

WEBINAR

2025-2026 Winter Weather Outlook



Before we get started....

- This webinar is being recorded. The recording will be available following the webinar
- By default, all attendees are in listen-only mode, and your microphone is muted
- Have questions? Enter them in the questions chat box, and we will answer them during the Q&A session at the end of the presentation
- Feel free to contact us after the presentation at info@aem.eco



Agenda

1. 2024-2025 winter season review
2. What goes into developing a winter outlook
3. The 2025-2026 winter outlook
4. Winter outlook industry-based impacts
5. Audience Q&A

2024-2025 Winter outlook meteorological team



KYLE LEAHY

Forecast Meteorologist



MARK PAQUETTE

Meteorologist



ROB REALE

Director, Meteorological
Services

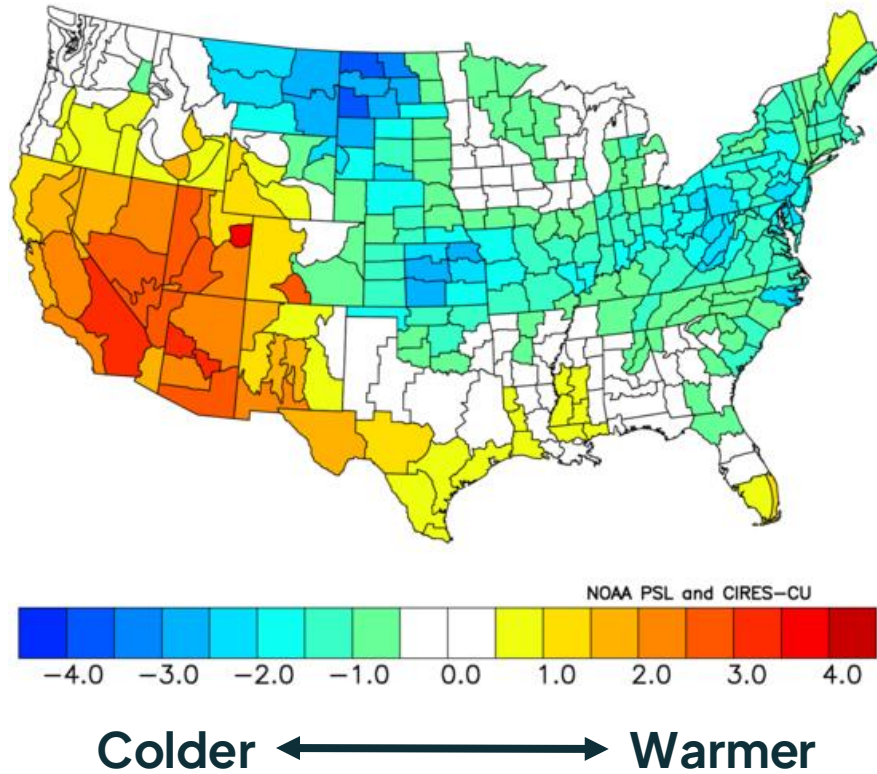


01

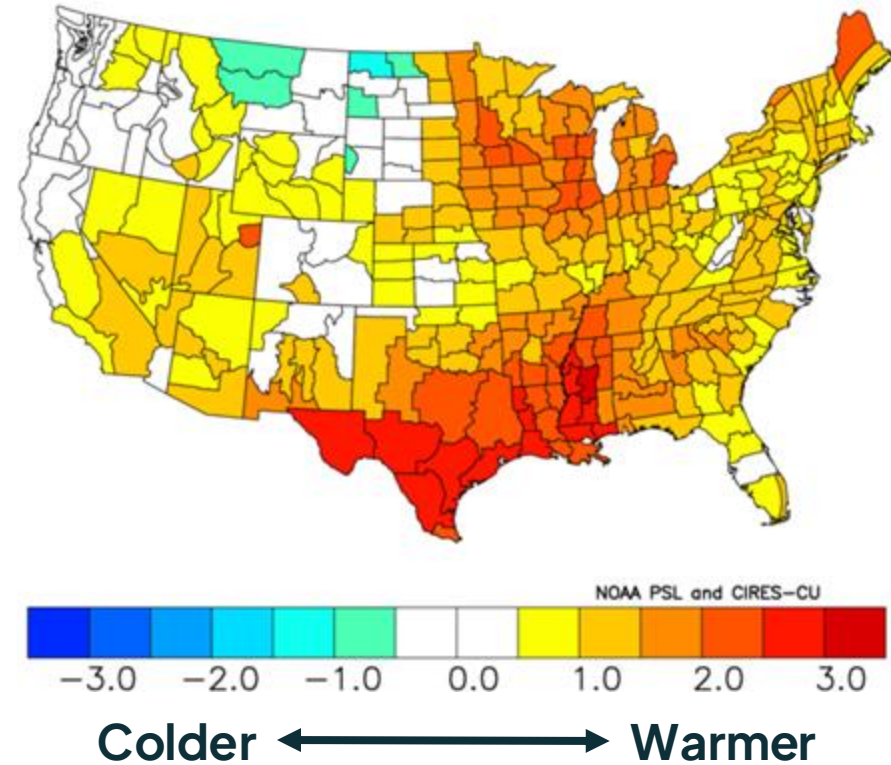
2024-2025 winter season review

2024–2025 winter recap - Temperature

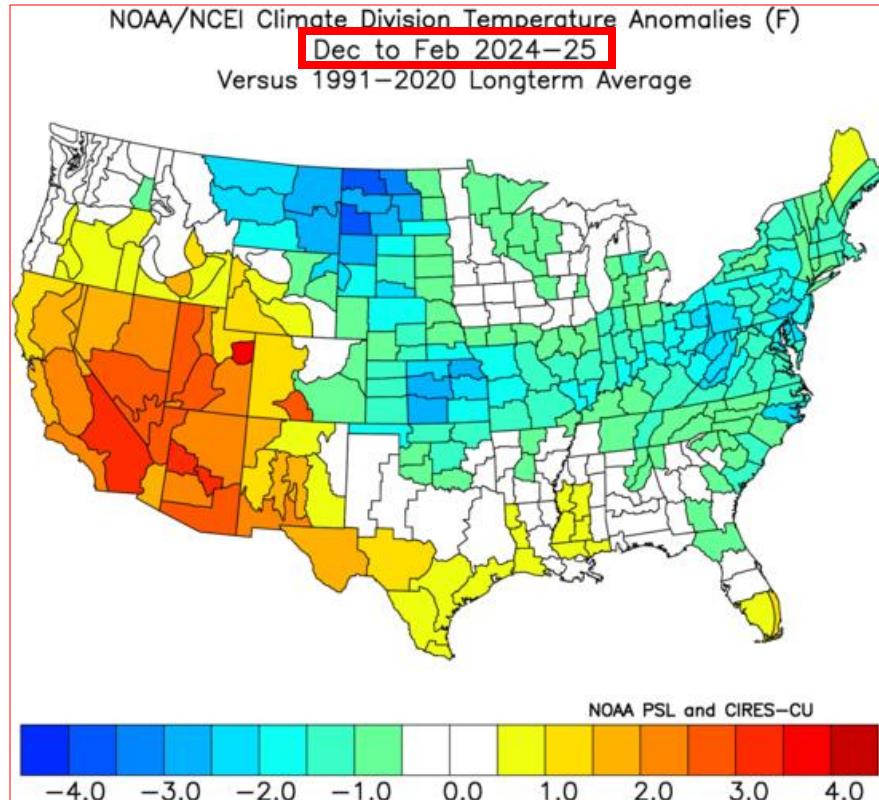
This one?



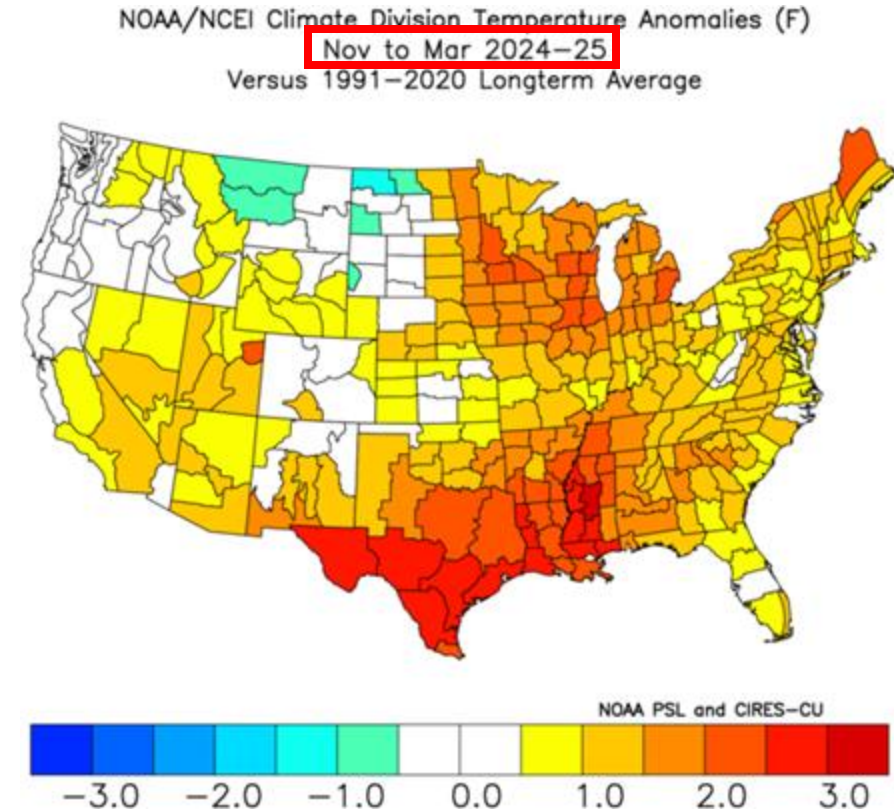
Or this one?



2024–2025 winter recap - Temperature

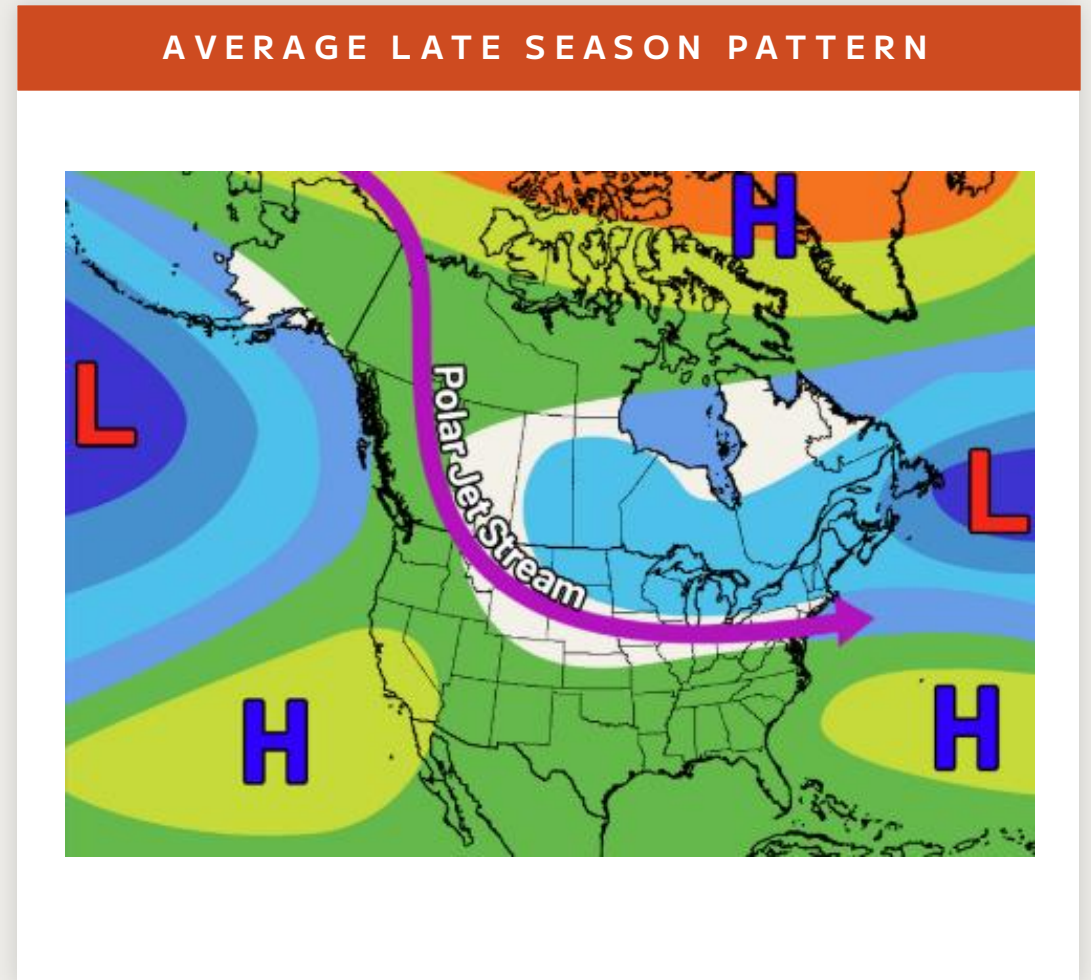
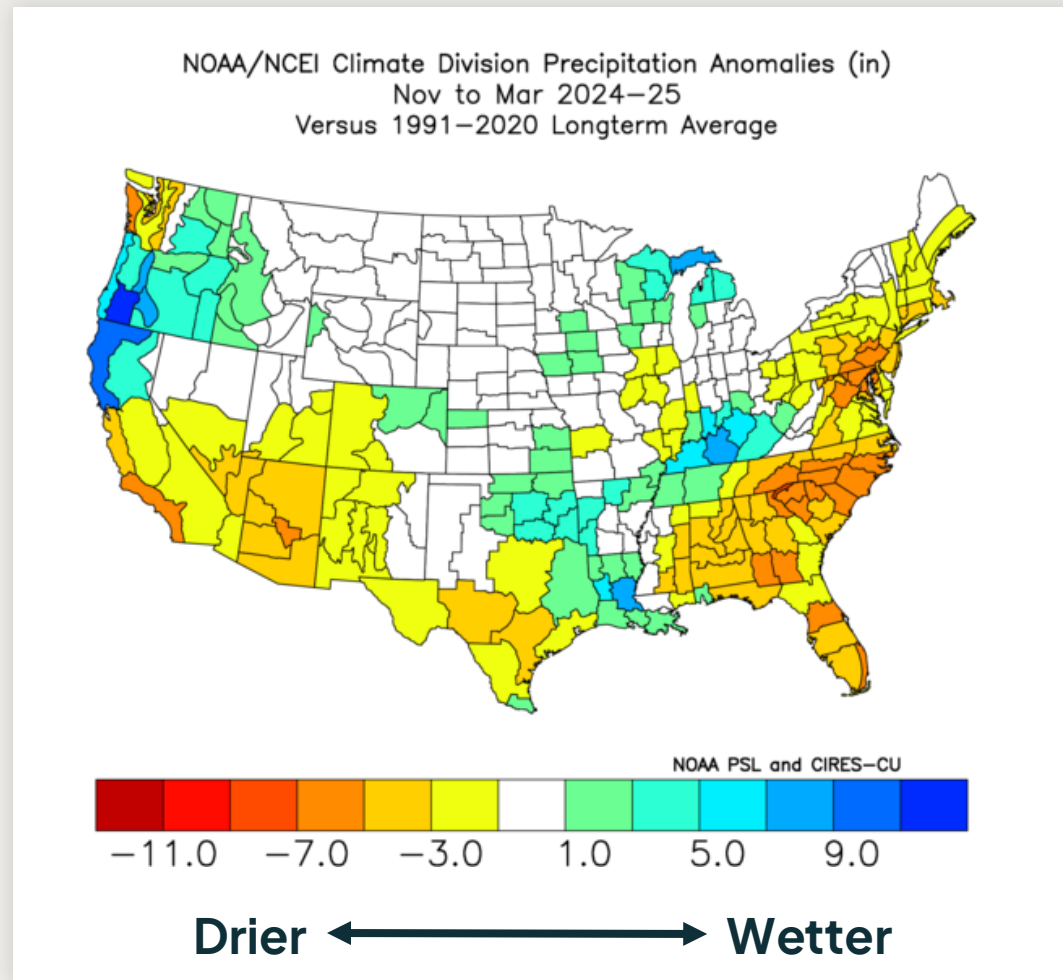


