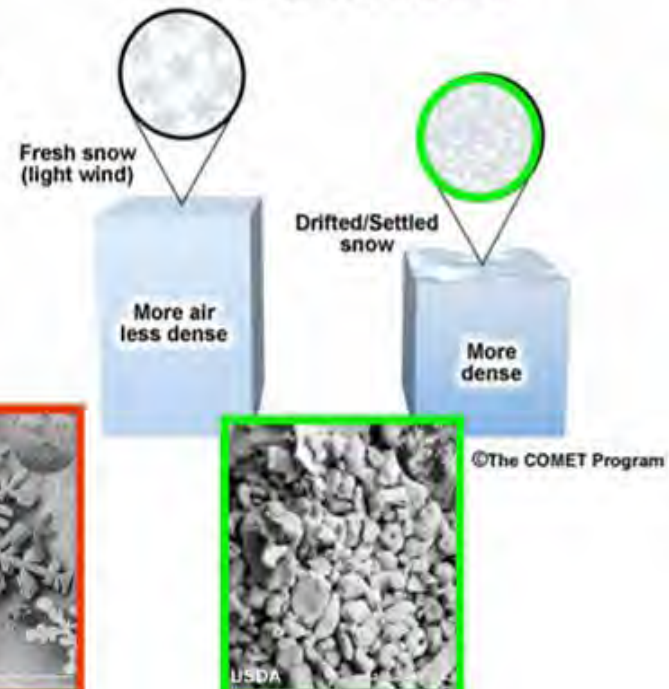
Blowing Snow

- Fresh dry snow is much easier to transport via the wind
- Snow density and water content increase in drifted snow

Blowing Snow Impacts

- Mechanical fragmentation and sublimation losses result in small, rounded particles.
- Windblown snow deposits are inherently more dense.

Snowpack Crystal Characteristics

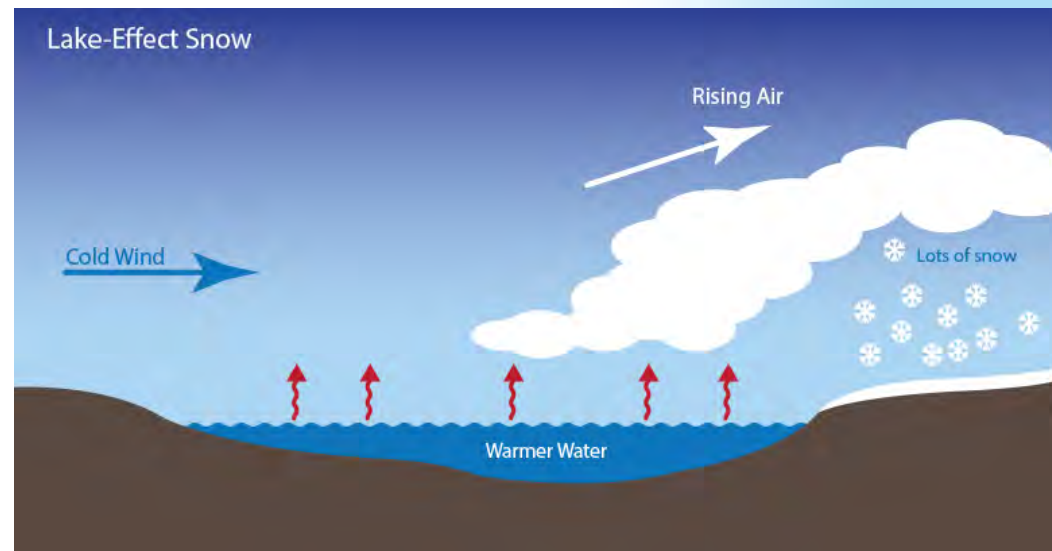


TYPE	MOTION	HEIGHT*	WINDSPEED	MPH
Creep	Roll	< 1 cm	<< 5 m/s	< 12
Saltation	Bounce	1 cm - 10 cm	5 - 10 m/s	12 to 25
Turbulent Diffusion	Suspended	1 m - 100 m	> 10 m/s	> 25