Colder ← → Warmer



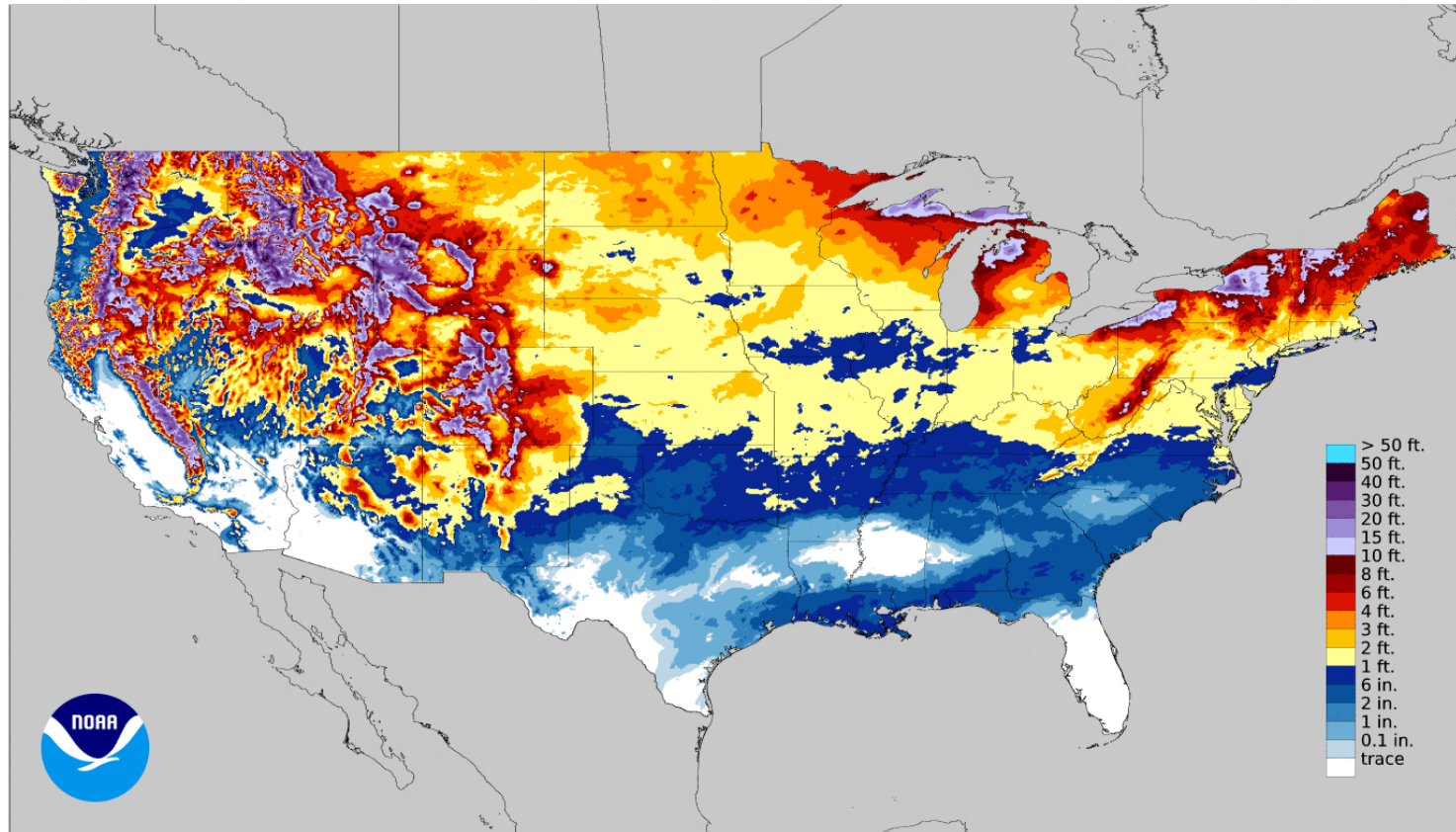
Colder ← → Warmer

Winter 2024–2025: Precipitation & pattern



Winter 2024-25 seasonal snowfall

Headlines



- **November 7–9:** Blizzard in parts of the Rockies & Plains brings heavy snow
- **January 4–7:** Storm brings significant snow from Kansas to Virginia
- **January 9–11:** Another storm brings wide swath of snow from the Ohio Valley into the mid-South
- **January 19–22:** Rare Gulf Coast snow storm, swath of 6–12" of snow from coastal TX into the FL panhandle!
- **February 4–6:** Atmospheric river brings heavy rain & snow to the west. Up to 3' of snow in the Sierras & strong gusty winds
- **March 2–6:** Blizzard conditions in parts of the Plains & Midwest, severe weather in the South

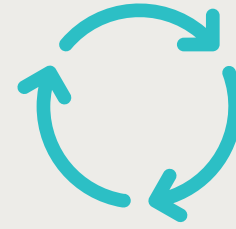


02

What goes into developing
a winter outlook

The process

How are seasonal forecasts made?



- Examination of current & recent global scale patterns & circulations
 - **ENSO (El Nino/La Nina)**
 - Other **Sea Surface Temperatures (PDO)**
- Develop “analog” years, where we link prior years with how we feel this winter will unfold using **pattern recognition**
- **Periodically evaluate** the analogs with respect to actual observed weather & near-term forecasts
- Incorporate computer model guidance **when appropriate**

What is an analog?

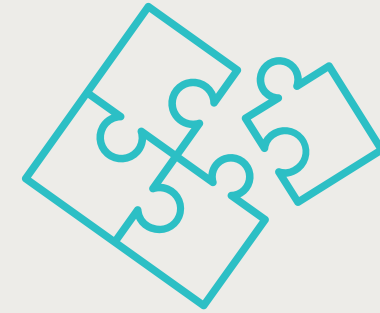
analog 2 of 2 noun

an·a·log

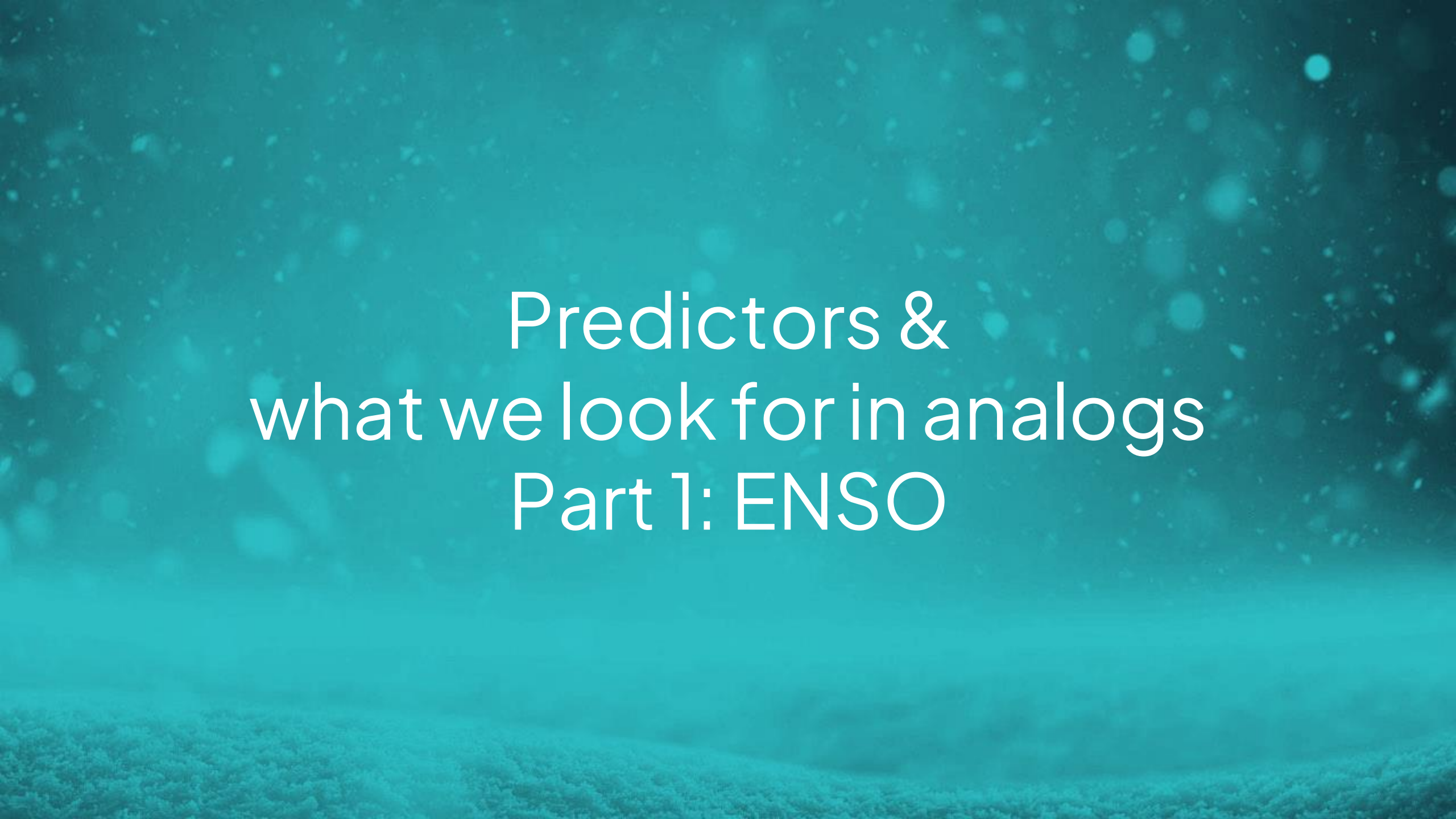
variant spelling of [ANALOGUE](#) entry 1

- 1 : something that is similar or comparable to something else either in general or in some specific detail : something that is [analogous](#) to something else
| historical *analogues* to the current situation

-Merriam Webster



- For our purposes, it's a winter that has characteristics and patterns similar to what we're expecting this season
- Unfortunately, there's no such thing as a perfect analog
- By developing several "decent fits" (~6 - 10), we get a sense of the range of possible deviations and outcomes

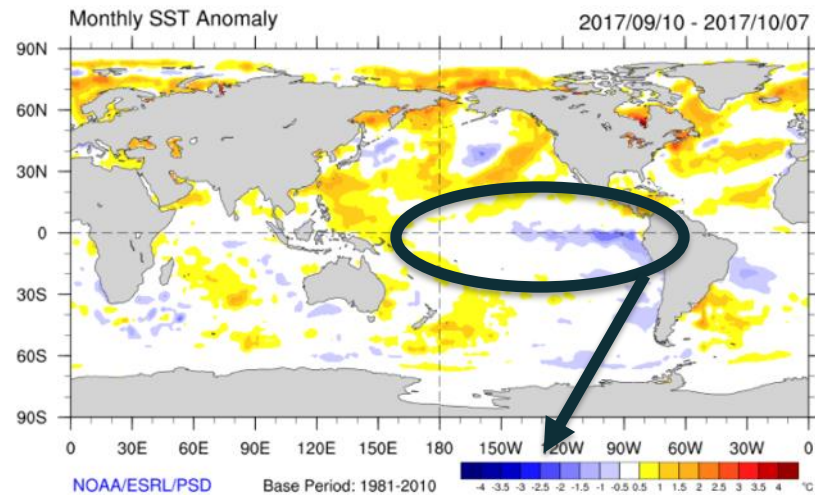
The background is a solid teal color with a bokeh effect of out-of-focus light spots. At the bottom, there is a faint, dark teal silhouette of a field or landscape.

Predictors & what we look for in analogs Part 1: ENSO

What is ENSO? (El Niño Southern Oscillation)

LA NIÑA

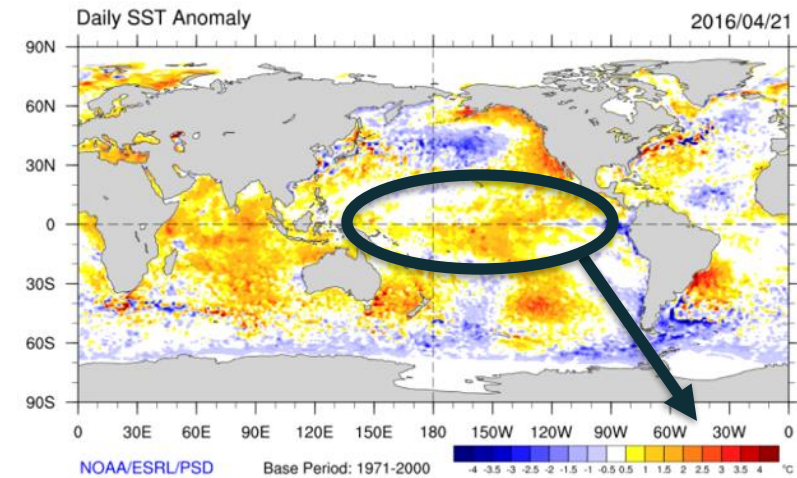
Sea surface temperature anomalies



Below average

EL NIÑO

Sea surface temperature anomalies



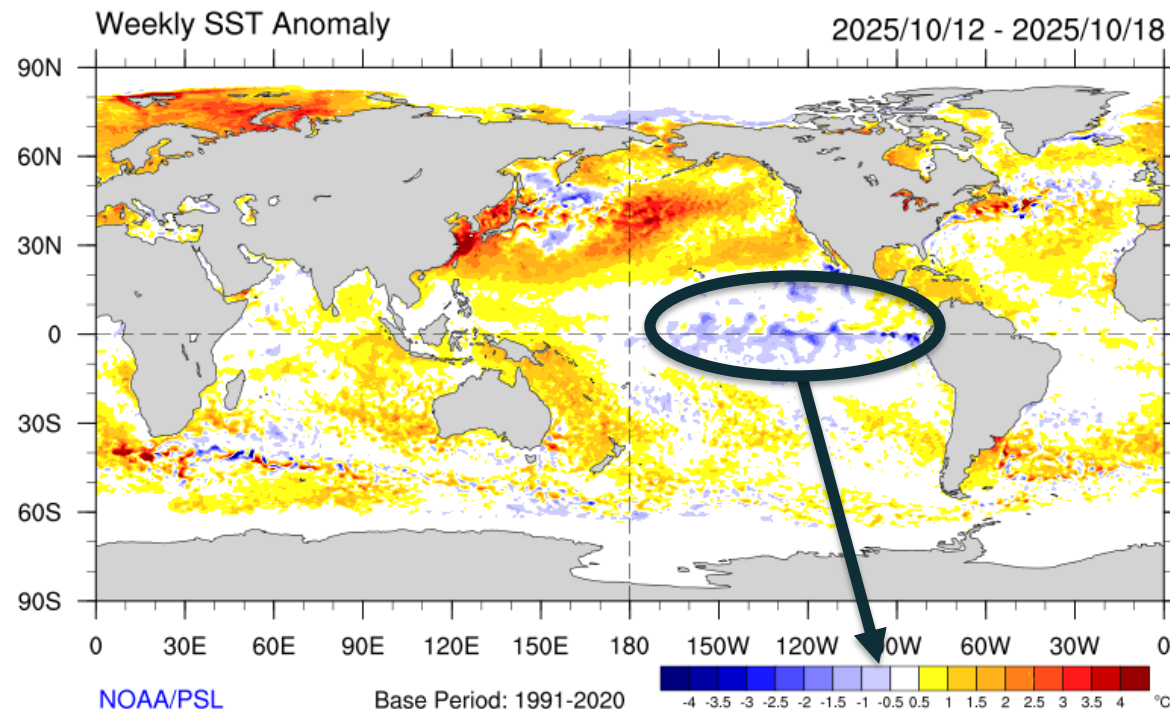
Above average

ENSO is a periodic, cyclical warming or cooling of the equatorial Pacific Ocean

Look at the huge difference!!!

Which phase of ENSO is expected this winter?

WEAK LA NIÑA DEVELOPING BY WINTER

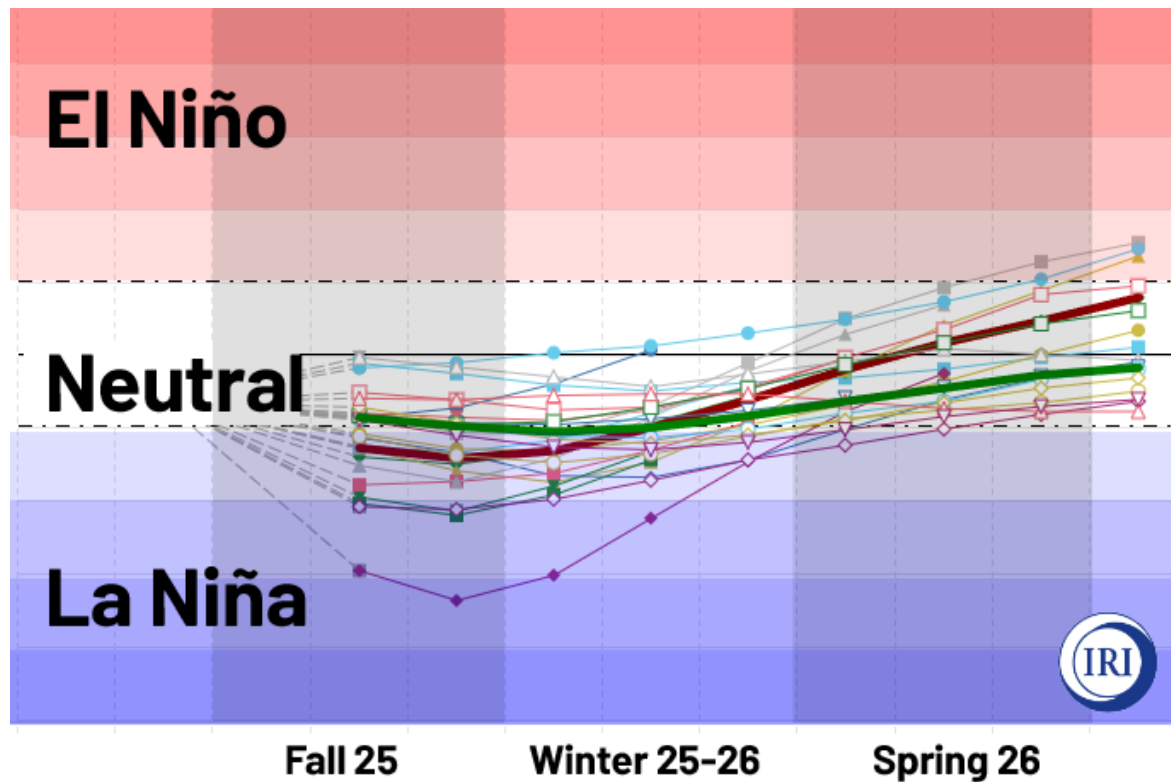


Below average

- Currently, the equatorial Pacific sea surface temperatures are only very slightly below normal, in a “cool neutral phase”
- Recent trends and modeling suggest that a weak La Niña will develop this winter

Forecast model predictions of ENSO through Spring

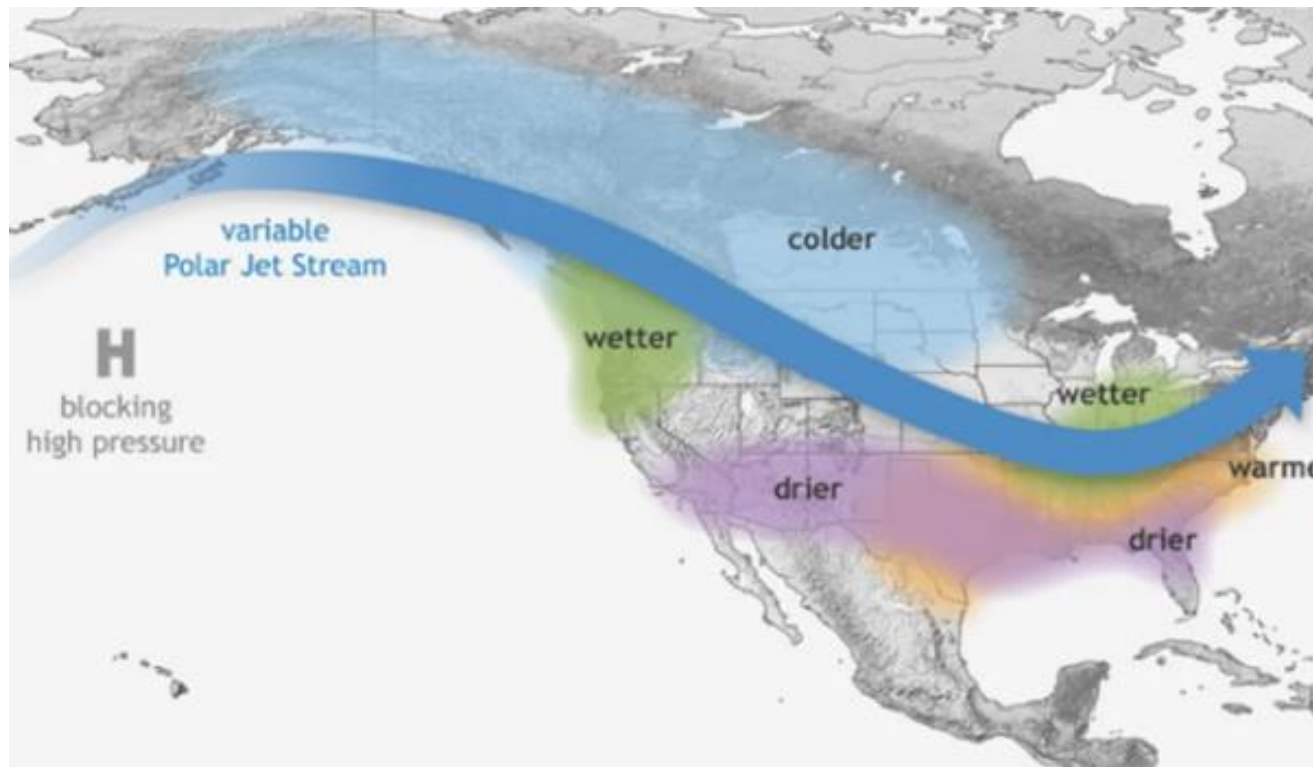
MODEL ENSO PREDICTIONS FROM OCTOBER 2025



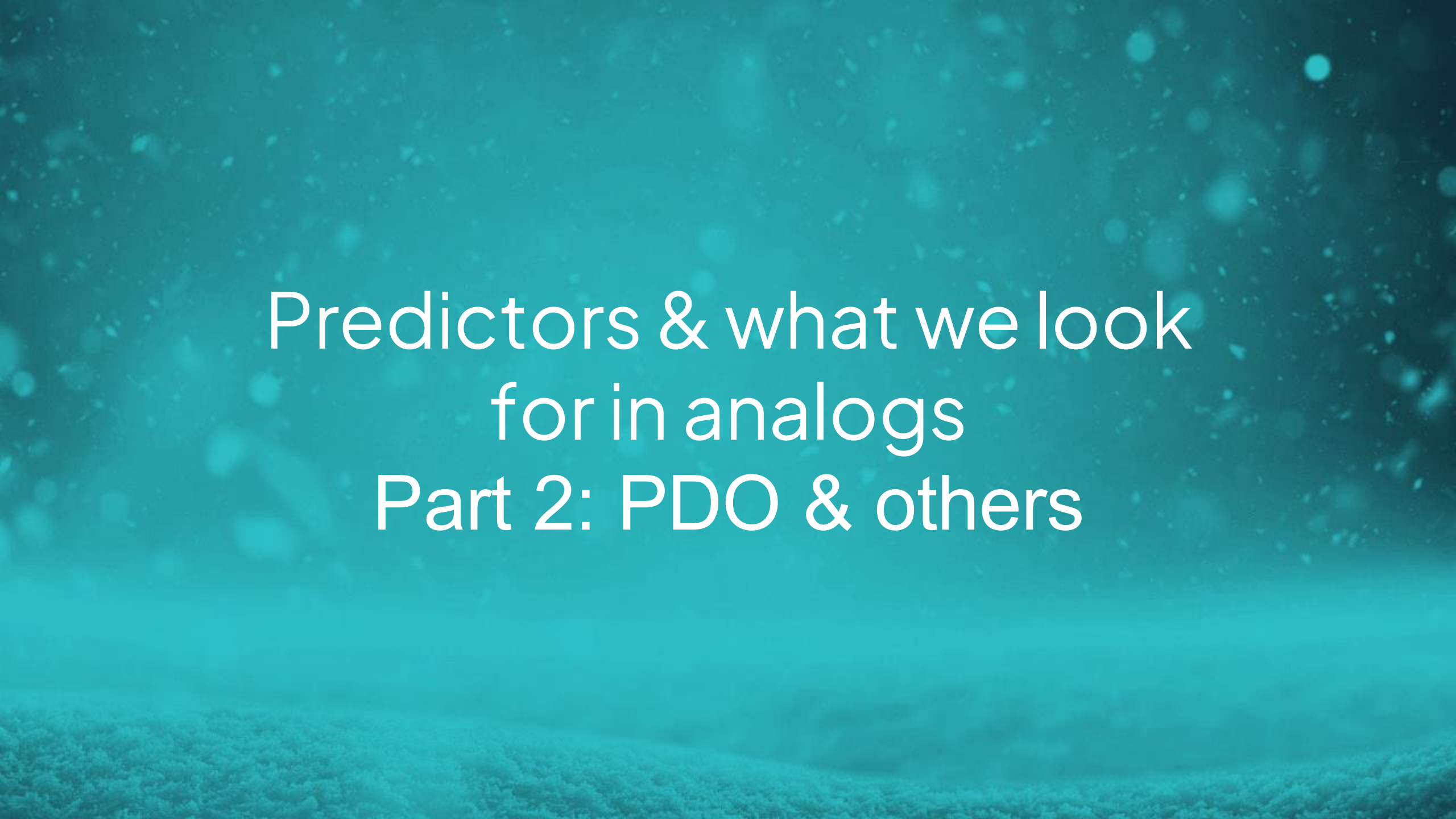
- Forecast for El Niño 3.4 Region (central equatorial Pacific Ocean)
- -0.5 is the threshold (shaded in the lightest blue) for a La Niña
- La Niña is expected to peak late fall/early winter, then trend neutral by the end of winter

Typical winter La Niña impacts

LA NIÑA JET STREAM PATTERN



- Wet (snow in the mountains) for the Northwest and Midwest to Ohio Valley
- Colder than normal across the north-central U.S.
- Dry across most of the southern U.S.
- Warmth overwhelms the southern Plains, Deep South, and Southeast



Predictors & what we look for in analogs

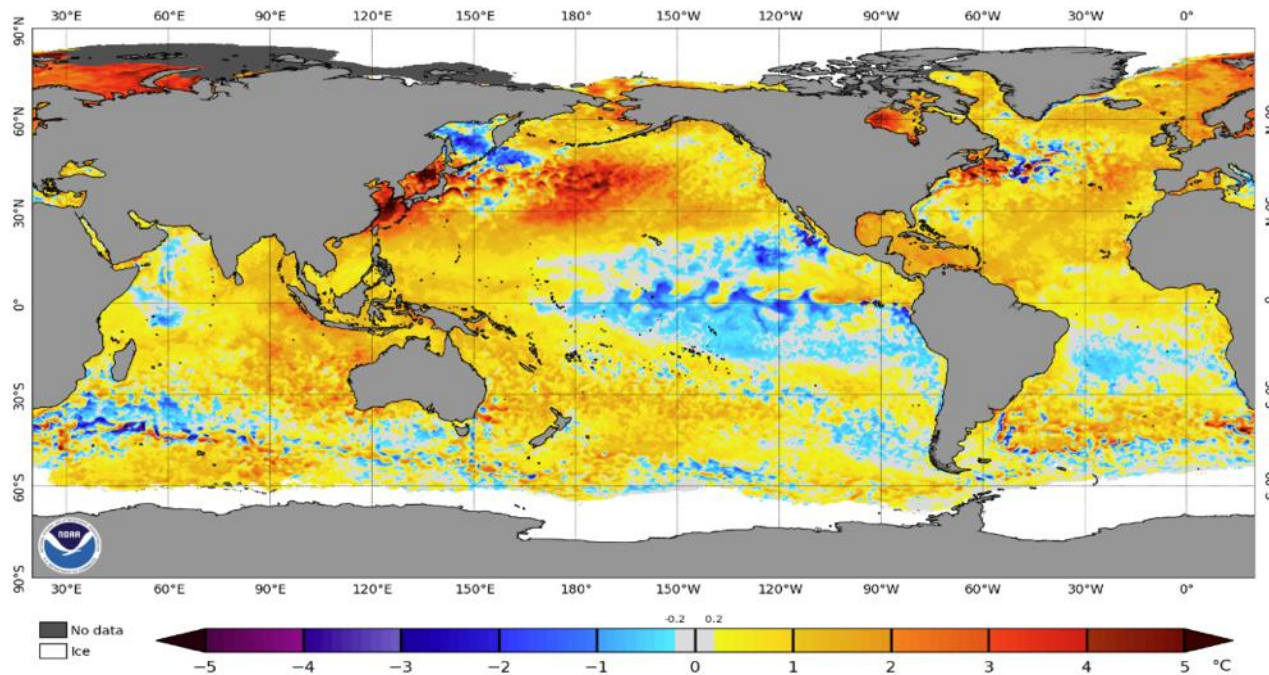
Part 2: PDO & others

Pattern of surface temps in the North Pacific (PDO)

WARM "BLOB" OF WATER IN THE NORTH PACIFIC OCEAN
MAY PROVE TO BE A HUGE PLAYER IN THIS WINTER'S WEATHER

Current Operational SST Anomaly Charts

NOAA Coral Reef Watch Daily 5km SST Anomalies (v3.1) 17 Oct 2025



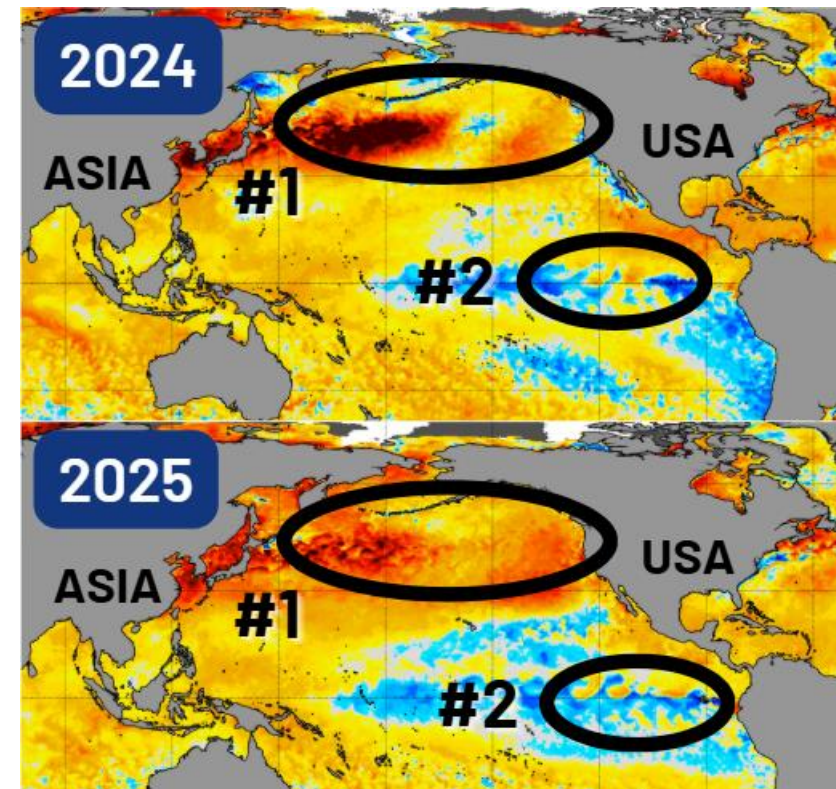
- Pacific Decadal Oscillation (PDO) is currently strongly negative and will likely stay that way
- A ridge, trough, ridge pattern across the US often results from a - PDO; with these features, the Northern Plains often are colder than normal, and the Southwest and Southeast tend to be warmer than normal; the trough locations determine the coast's temps
- Analog years focused on neutral to weak La Niña winters coupled with a negative phase of the Pacific Decadal Oscillation