* Numbers vary based on snow density

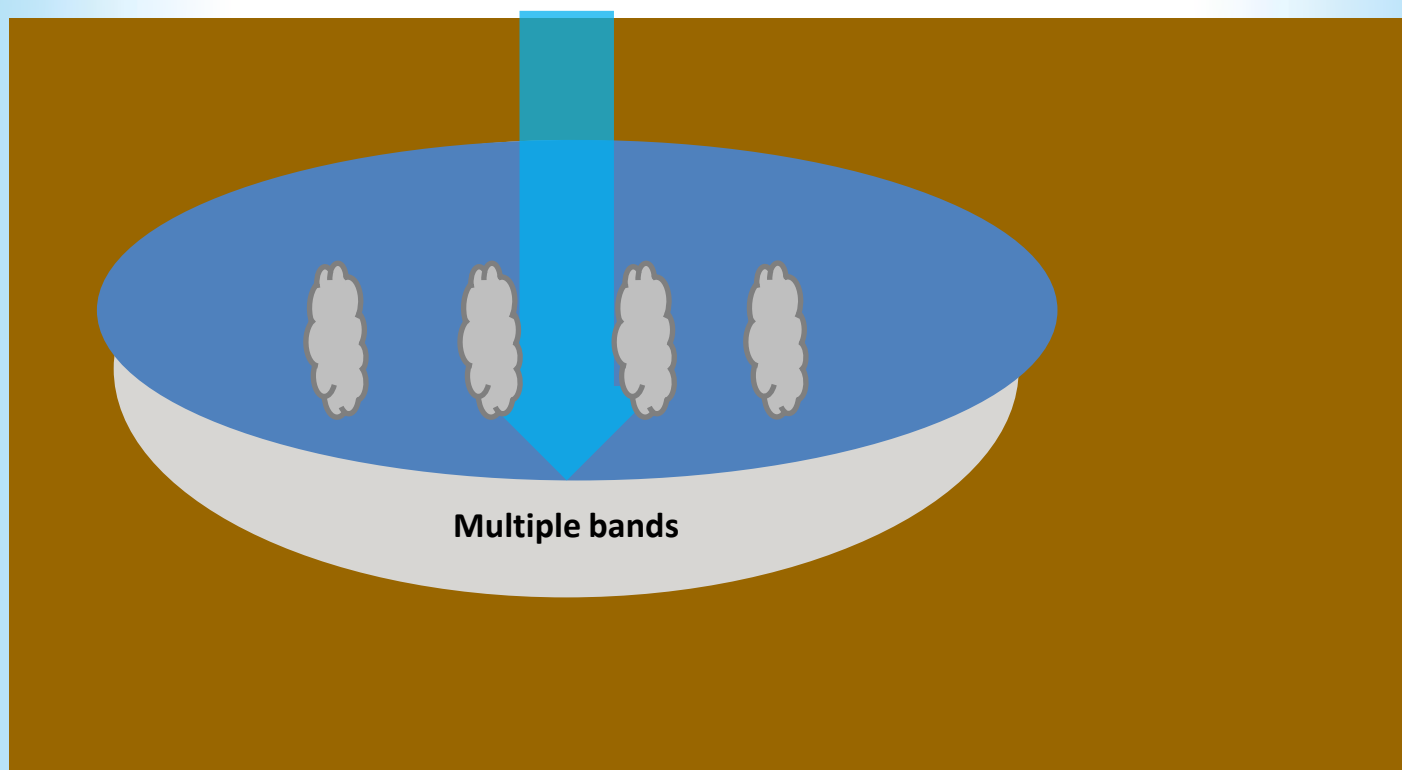
Lake Effect

- Cold air blowing over warm water
 - Low level instability
 - Moist air rises
 - Snow deposits downwind
- Great Lakes
 - Moisture source
 - Frequent cold air outbreaks