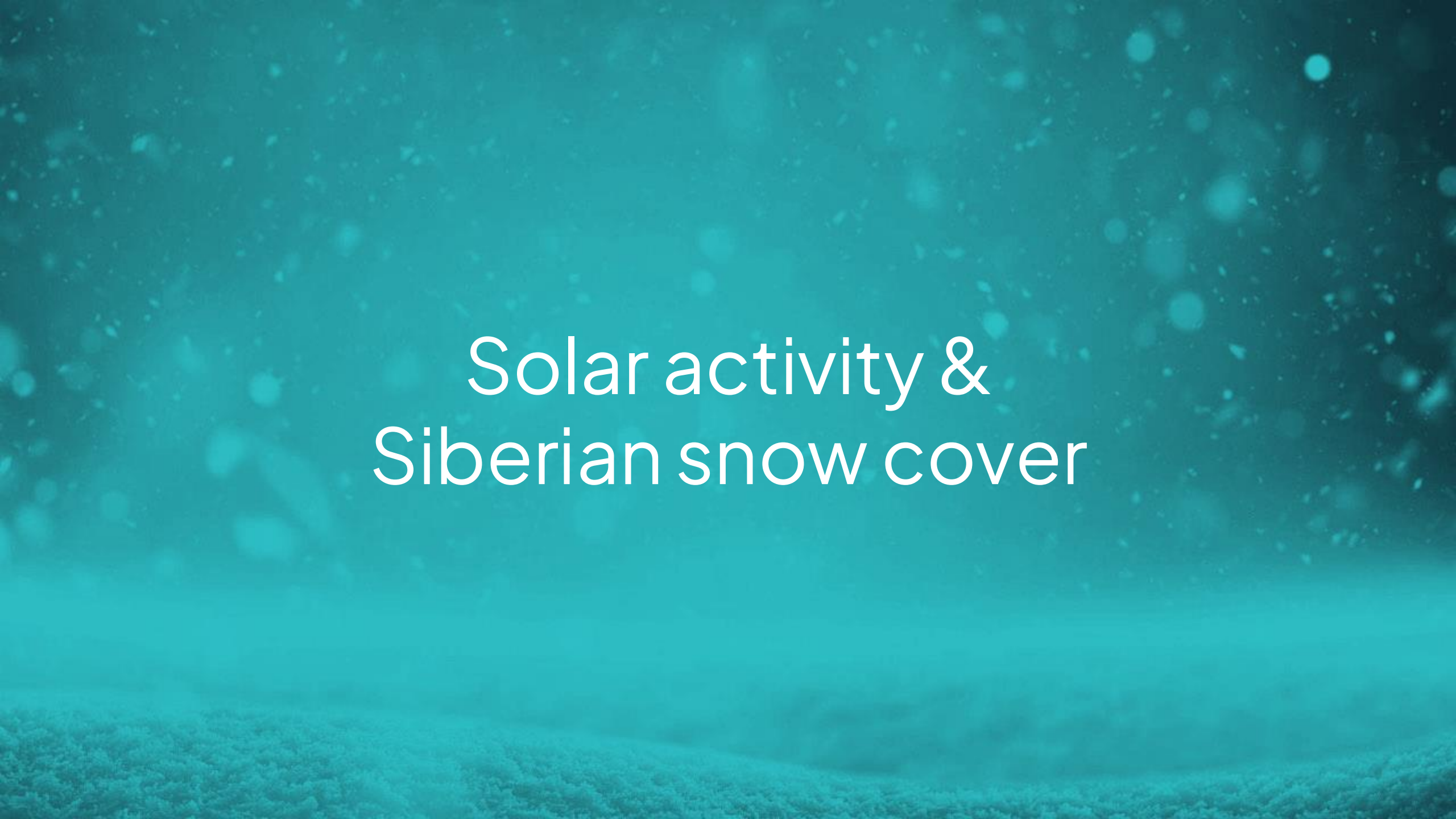
Quick comparison: Pacific Ocean

Pacific Ocean Water Temps Fall 2024 vs. Fall 2025

KEY TAKEAWAYS

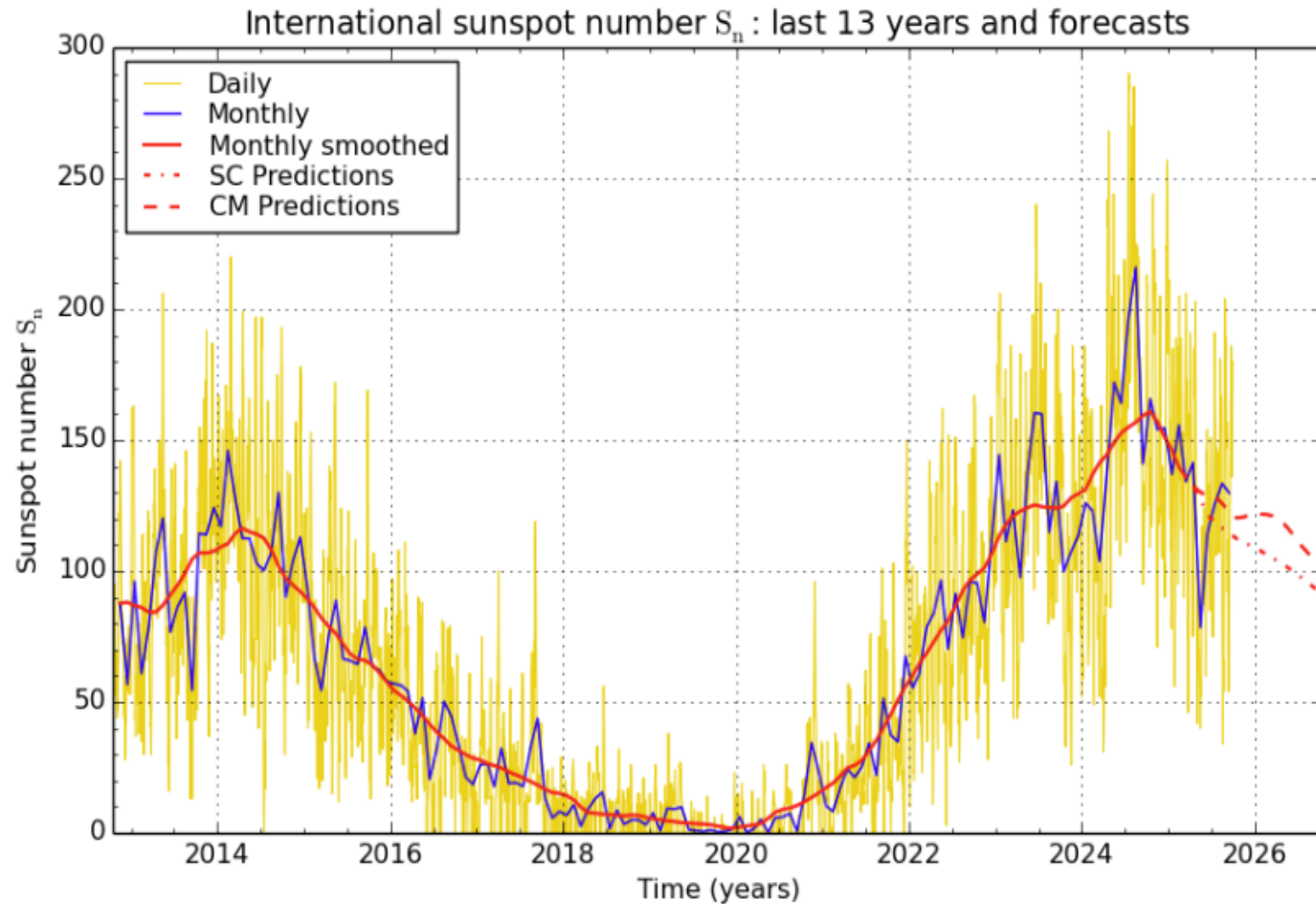
- Overall there are similarities: with a fairly warm North Pacific (Area #1, the PDO region), except for cool waters near the equator and off the coast of South America (Area #2, the ENSO region)
- The primary difference is the PDO has shifted considerably. In 2025, note the “less warm” water east of Asia, and the warmer water south of Alaska and off the U.S. West Coast
- Secondly, the reflection of La Niña is more cohesive in 2025, especially on the eastern side
- These shifts in the PDO are worthy of monitoring through the season; if this shift continues, it’s possible the winter will be colder than we’re currently forecasting, especially in the Eastern U.S. & Canada



The background is a teal-colored image. The upper portion features a bokeh effect with numerous out-of-focus light spots of varying sizes. The lower portion shows a field of small, light-colored flowers, possibly daisies, in soft focus.

Solar activity & Siberian snow cover

Solar Maximum

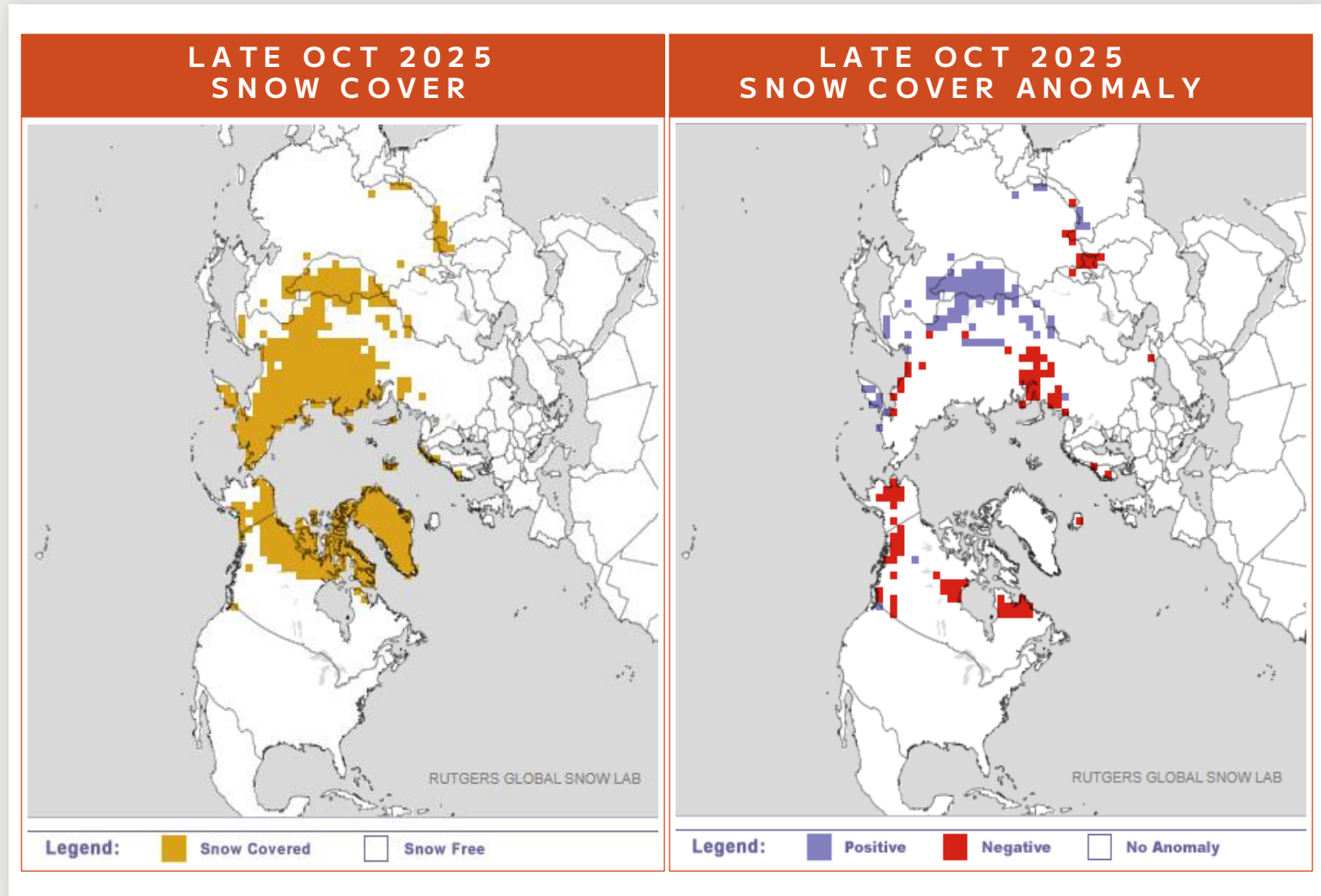


SILSO graphics (<http://sidc.be/silso>) Royal Observatory of Belgium 2025 October 3

- During solar maximum, the polar vortex tends to be more constricted
- Below-normal snow accumulations are favored during solar maximum
- The solar max can have subtle effects on the North Atlantic and Arctic Oscillations

Siberian snow cover (SSC)

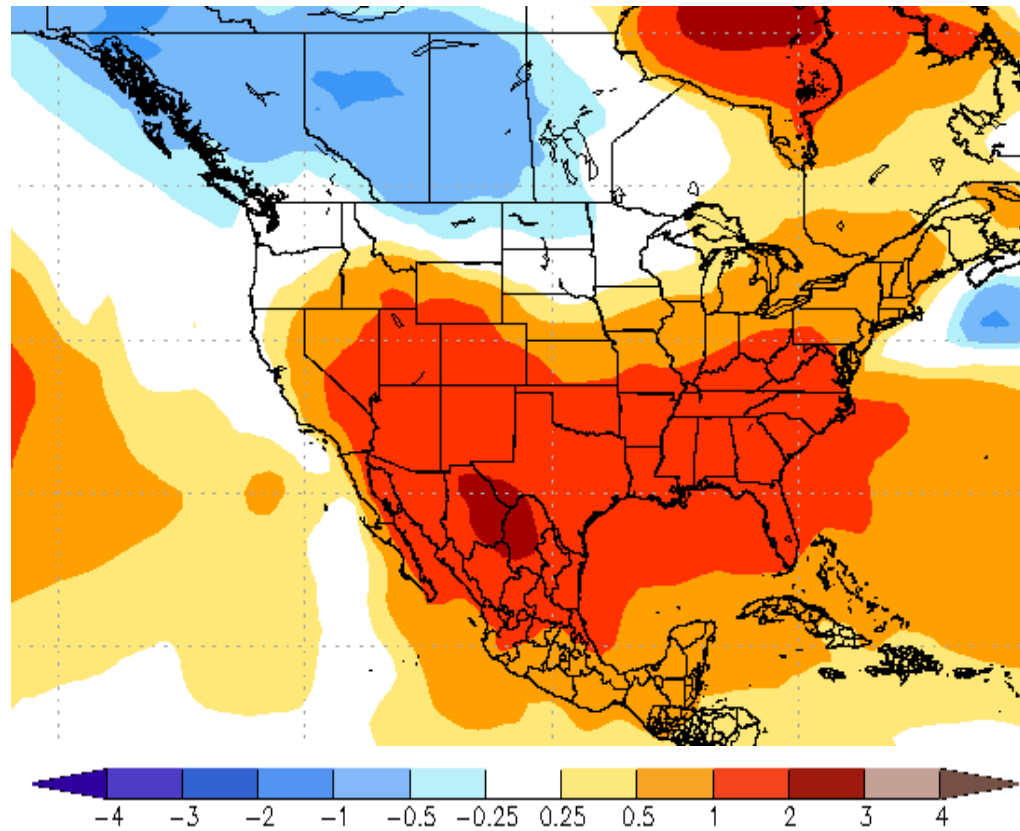
- SSC is currently running at or above normal
- This is a shift from recent years, which had been near if not below average
- This extra snow & ice cover now can allow for pools of colder air to be more prevalent
- This increased snow cover could help define/locate the ridge/trough/ridge pattern described earlier



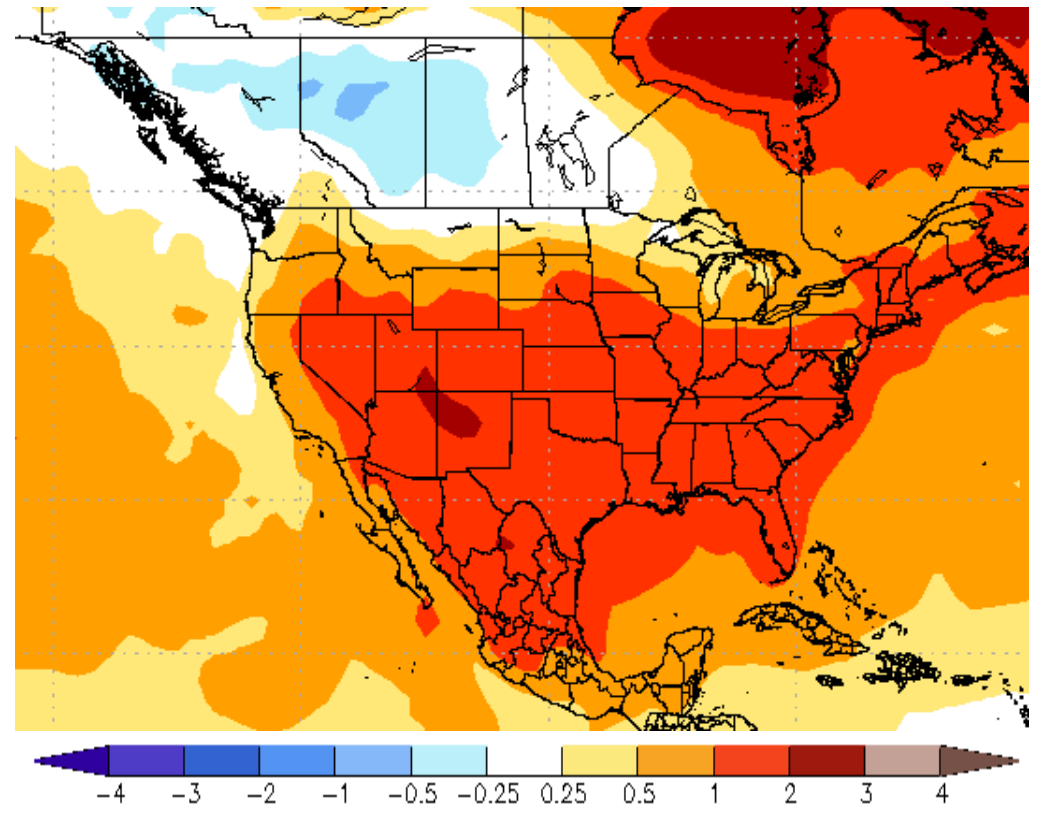
Long-range climate models*

Winter Temperature Forecasts - Climate Models

NORTH AMERICAN ENSEMBLE TEMPERATURES

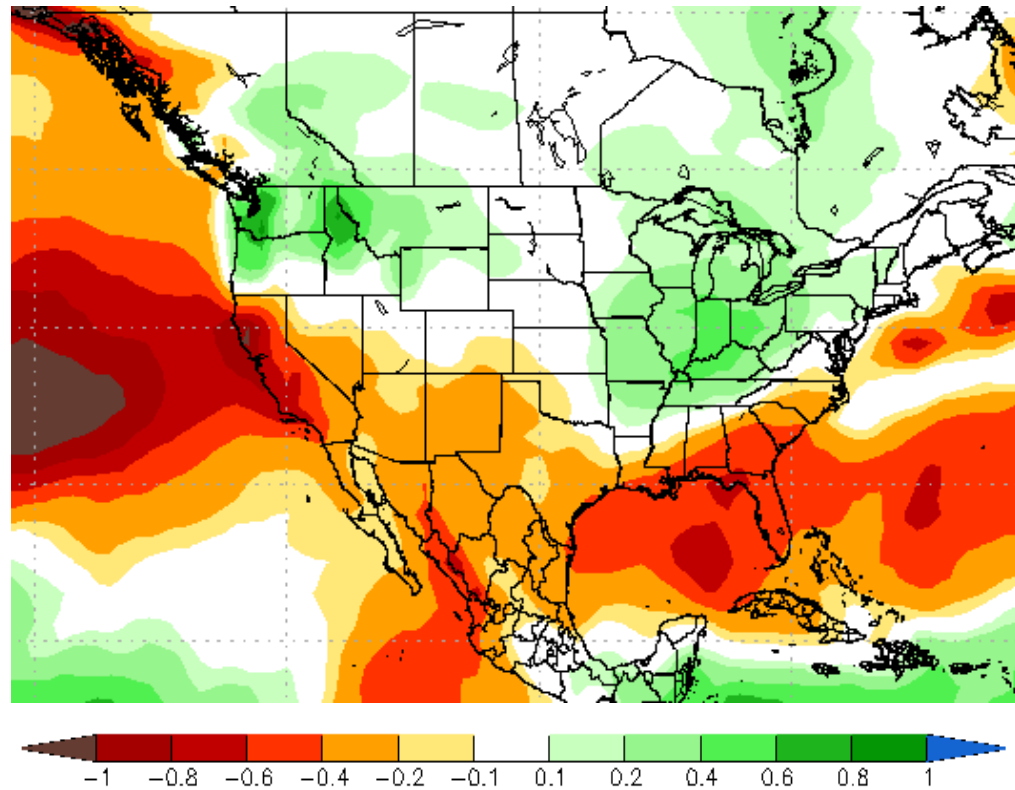


EUROPEAN MODEL TEMPERATURES

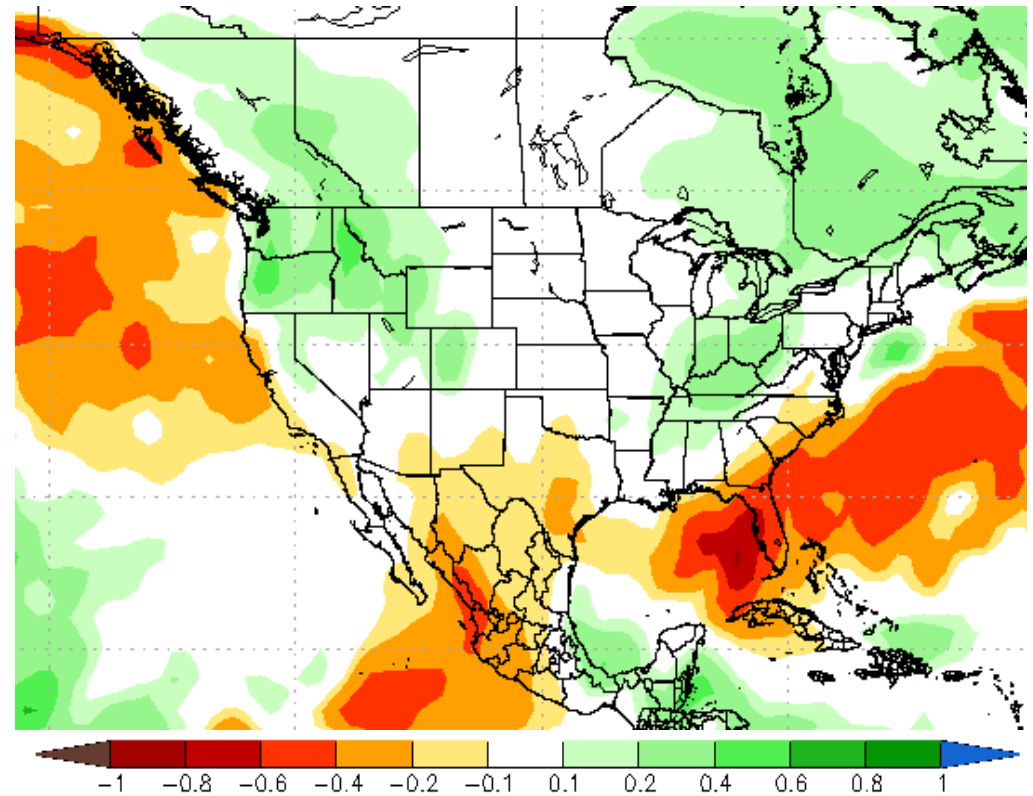


Winter Precipitation Forecasts - Climate Models

NORTH AMERICAN ENSEMBLE PRECIPITATION



EUROPEAN MODEL PRECIPITATION

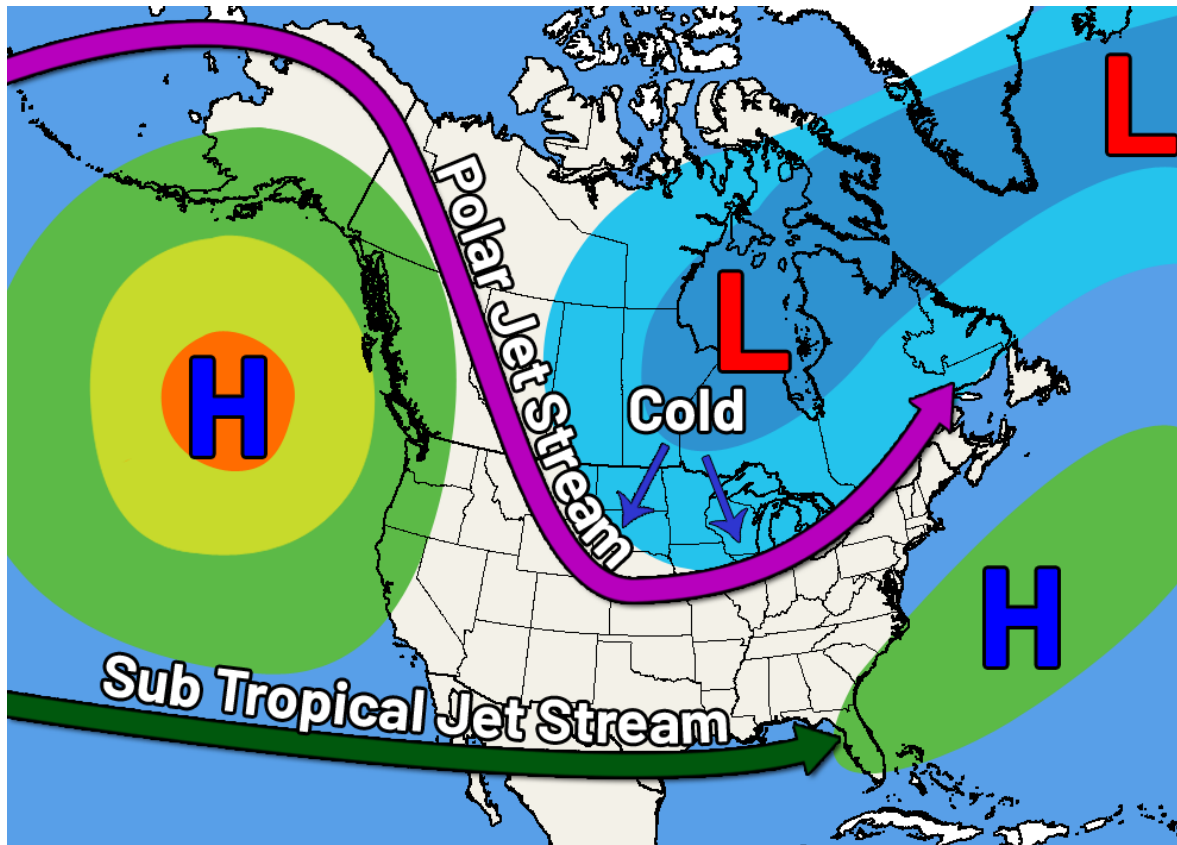


The background is a solid teal color with a bokeh effect of out-of-focus light spots. At the bottom, there is a dark, textured area that looks like grass or a field.

Putting the predictors together

Expected pattern for winter 2025-26

NORTH AMERICAN JETSTREAM PATTERN



- Several similarities to the La Niña map
- Active polar jet out of Canada & into the northern U.S.
- Colder than normal across the north-central U.S. and a good portion of central Canada
- High pressure off West Coast...precise placement very important
- Relatively weak subtropical jet stream



03

2025-26 winter weather outlook

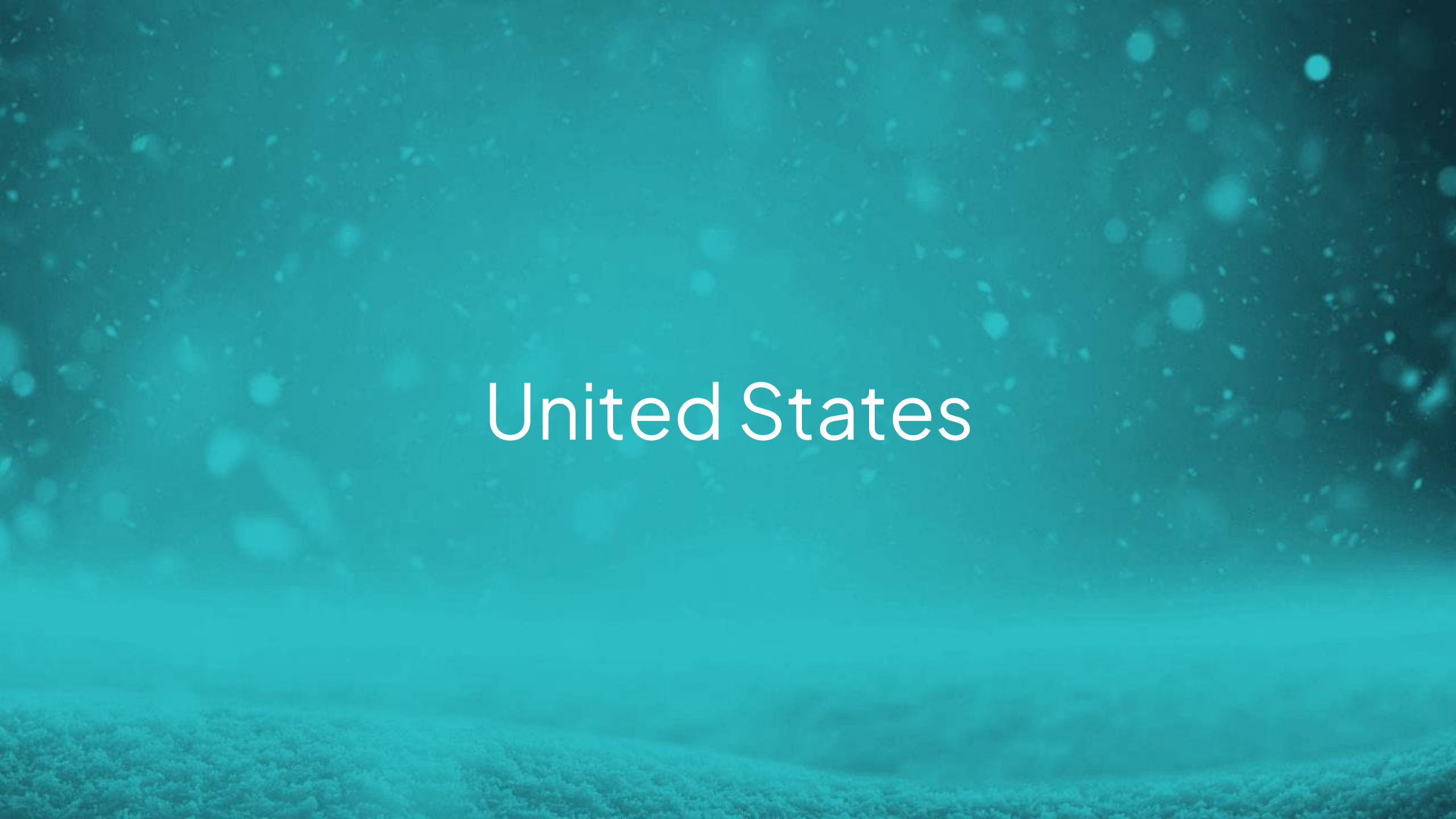
A background image of a snowy winter scene. On the left, a large tree is covered in snow. In the center, a snow-covered road leads into the distance. On the right, more snow-covered trees are visible. The overall tone is light and wintry.

2025–2026 winter outlook

Winter forecast period:

November 2025 – Mid–April 2026

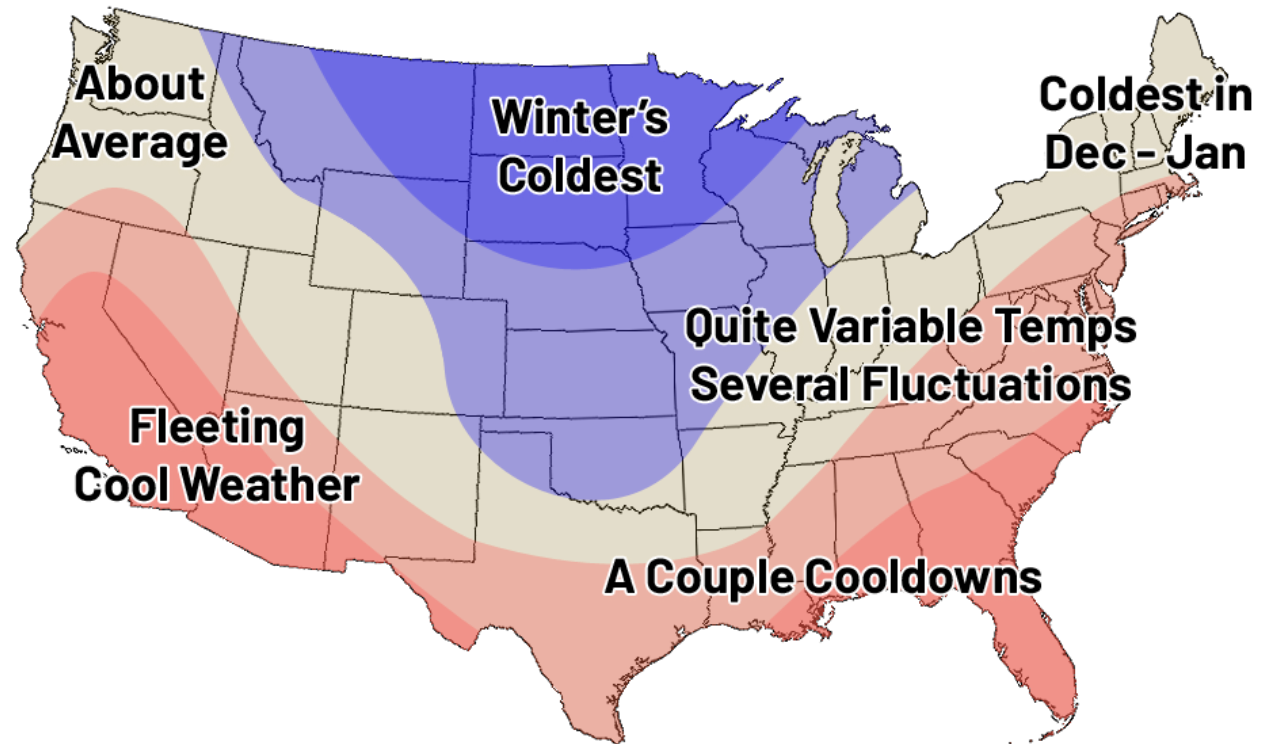
The expected temperature and precipitation anomalies for these months in the contiguous U.S. and southern Canada are highlighted in this Winter 2025–2026 outlook

The background is a teal-colored image. The upper portion features a bokeh effect with numerous out-of-focus light spots of varying sizes. The lower portion shows a close-up of sand dunes, with the ridges and valleys of the sand visible. The text "United States" is centered horizontally and vertically in a white, sans-serif font.

United States

Major regional impact points – Temperatures

- Several arctic blasts are expected to march south/southeastward from Canada, with their greatest impacts on the northern and central Plains as well as the Midwest and Great Lakes
- The Northeast and Mid-Atlantic will likely see the coldest part of the winter early in the cold season
- The battleground between the warm & cold from the Plains into the Northeast will likely experience several significant fluctuations
- By the time the arctic air reaches the southern tier, it will usually be modified and generally will not last for long



Major regional impact points – Precipitation

- The combination of cold air, warm Great Lakes, and an active storm track likely leads to above normal precipitation for much of the Great Lakes & Ohio Valley
- The northern Rockies & northern Plains are favored for snow with above-normal precipitation combined with arctic air
- Below-average precipitation is favored for much of the West & southern U.S.
- Even though the East may see slightly below-normal precipitation, it should be more active than it's been recently



Major regional impact points – Snowfall

- Great Lakes snow belts look poised to see several impactful events, potentially with an early start to the snow season
- An active storm track near the East Coast gives the potential for numerous small to medium snow and ice events. A large Nor'easter (or two) can't be ruled out
- Northern Plains and northern Rockies could see more snow than usual while a quieter-than-normal southern jet stream could lead to an overall dry winter for the southern tier of the country

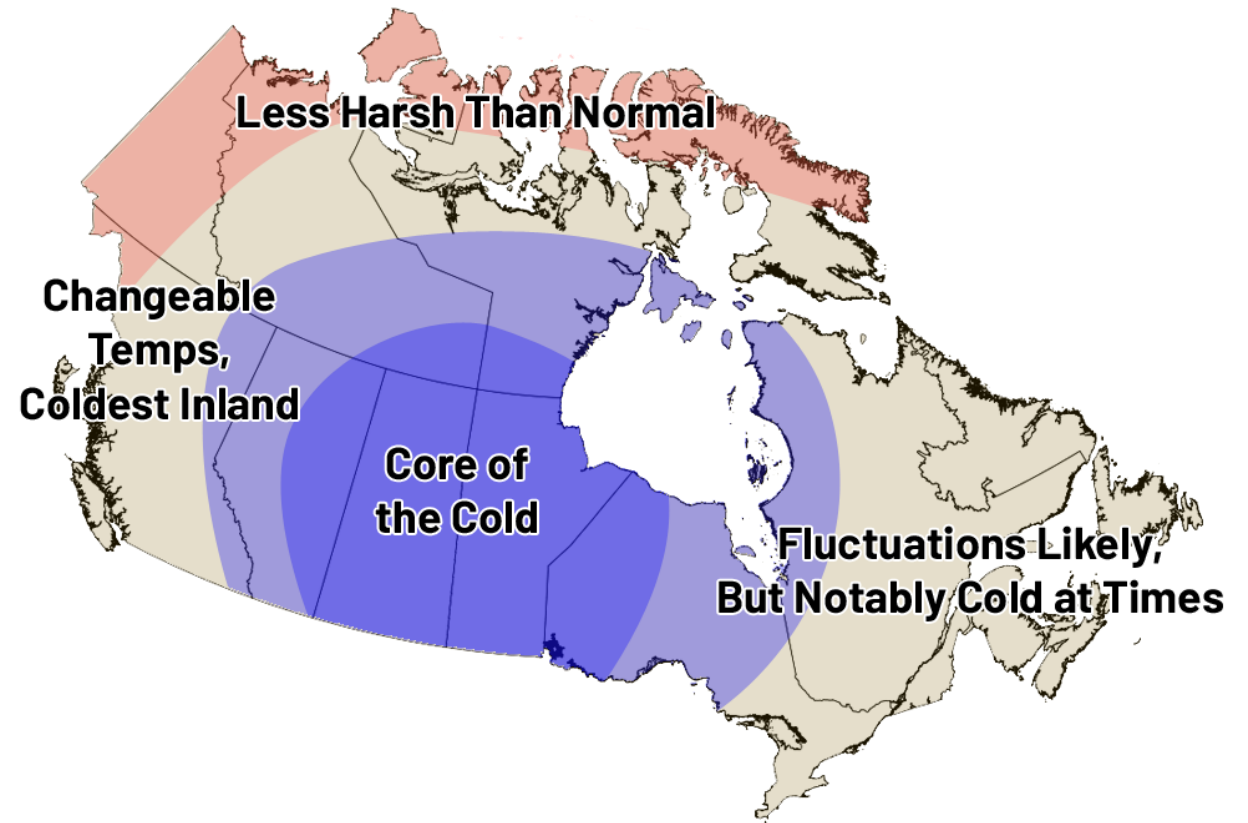


The image features a monochromatic teal background. Numerous small, white, out-of-focus specks are scattered throughout, creating a bokeh effect that suggests falling snow or a misty atmosphere. At the bottom of the frame, there is a horizontal band of slightly more detailed, textured white specks, representing a layer of snow on the ground.