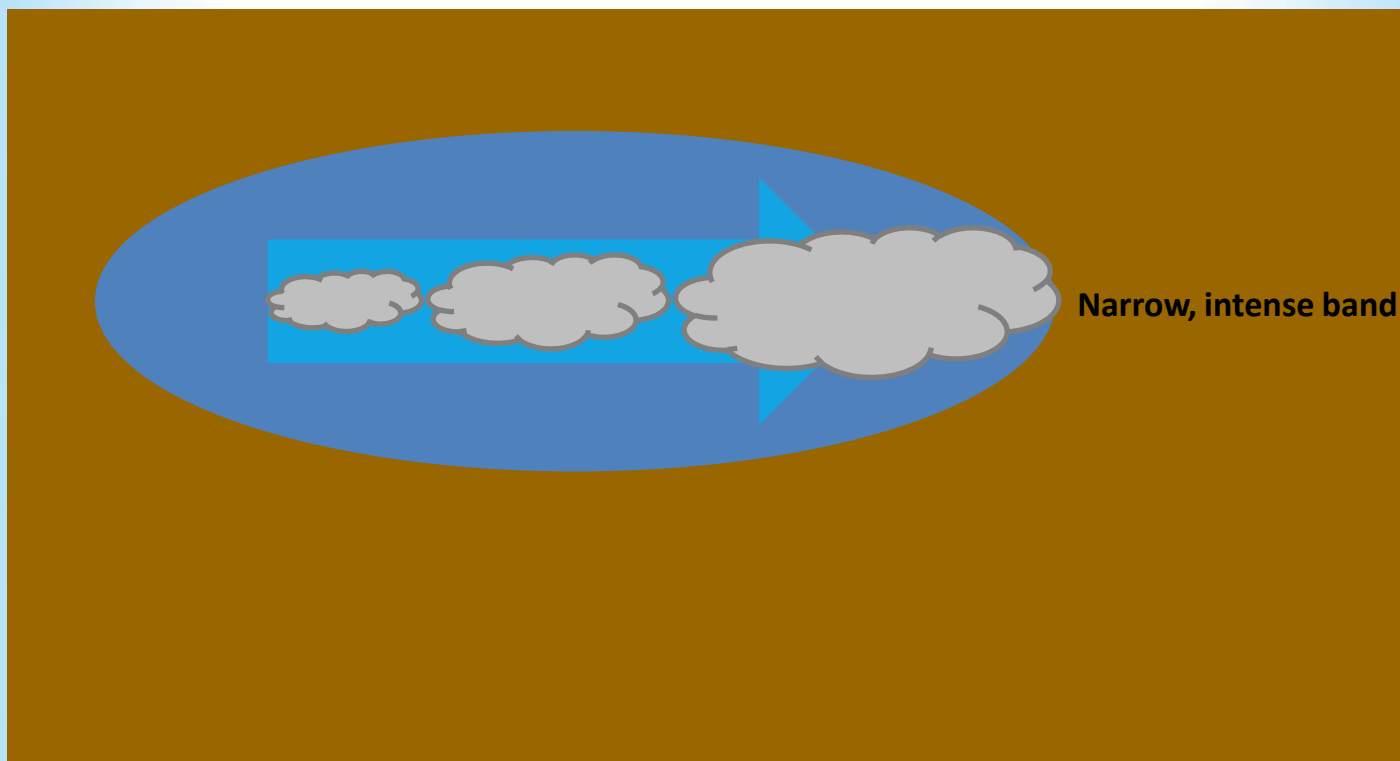


Lake Effect

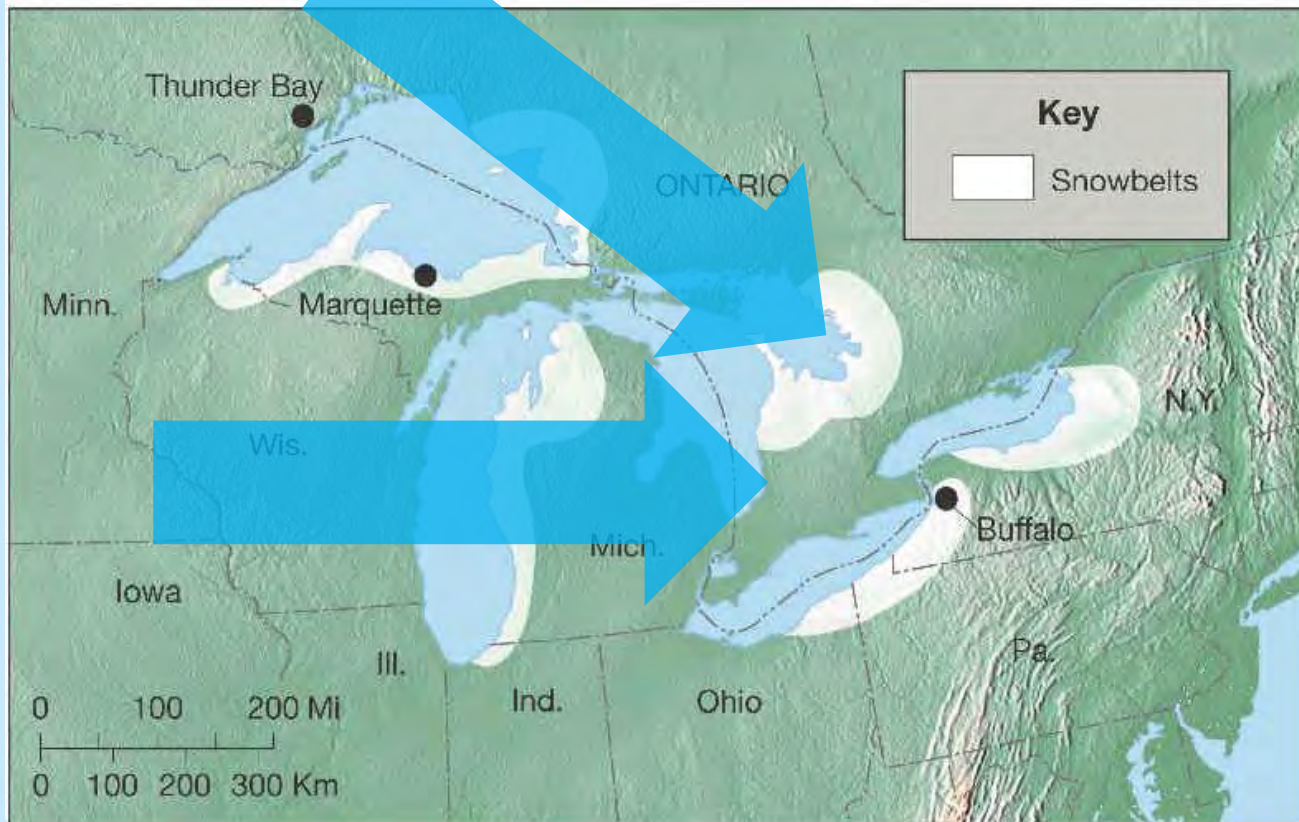




Lake Effect



Lake Effect





Freezing Spray

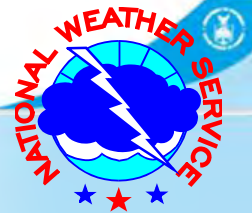
- Freezing spray is the accumulation of freezing water droplets due to the combination of cold water, wind, and cold air. Wave action is also a big factor on sea shore structures and vessels.
- We do issue freezing spray advisories and watches. Reports of freezing spray is important information for us (we never receive observations!).
- Please report the location, time of the event, how thick the ice is, wave conditions and winds if known.



Coastal Erosion / Inundation

- During major coastal storms the combination of high tides, strong onshore winds, and wave action cause significant damage to coastal areas.
- Please report any Coastal Erosion (natural or man-made) that you witness.
- Water inundation over low-lying areas that is impacting man-made features (roads...etc) is also very important to report.





Total Water Level

- What is Total Water Level?

Tide



**Storm
Surge**



**Wave
Runup**



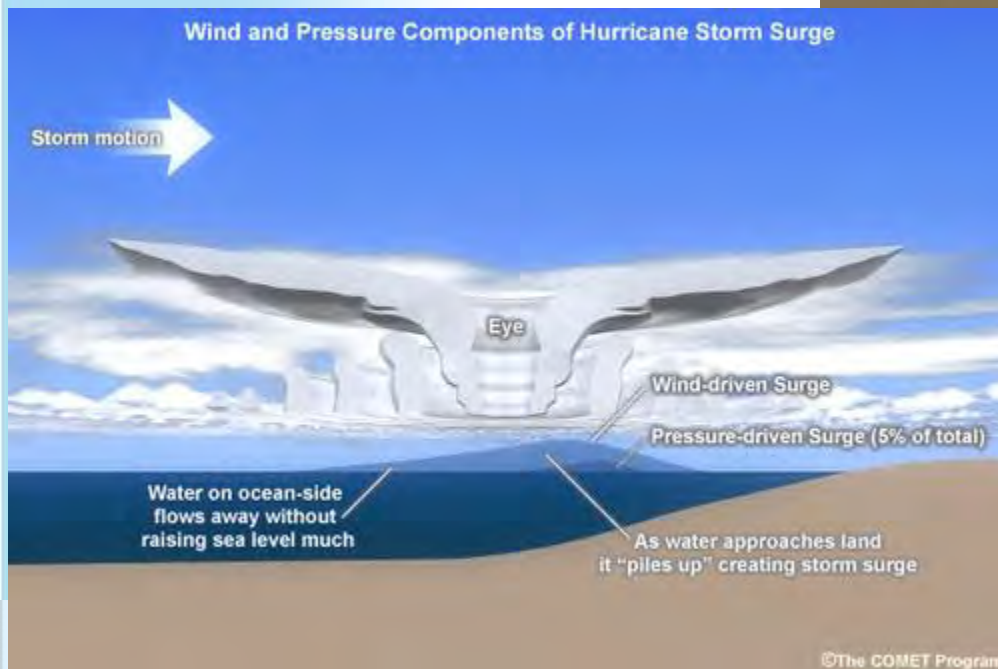
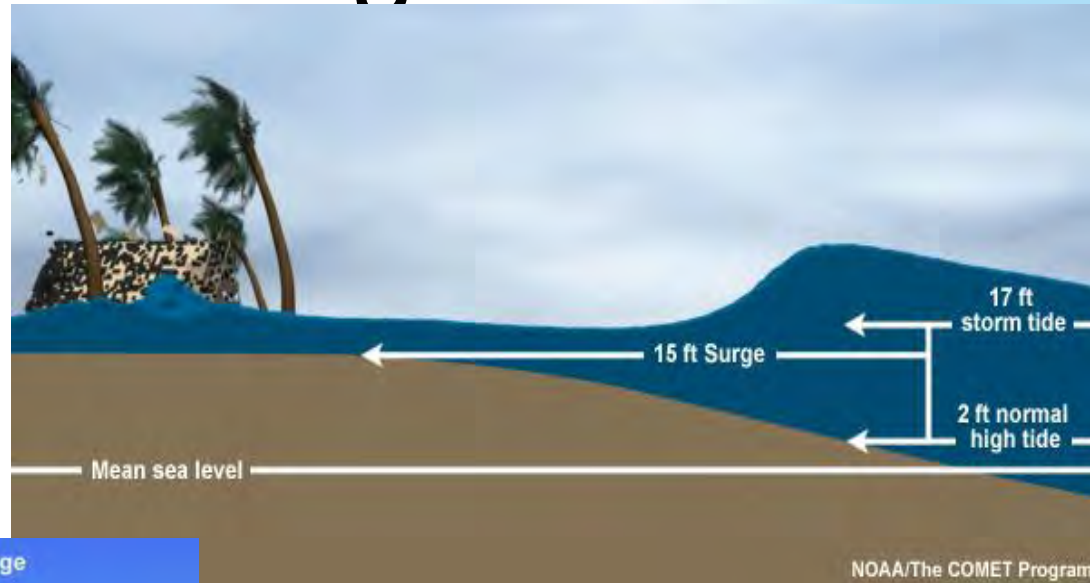
**Fresh-
water**

- To get the total picture of a coastal flood threat!



Storm Surge

- Storm surge is an abnormal rise of water generated by a storm, over and above the predicted astronomical tides.



- Storm surge is primarily driven by wind pushing water into the coastline (wind direction is very important!!!).
- The shape of the coastline itself plays a large role in how large the storm surge is for a storm

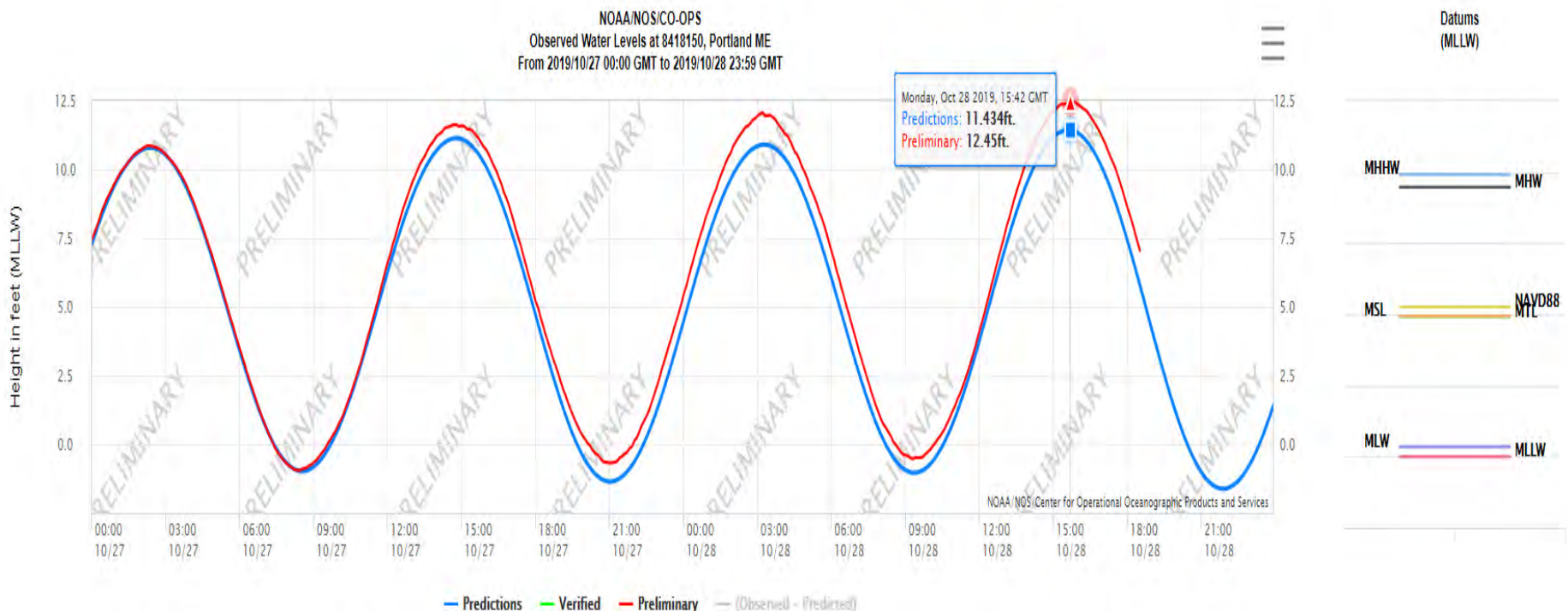
Wave Runup

- Wave runup is the maximum vertical extent of wave uprush on a beach or structure above the still water level
- Waves are very destructive due to the energy they possess: can destroy dune structures, artificial dunes, roads and buildings



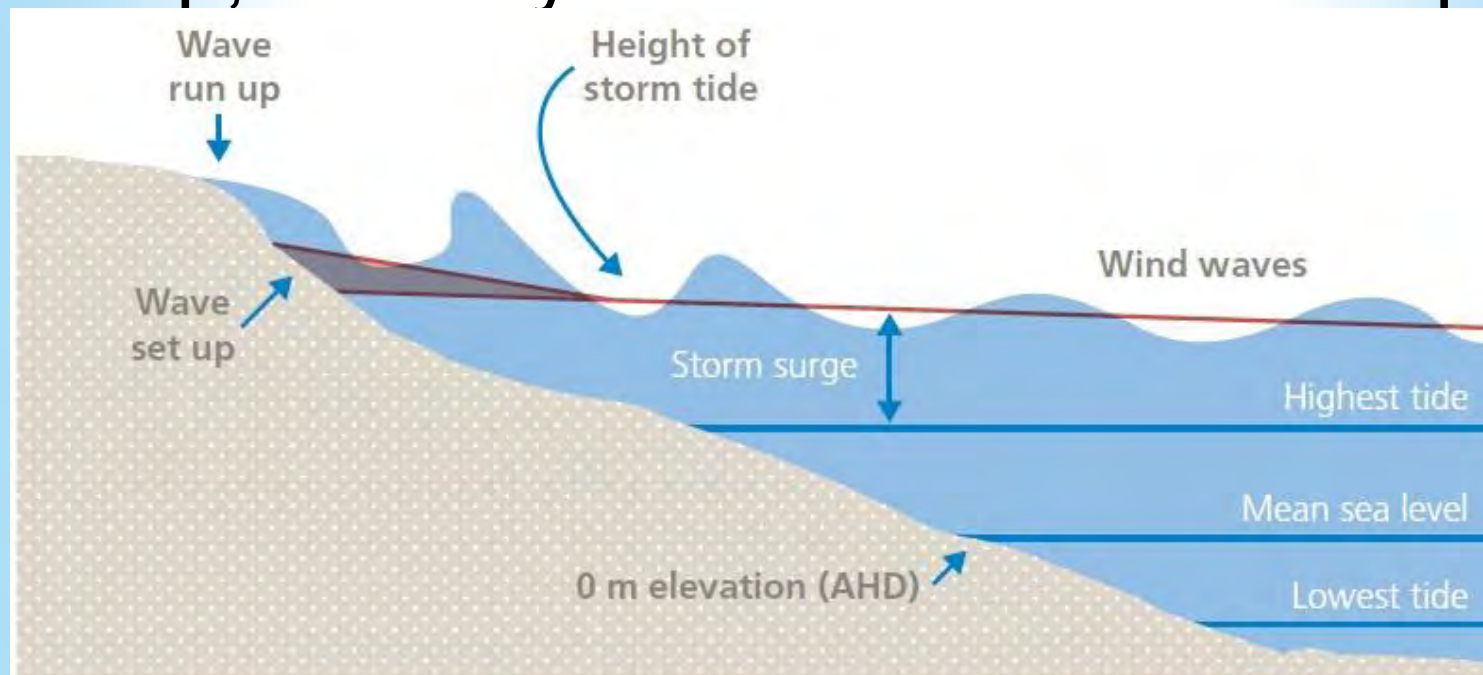
Tides

- HAT can have large impacts on coastal flooding
- HAT levels can be equivalent to a 2-3' storm surge at different locations along the Maine coast at high tide
- On the flip side water levels are much lower than normal at low tide