Canada

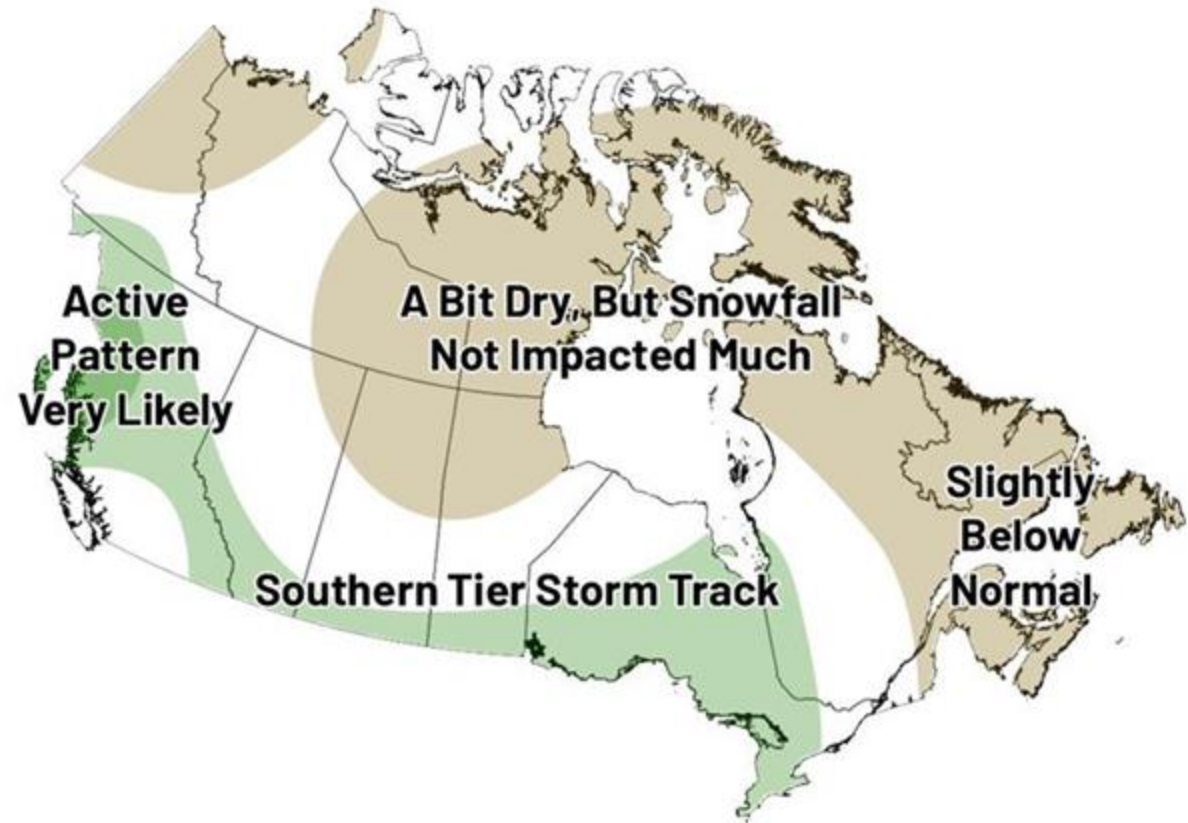
Major regional impact points – Temperatures

- The polar vortex is favored to sit near Hudson Bay at times this winter, which favors the coldest weather to set up over the central provinces
- The West Coast of Canada and the eastern provinces will teeter between extremely cold air and just "normal" cold air this winter
- Quebec and Labrador can turn particularly cold at times due to the placement of the polar vortex near Hudson Bay
- Yukon, the Northwest Territories, and the far northern provinces won't be as cold as normal this winter, but it will still feel chilly



Major regional impact points – Precipitation

- An active storm track is expected in British Columbia; this will open the door to a few bigger storms throughout the winter
- Areas near the U.S. border are also expected to be more active than normal; Areas near Lake Ontario may be especially busy due to lake effect activity
- The far eastern provinces won't see as many coastal storms this year but are still expected to see a number of smaller systems
- The central and northern provinces will still see snow despite the winter being drier



Major regional impact points – Snowfall

- The combination of brutally cold air at times and an active storm track will lead to many snow and ice chances, especially away from the coast
- Areas near the U.S. border and in Ontario look especially snowy this year; areas in and around Lake Ontario may be some of the snowiest this winter due to lake-effect activity
- Even though the eastern provinces won't be as active this year, the cold air will certainly be there at times to still produce a number of small to medium winter weather events.





04

How this outlook
impacts your industry

Snow & ice + transportation

Revisiting The U.S. Snowfall Outlook

U.S. SNOWFALL OUTLOOK

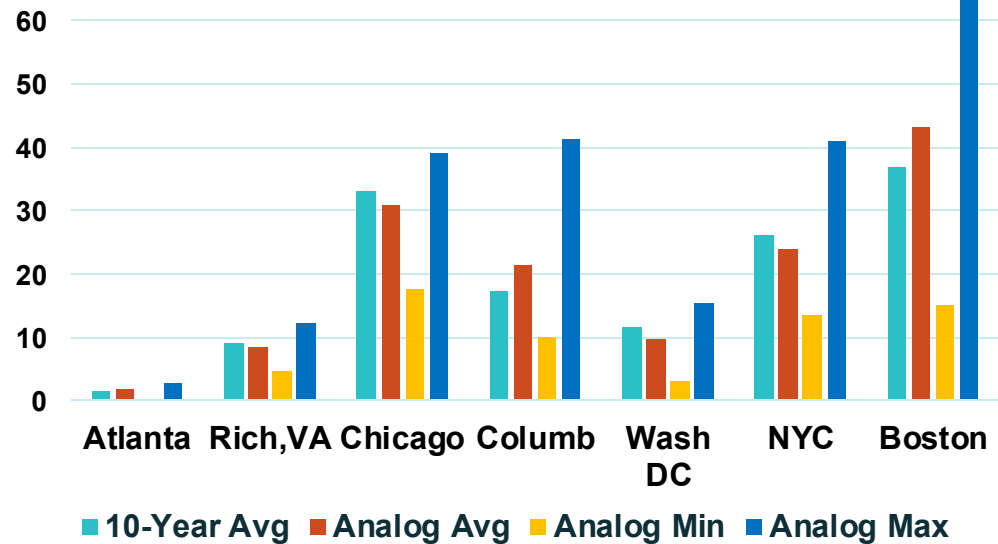


REMAINING QUESTIONS

- The northern Rockies & Plains snow a lot, no matter what, right?
- There's lots of gradients, what are some of the ranges of possible seasonal snowfalls?
- What's a "medium" event for the East Coast?

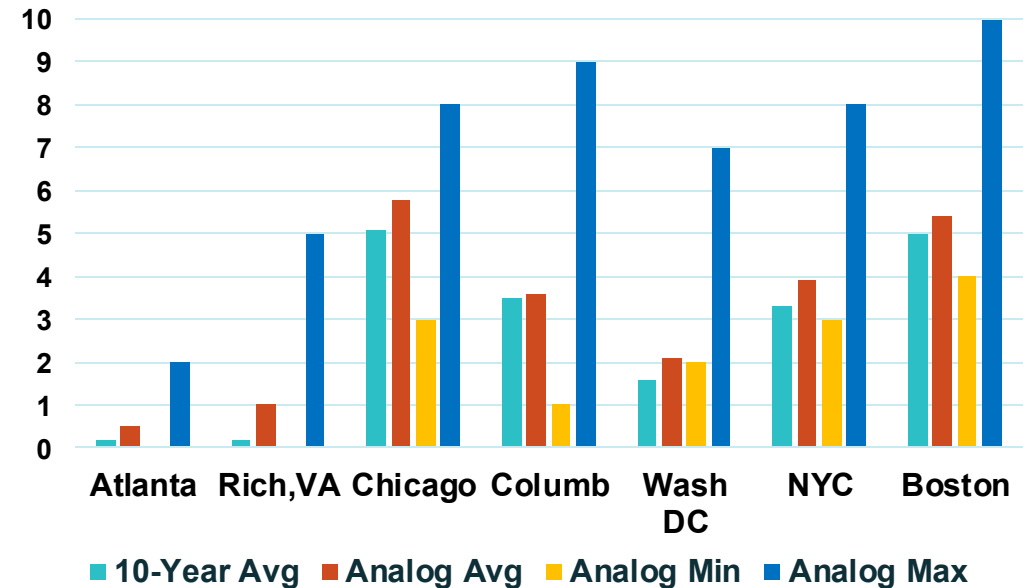
Analog season snowfall data - East

TOTAL SEASONAL SNOWFALL



Mixed outcomes, but overall, the difference between the analog snowfall and the 10-year average is low to modest, though there's high-end potential north of I-70

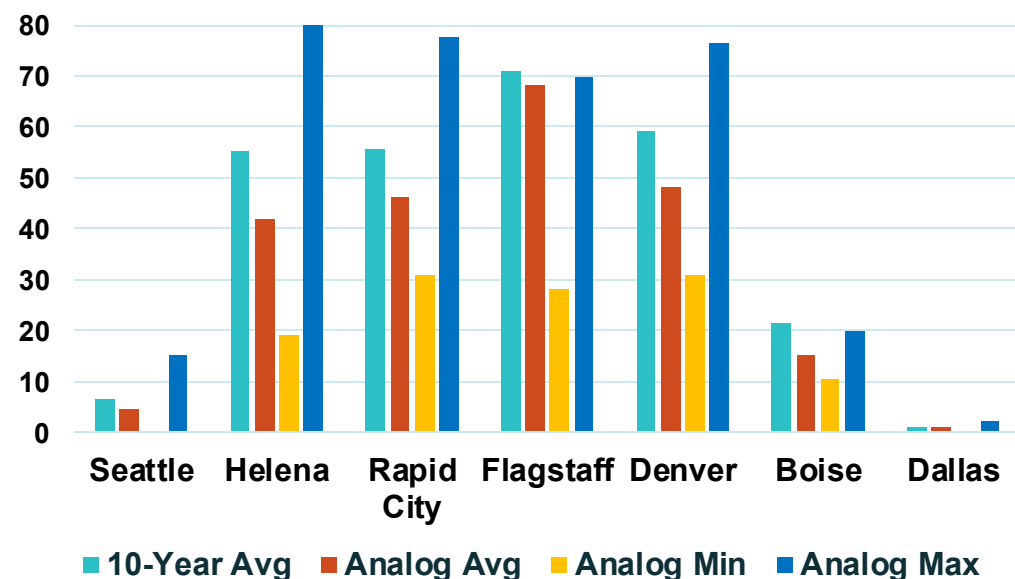
NUMBER OF 2"+ SNOW EVENTS



The variation of 2"+ events mirror the trends of the total seasonal data. There's a little more variation than one would expect between the mins and maxes, even in a place like Boston

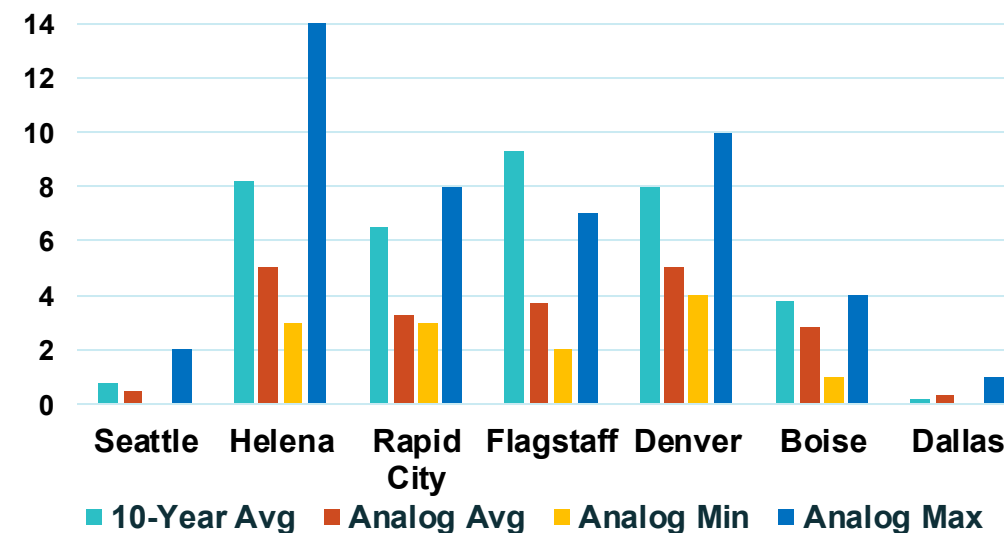
Analog season snowfall data - West

TOTAL SEASONAL SNOWFALL



Significant volatility is present, likely owing to the placement of the ridges and troughs across the country, which is particularly crucial in the Western U.S. Especially in places like Helena & Rapid City, we feel there's a good potential to be considerably above normal

NUMBER OF 2" + SNOW EVENTS



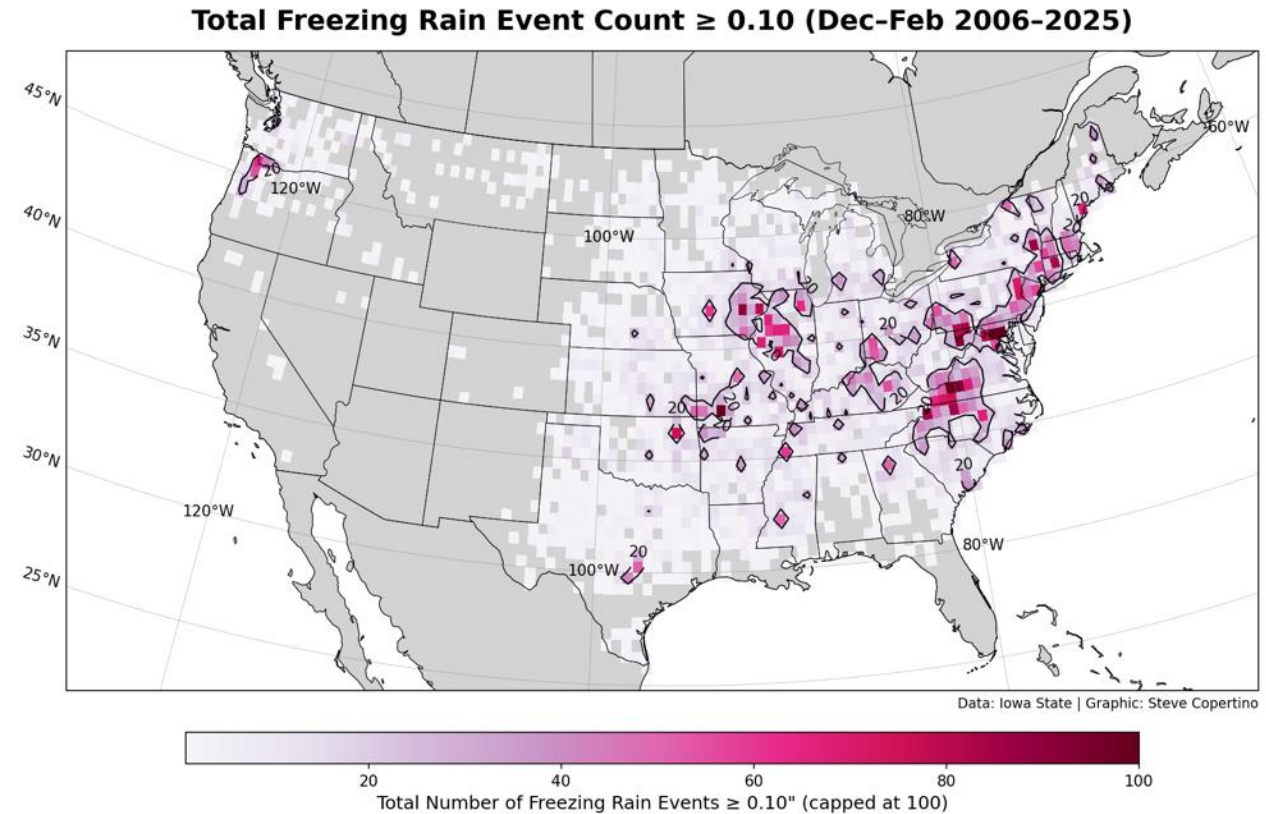
This is a fairly noisy data set, but locations like Helena, Rapid City and Denver, which show some of the greatest number of 2" plus events, are exactly the ones we're forecasting the highest risks to exceed their averages this season

Freezing rain & ice storms

FREEZING RAIN CHALLENGES & 20 YEAR CLIMATOLOGY

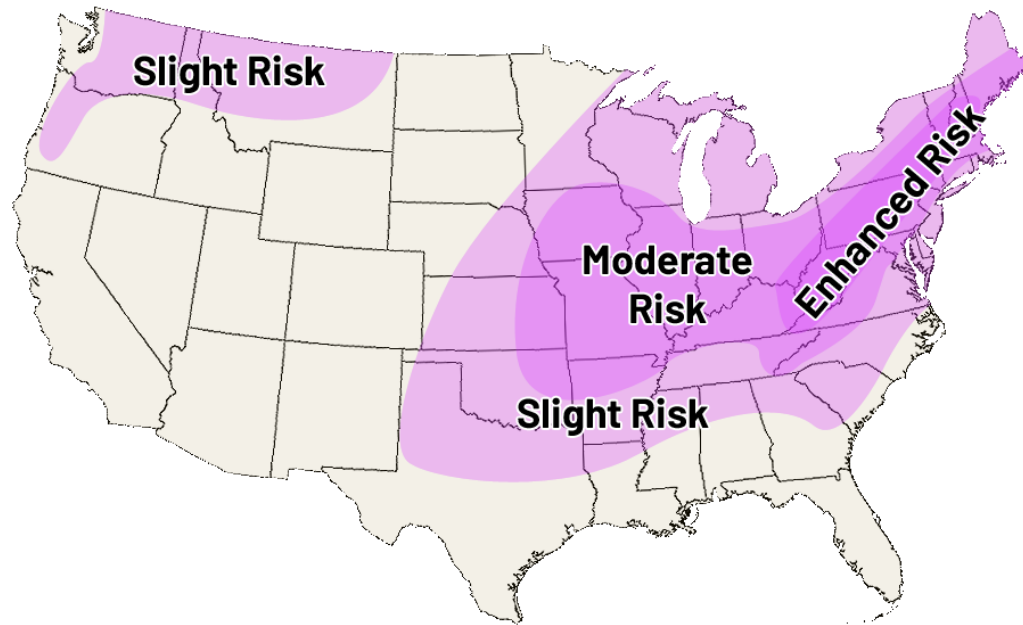
Specific challenges posed by freezing rain & ice storms

- The slightest amount of precipitation can cause major problems (flurries that harmlessly swirl vs. sprinkles that dampen the below-freezing ground)
- You often can't see it!
- Usually, you can't plow it; must rely heavily on deicers, which need to be repeatedly applied through a storm
- Weighs down trees & powerlines, complicating the transportation problem with blocked roads & power outages

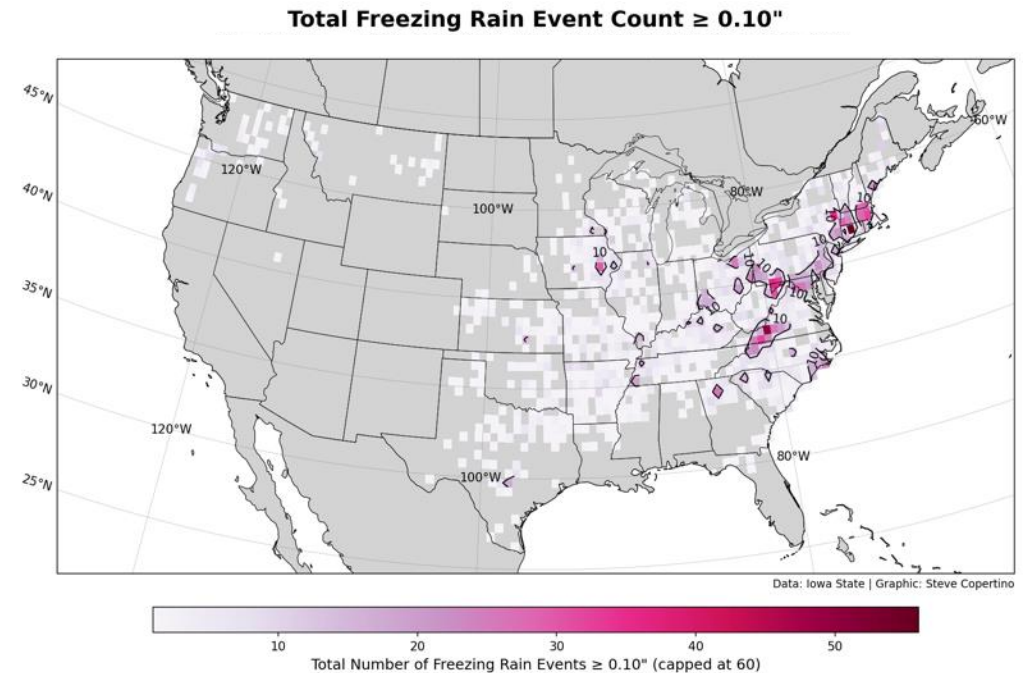


Analog freezing rain data & this season's outlook

2025 - 2026 FREEZING RAIN OUTLOOK



ANALOG FREEZING RAIN EVENTS

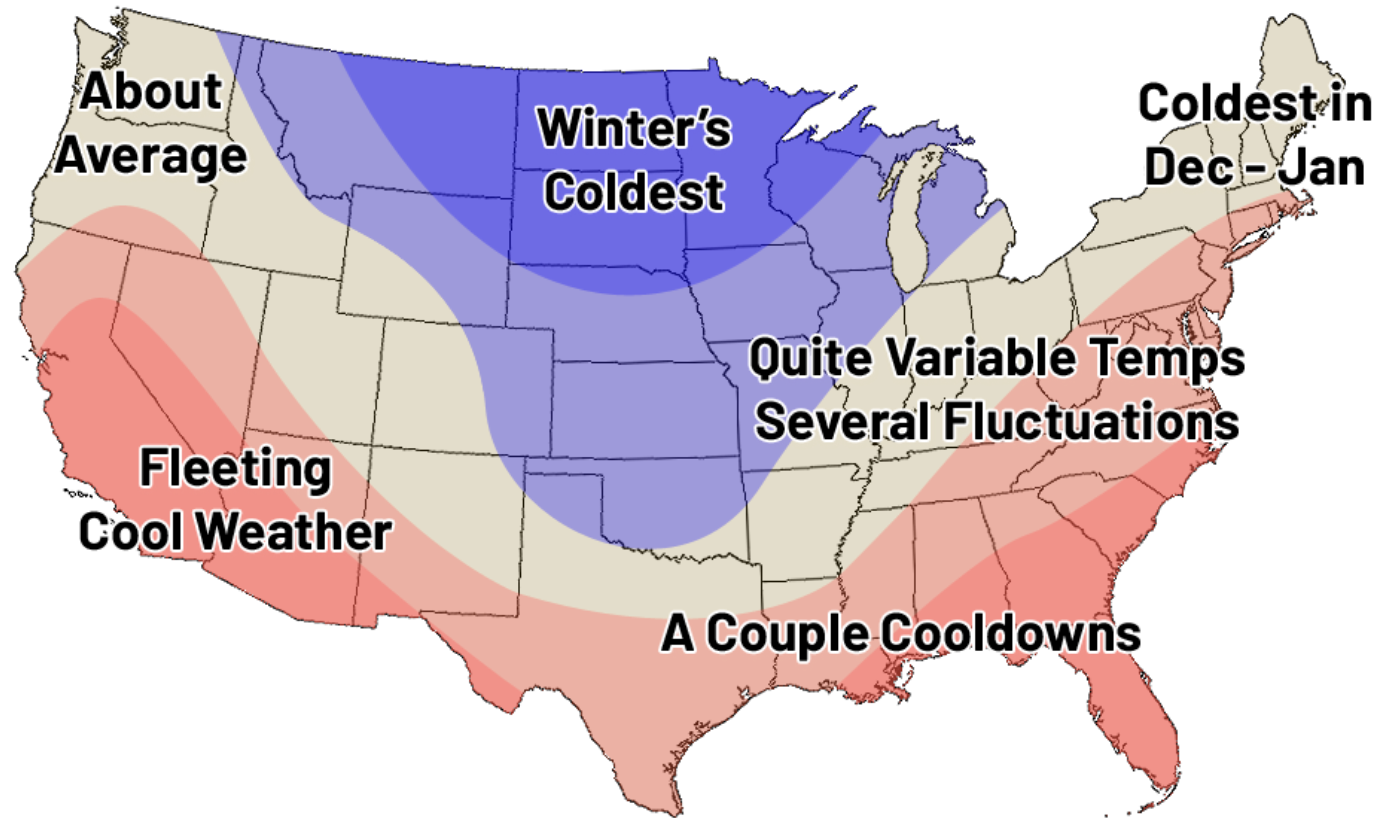


The background is a solid teal color with a bokeh effect of out-of-focus light spots. At the bottom, there is a silhouette of sand dunes.

Oil, gas, & energy

Revisiting the U.S. temperature outlook

U.S. TEMPERATURE OUTLOOK

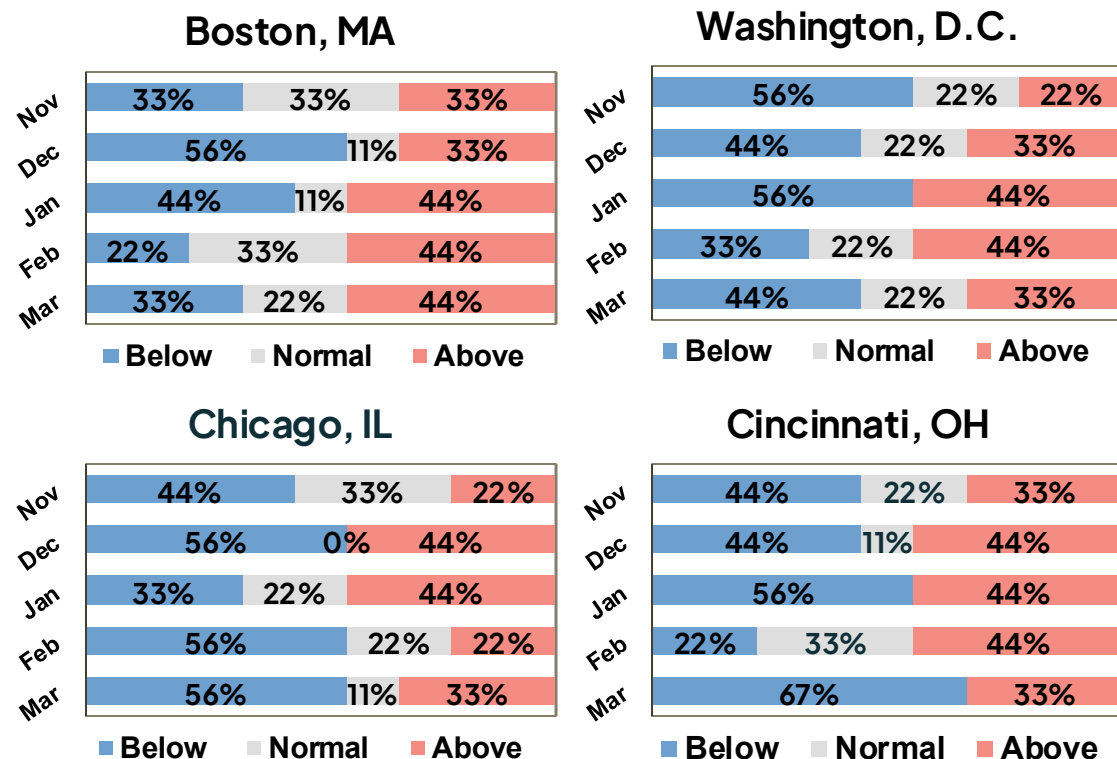


REMAINING QUESTIONS

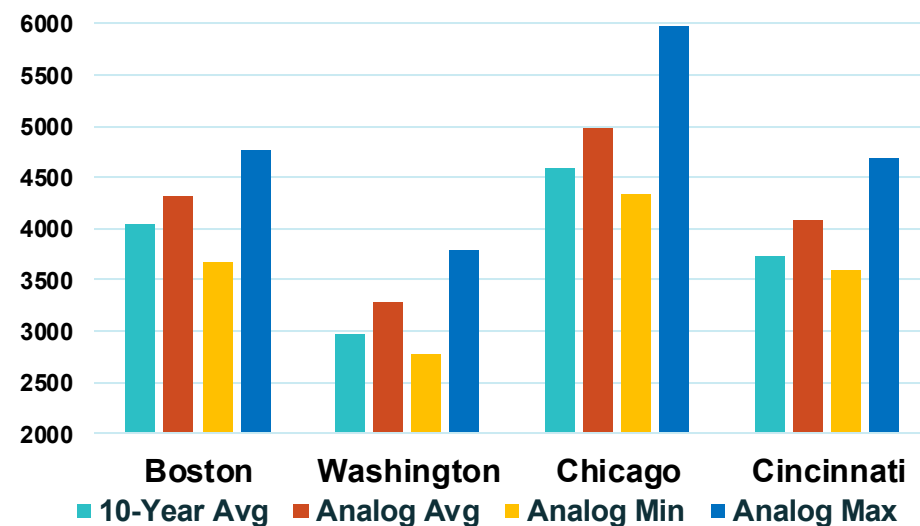
- Isn't winter always cold, especially in the upper Plains?
- When will the cold be the most/least pronounced?
- What kinds of extremes are possible?
- How will this tie into potential energy demand and consumption?