Total Water Level

- Putting it all together gets you the final ocean water height
- Tidal affected rivers don't have wave runup, but they do have fresh water input



Reporting Winter Weather

- Anybody can measure snow, but you will know how to accurately measure snow!!!
- Snowfall measurement is typically more difficult than rainfall
- Snowfall measurement takes a little more time

Accurate and timely snowfall measurements can be extremely important to the local National Weather Service office, public works departments, media outlets, climatologists, and other scientists

Reporting Winter Weather

Measuring Snow

- Most concerned with newly fallen snow, snowfall rates, and snow depth on the ground.
- Where, what, and how to best measure.
- Best measurement practices.
- How to make snowfall reports.



Selecting A Good Location

-

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as

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Snow measured under a tree



Notice that only 3.0 inches of snow has accumulated here

Snow measured in the open



...whereas 6.5 inches has fallen in the open

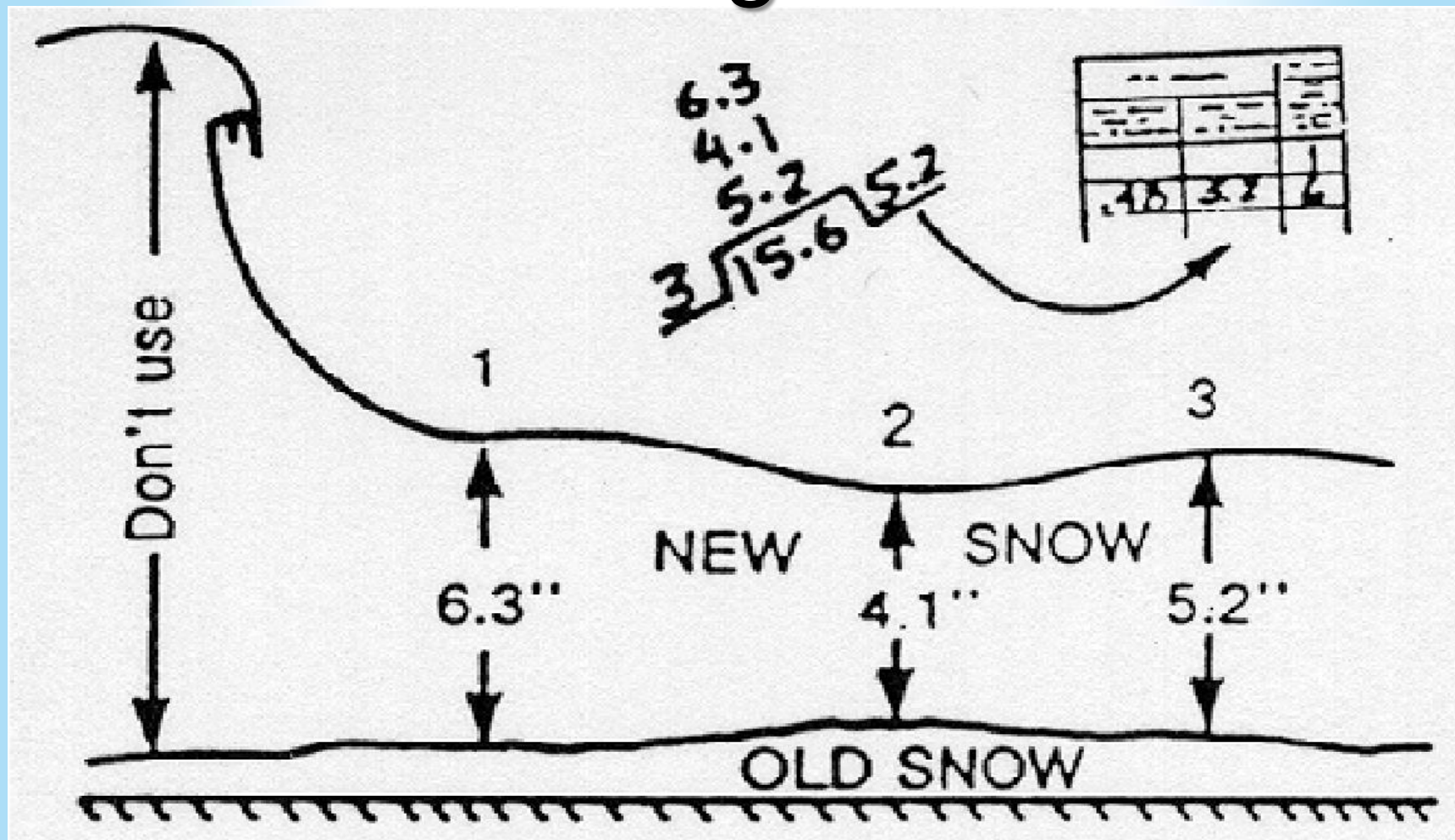
What You Can Use To Measure

- Rulers, Measuring Tape, Yardsticks
 - Measure to the nearest tenth of an inch.
 - Take an average (measure in a few spots where drifting has not occurred).





Measuring Snowfall



Take an average



What You Can Measure On

- Measuring on the grass or an elevated surface such as a deck is fine.
- Remember to avoid measuring right next to your house, or close to a driveway or road.
- You want to measure in a few different locations, to get the best average.
- Measurements made on a snowboard are best.

What You Can Measure On

Snow board

- A hard surface which can give you a more accurate measurement of snow.
- Measuring in grass will give you a higher reading.
- A snow board can be any light color board, roughly 2 feet by 2 feet.
- A piece of plywood painted white would be an example.



What You Can Measure On

- It's a good idea to mark the location of your snow board with a flag, reflector, or stick.
- This is a must for our area.



How Often Should I Measure?

- Measure at least **once** during the storm, as close to the end of snowfall as possible. This gives us the final snowfall total (newly fallen snow). ***Most Important!**
- If you can, you can also supply periodic updates (6hrs) of updated snowfall amounts.
- If you are experiencing very heavy snowfall, 2" an hour or greater, report every hour if you can.
- Do not measure and clear off the snowboard every hour! Clear the board every 6 hours or end of the event.



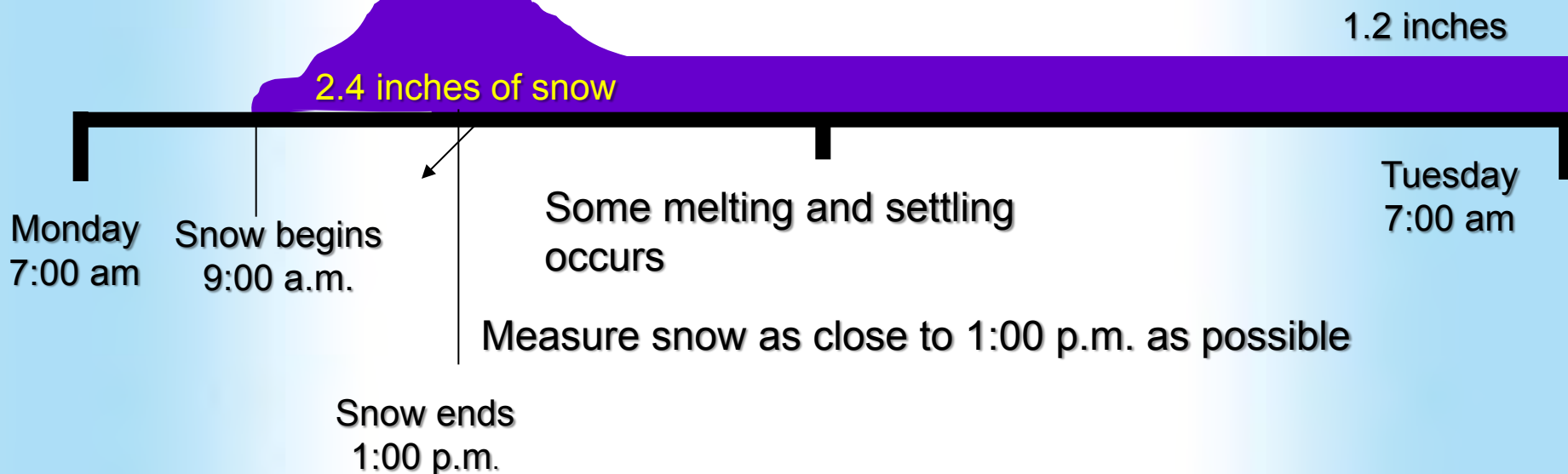
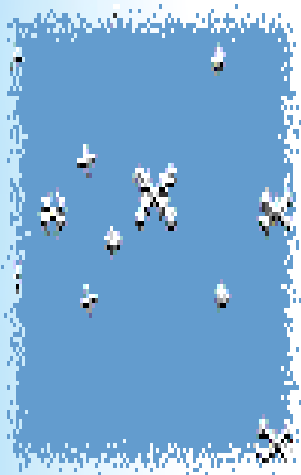
Clearing Your Location

- After you have made a final measurement, clear off the location so you are ready for the next snowfall.
- You can clear the board every 6 hours during a storm, but not before then.
- If you are using a snowboard, you can put the board on top of the newly fallen snow so that it is higher than the surrounding area (you don't want the snowboard in a snow hole)





A Snow Event



Measuring Sleet

- Locate a level, solid surface in the open
- Don't measure under/near trees or buildings, sleet bounces and rolls off surfaces.
- Directly measure the depth with a ruler in multiple locations and average.
- If you have snow that changes over to sleet, try to report how much is snow and how much is sleet.
- We know this can be difficult!



Measuring Freezing Rain

- Ideally you will find a flat metal object and measure the vertical thickness directly (vertical thickness measurement)
- Second method (mean radial thickness) is to find a twig coated by ice.
 - Measure the distance between the two yellow areas on each side.
 - Then divide by two.
 - $\frac{1}{4}'' + \frac{1}{4}'' = \frac{1}{2}'' / 2 = \frac{1}{4}''$ ice





Snow Measuring Summary

1. Find a nice, level place to measure where drifting or melting has not occurred (like a snowboard)
2. Slide snow stick or ruler into snow until it reaches the ground/board surface. Take an average.
3. Most concerned with newly fallen snow (storm total). These values are always to the nearest tenth of an inch.
4. Make sure to clean your location for the next snowfall when you are done measuring.



Measuring Snow Practice

A major snowstorm hits on the weekend when you are home. You decide to report throughout the storm. You already have 2" on the ground prior to the storm but your snow measuring area is free of snow.

- The snow starts at 9 AM and by 2 PM you have 5.3". You call the office.
 - What is the newly fallen snowfall at 2 PM?
- The snow continues and you pick up another 5 inches when it ends at 10 PM.
 - What is the final snowfall total at 10 PM?

Measuring Snow

Answer

- When you call the office at 2 PM you report 5.3”.
- When you call the office at 10 PM tell them you have measured 10.3” and this is a final total.
- No need to say 5” more fell. Different people may answer. Just give a running total, and be sure to give the final total at the end.

When to Report?

- Snowfall / Sleet

Newly Fallen snow: Try to call as close to the end of the event as possible (newly fallen, snowfall total).

Intense snowfall rates (2" or more per hour).

Extra Mile:

Knowing how much has fallen at the end of the event is nice, but knowing it as it is happening is **best** for our warning decision process. Call us with updates as possible, every 6 hours throughout the event.

Knowing when the snow started is also important information.

When To Report?

- **Ice Accumulation – any!**
 - Surface it is accumulating on
 - Thickness
- **Ice Cover On Rivers**
 - Provide ice reports once per week
 - Send updates as necessary due to ice jams or flooding
- **Coastal Erosion and Inundation**
 - Any damage, flooding or erosion you see
- **Freezing Spray – any**
- **High Winds – speeds and wind damage**
- **White-Outs / Blizzard Conditions – Near zero visibility and winds 35 mph**

Courtesy: Newzjunky





Storm Spotter Reporting Info

Report!!!!

- **Who** You are (Name and Spotter #)
- **What** You experienced
- **Where** The event occurred
give direction and distance from known location
- **When** The event occurred (exact time)

*****Preferred Method*****

Toll Free Weather Spotter Reporting Number:

1-800-482-0913

Pro: Quick and Fast



Online Form

- Via our website homepage select the “Submit Storm Report” Tile <https://inws.ncep.noaa.gov/report/>
- Forecasters will be notified at the office
- Do Not forget your Spotter ID Number!



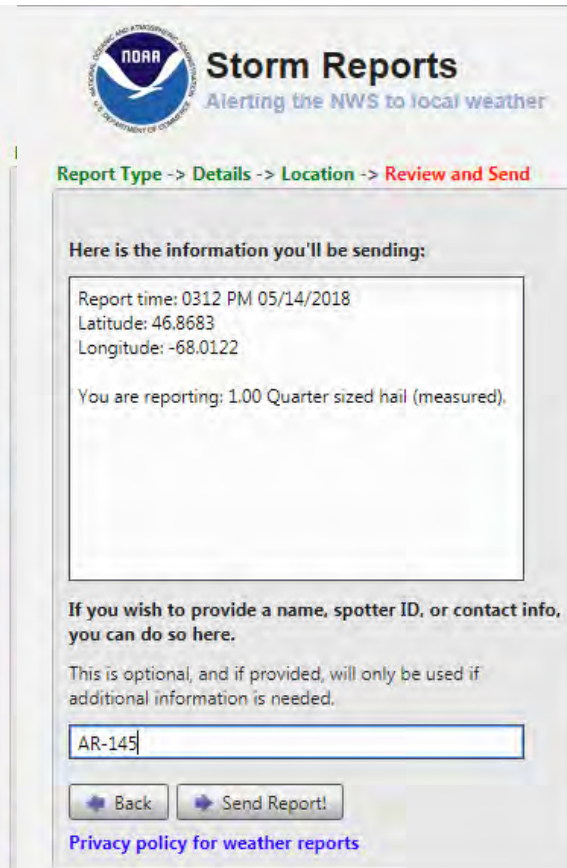
NOAA Storm Reports
Alerting the NWS to local weather

Report Type -> Details -> Location -> Review and Send

Hail

Back Next

[Privacy policy for weather reports](#)



NOAA Storm Reports
Alerting the NWS to local weather

Report Type -> Details -> Location -> Review and Send

Here is the information you'll be sending:

Report time: 0312 PM 05/14/2018
Latitude: 46.8683
Longitude: -68.0122

You are reporting: 1.00 Quarter sized hail (measured).

If you wish to provide a name, spotter ID, or contact info, you can do so here.

This is optional, and if provided, will only be used if additional information is needed.

AR-145

Back Send Report!

[Privacy policy for weather reports](#)

Pro: Quick, Fast, Mobile Friendly

Reporting Via Social Media



twitter.com/NWSGray

facebook

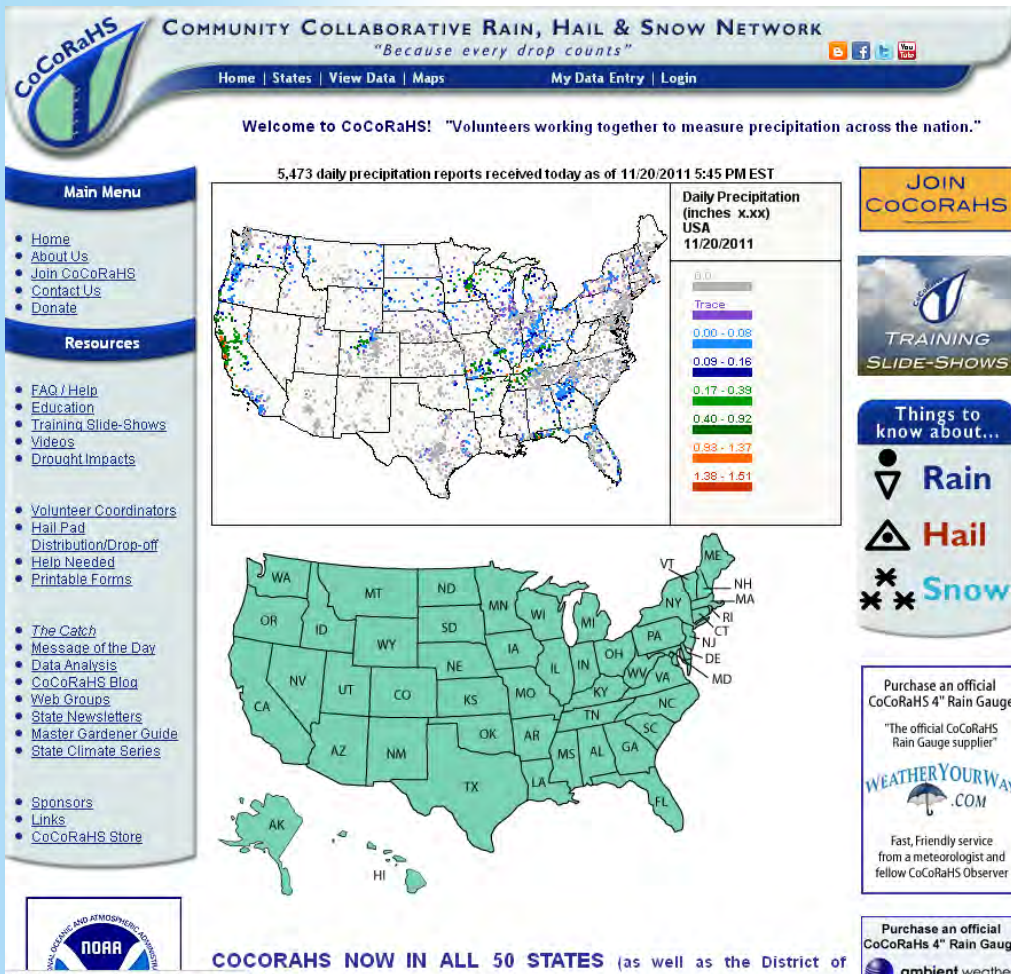
<http://www.facebook.com/NWSGray>

- 1) We will put up a post asking for reports
- 2) Be sure to indicate your spotter number (we know you have been trained)!
- 3) Include a picture or video if possible (snowfall, coastal flooding)!!!

CoCoRaHS

www.cocorahs.org

- Report rain and snow amounts everyday.
- Make reports online.
- This is ideal for those who wish to record the weather everyday.
- More training can be found online.
- Reports auto-ingest into our system.



CoCoRaHS
COMMUNITY COLLABORATIVE RAIN, HAIL & SNOW NETWORK
"Because every drop counts"

Home | States | View Data | Maps | My Data Entry | Login

Welcome to CoCoRaHS! "Volunteers working together to measure precipitation across the nation."

5,473 daily precipitation reports received today as of 11/20/2011 5:45 PM EST




Daily Precipitation (inches x.xx) USA 11/20/2011

Trace
0.00 - 0.08
0.09 - 0.16
0.17 - 0.39
0.40 - 0.92
0.93 - 1.37
1.38 - 1.51

JOIN CoCoRaHS

TRAINING SLIDE-SHOWS

Things to know about...

-  **Rain**
-  **Hail**
-  **Snow**

Purchase an official CoCoRaHS 4" Rain Gauge
"The official CoCoRaHS Rain Gauge supplier"

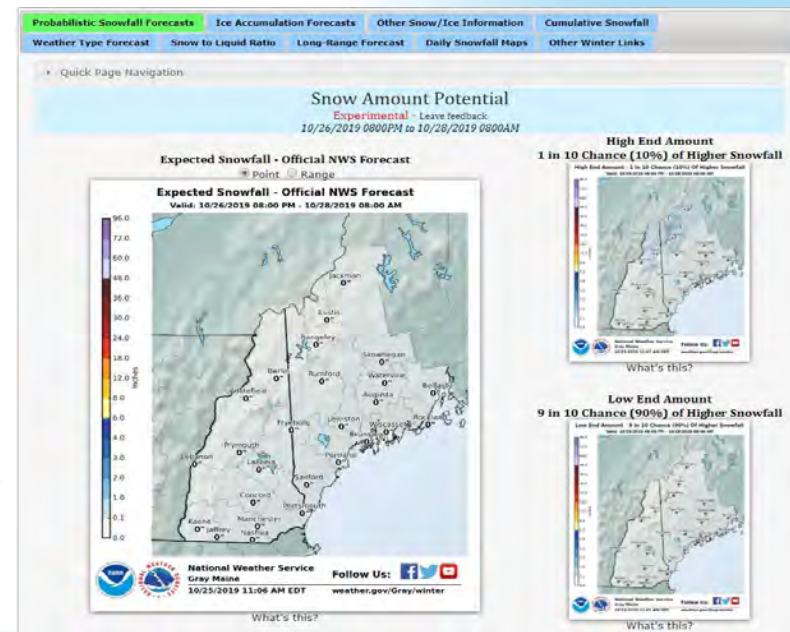
WEATHERYOURWAY.COM
Fast, Friendly service from a meteorologist and fellow CoCoRaHS Observer

Purchase an official CoCoRaHS 4" Rain Gauge
ambient weather

COCORAHs NOW IN ALL 50 STATES (as well as the District of Columbia)

How to Stay Up To Date?

- Internet:
 - www.weather.gov/gyx
 - www.weather.gov/gyx/winter
- Social Media
 - <https://twitter.com/nwsgray>
 - <https://www.facebook.com/NWSGray>
- Phone/Tablet Apps
 - mobile.weather.gov
 - FEMA Weather Alerts
 - Private Weather Apps
 - All of them relay NWS Watches/Warnings
 - Good radar apps for tracking storms out there



Winter Preparedness Resources

- <https://www.weather.gov/safety/winter>
- https://www.weather.gov/wrn/winter_safety
- <https://newengland511.org/>



What about this winter?

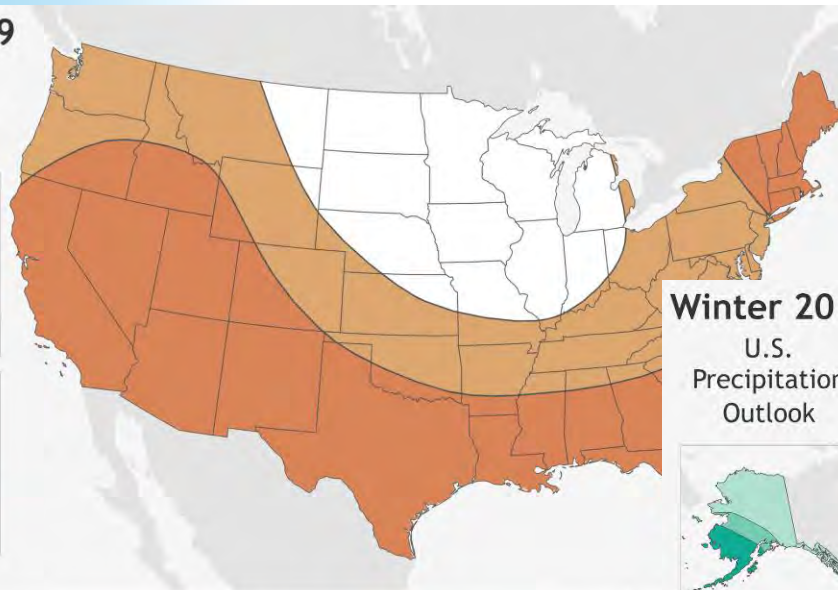
<https://youtu.be/FYHs2Ng7iuc>

Winter 2019

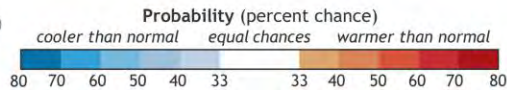
U.S. Temperature Outlook



AK and HI not to scale

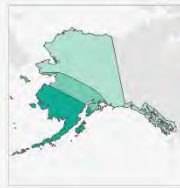


Temperature Outlook
for December 2019 – February 2020
Issued 17 October 2019

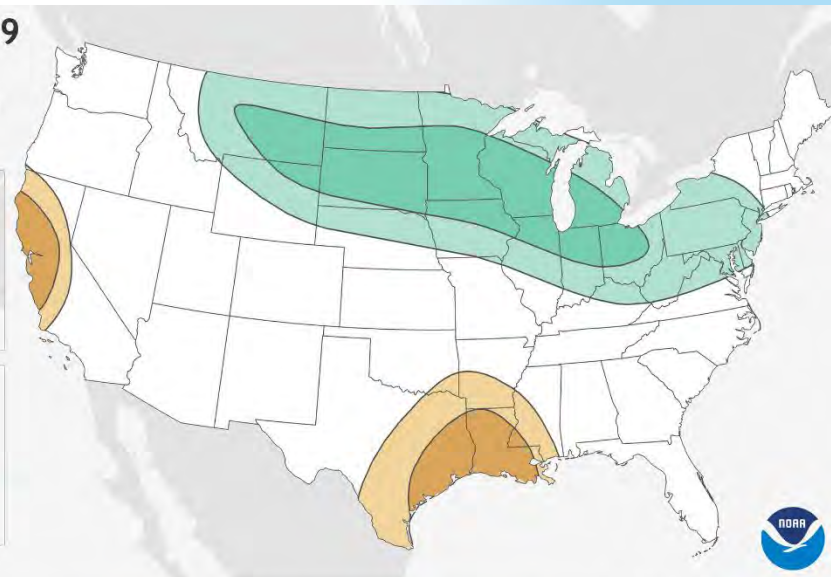


Winter 2019

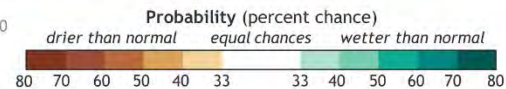
U.S. Precipitation Outlook



AK and HI not to scale



Precipitation Outlook
for December 2019 – February 2020
Issued 17 October 2019



NWS Climate Prediction Center
Map by NOAA Climate.gov



NATIONAL WEATHER SERVICE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION



ANY QUESTIONS?