Analog season temperature analysis – East

WHEN IS IT LIKELY TO BE THE COLDEST? A PROBABILISTIC VIEW

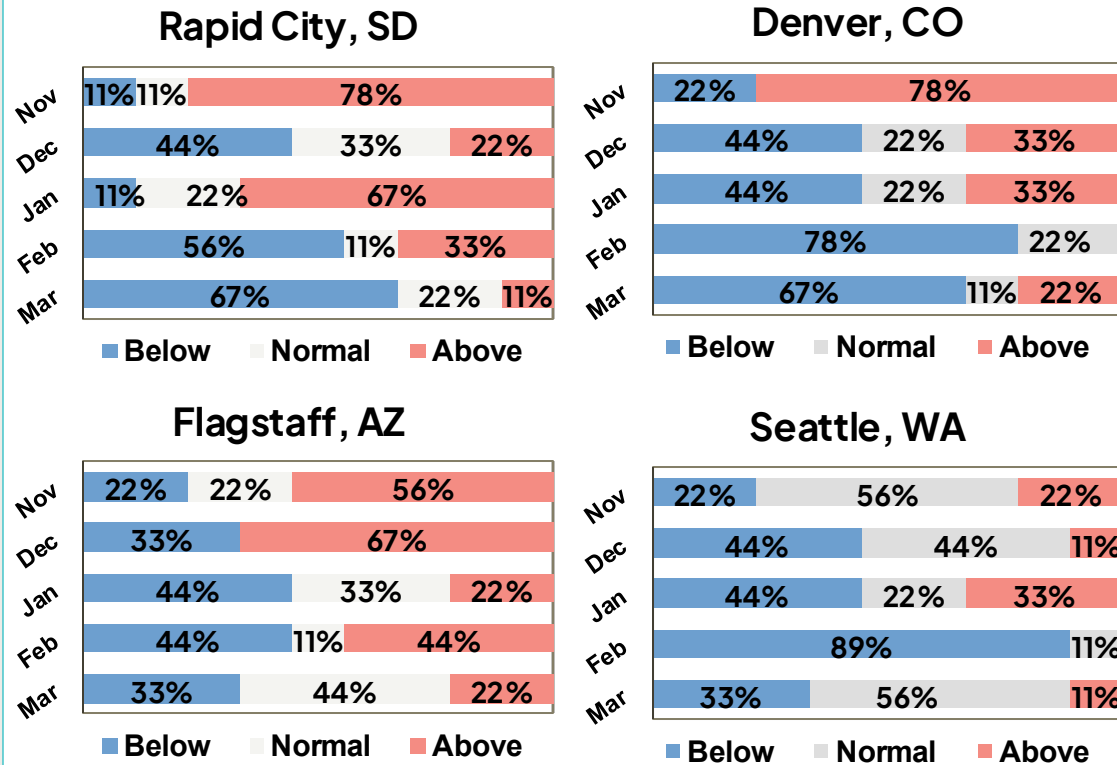


SEASONAL HEATING DEGREE DAYS

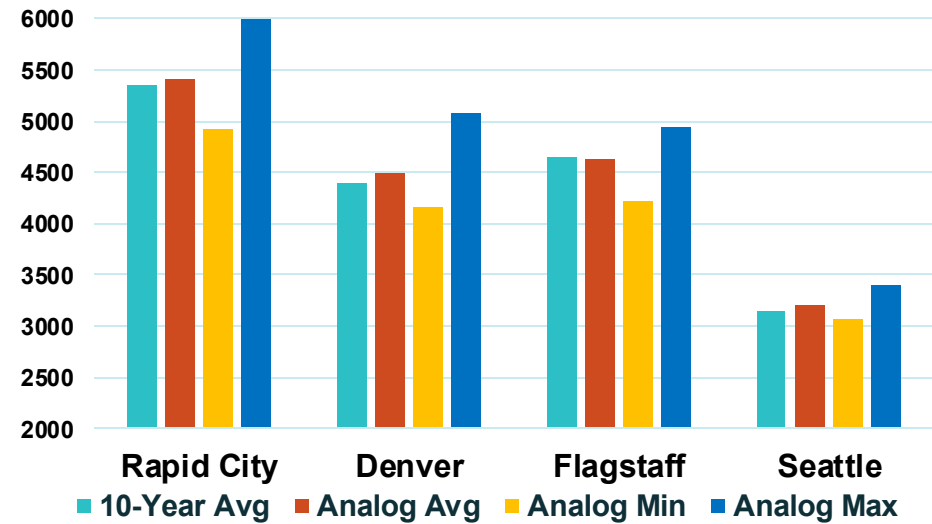


Analog season temperature analysis – West

WHEN IS IT LIKELY TO BE THE COLDEST? A PROBABILISTIC VIEW



SEASONAL HEATING DEGREE DAYS



The background is a solid teal color with a subtle, out-of-focus pattern of small, light-colored particles or dust specks scattered throughout. At the bottom of the image, there is a horizontal band of a darker teal color, which appears to be a close-up, textured surface of grass or low-lying vegetation.

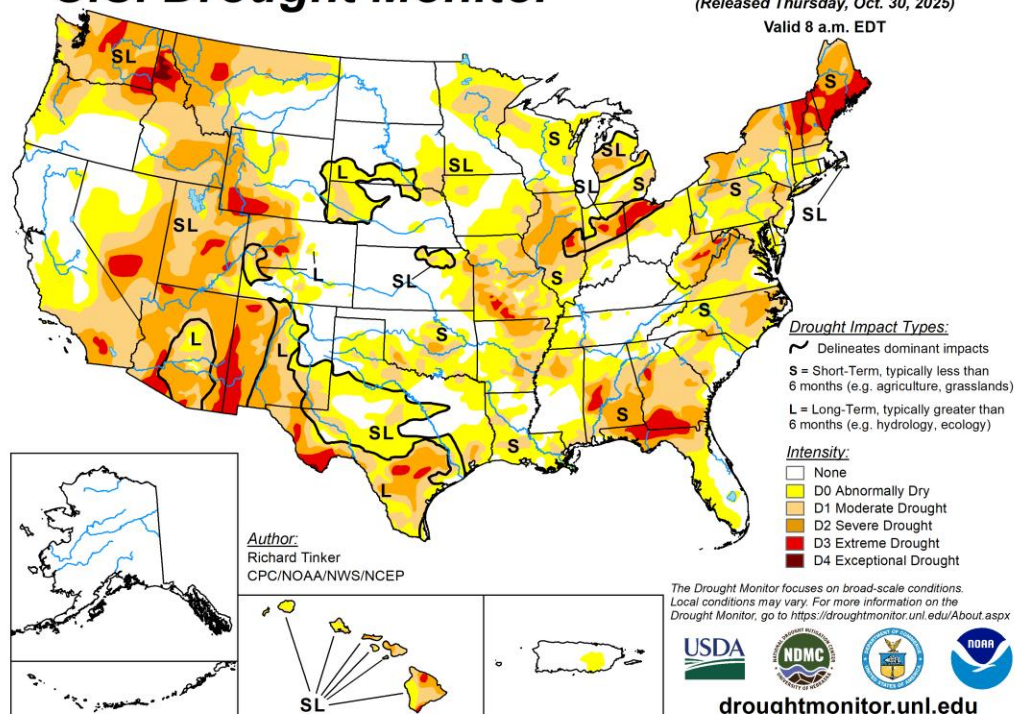
Drought & fire

Latest drought information & expected trends

CURRENT DROUGHT STATUS

U.S. Drought Monitor

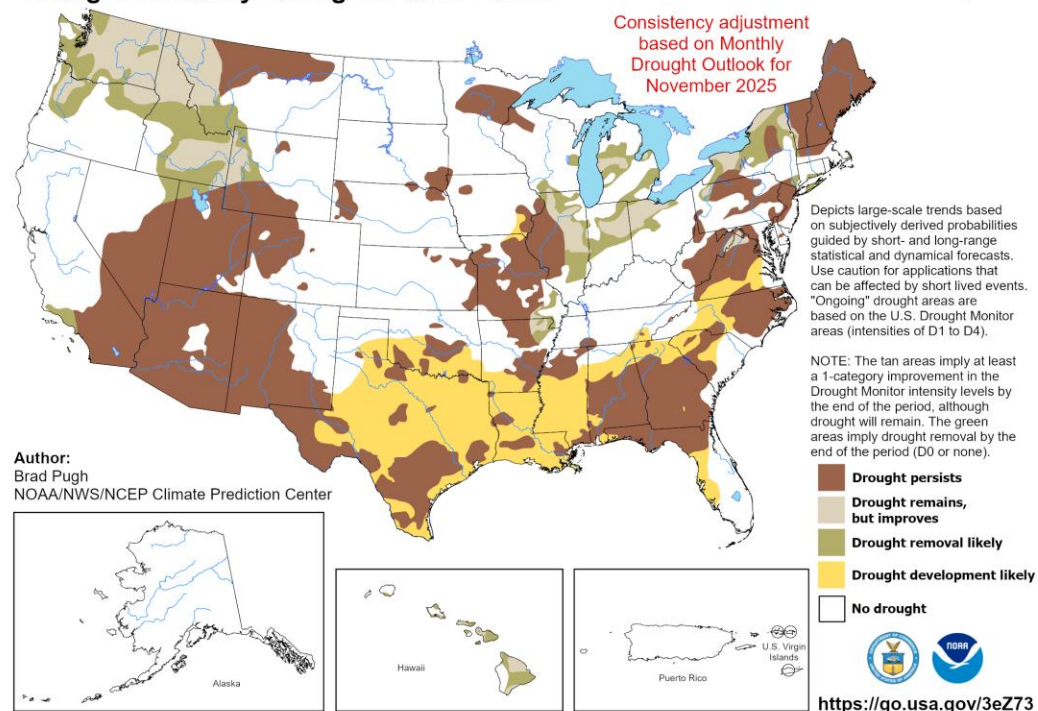
October 28, 2025
(Released Thursday, Oct. 30, 2025)
Valid 8 a.m. EDT



DROUGHT OUTLOOK THROUGH JANUARY

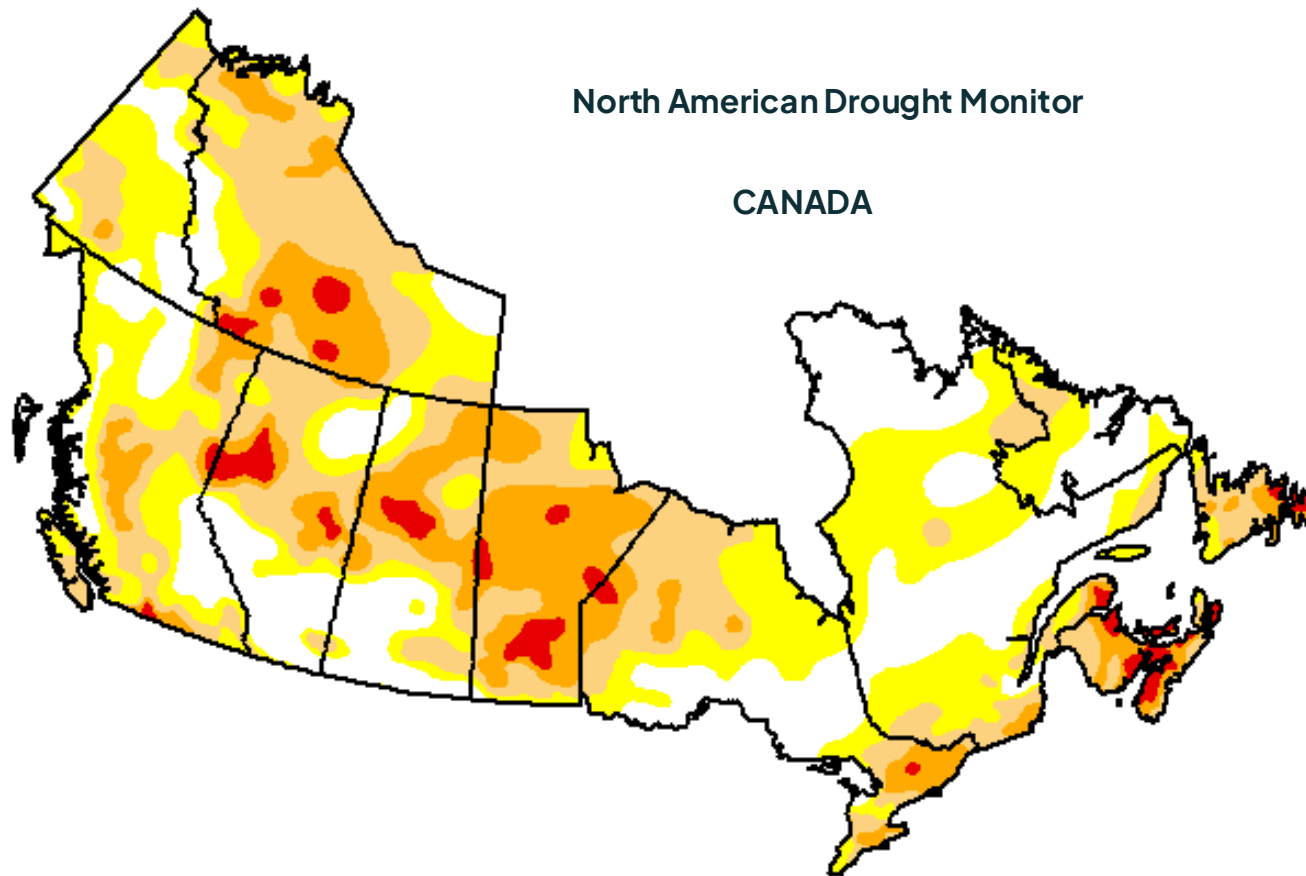
U.S. Seasonal Drought Outlook Drought Tendency During the Valid Period

Valid for November 1, 2025 - January 31, 2026
Released October 31, 2025



Latest drought information in Canada

CURRENT DROUGHT STATUS



Date Valid: Aug. 31, 2025

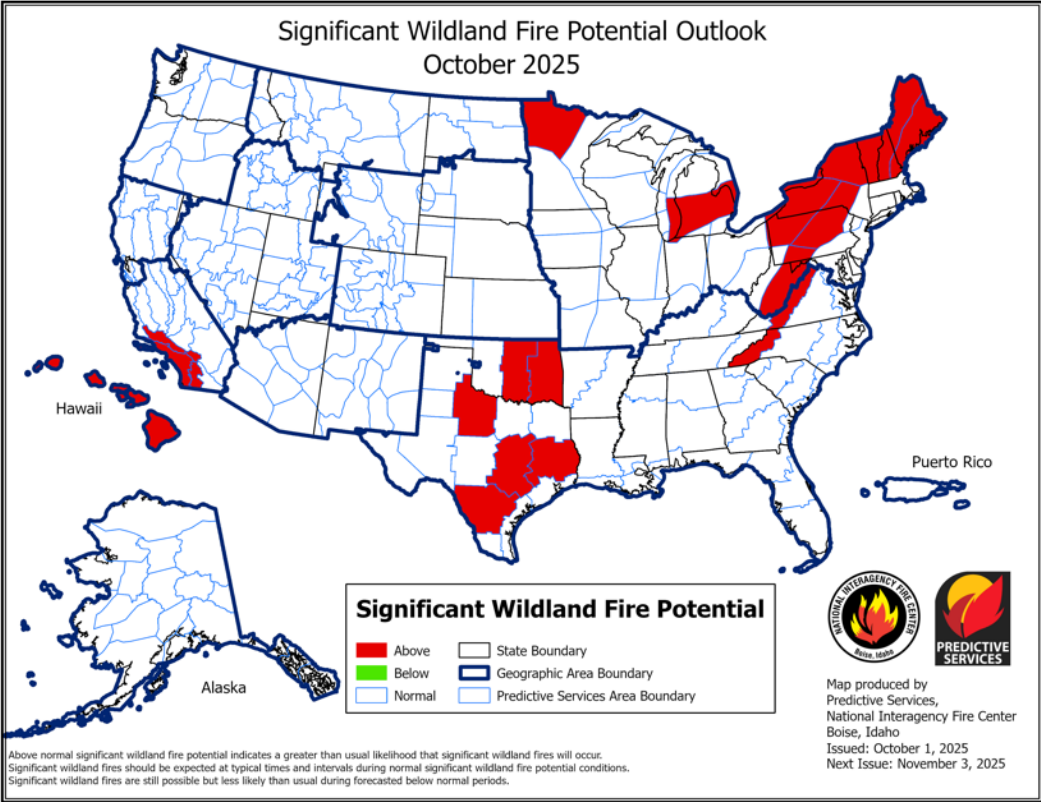
Map Released: Sept. 17, 2025

Intensity

- None
- D0 (Abnormally Dry)
- D1 (Moderate Drought)
- D2 (Severe Drought)
- D3 (Extreme Drought)
- D4 (Exceptional Drought)

Wildland fire potential outlook

OCTOBER 2025



NOVEMBER 2025

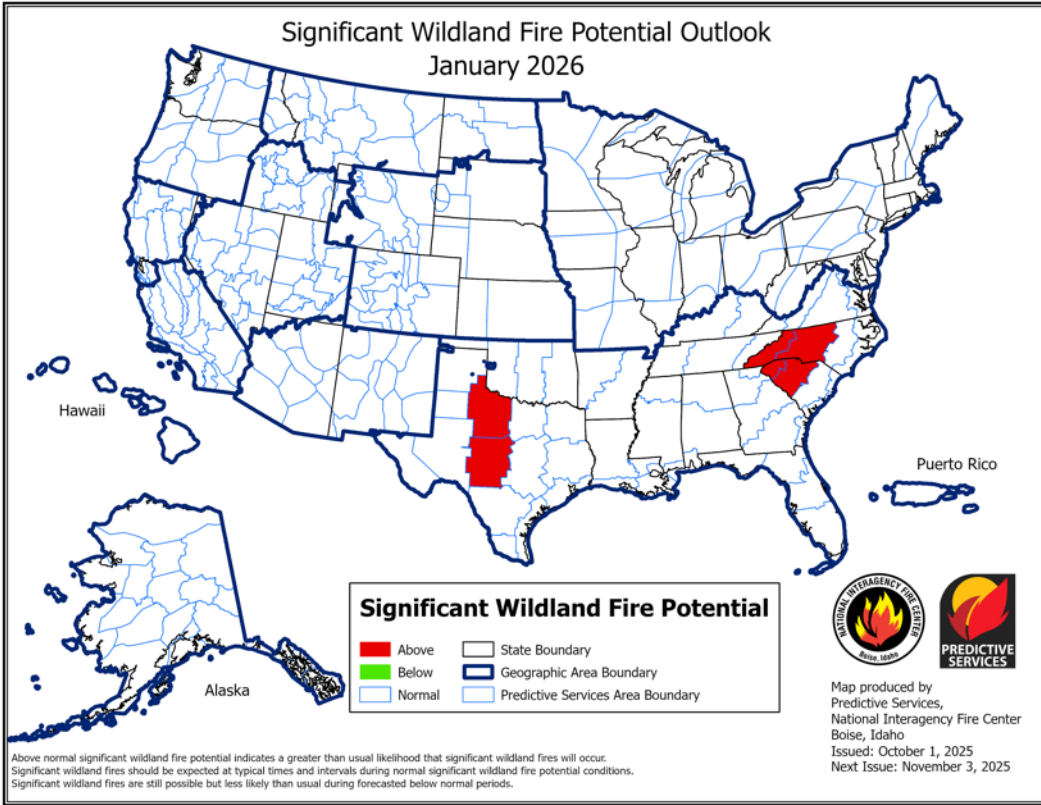


Wildland fire potential outlook

DECEMBER 2025



JANUARY 2026

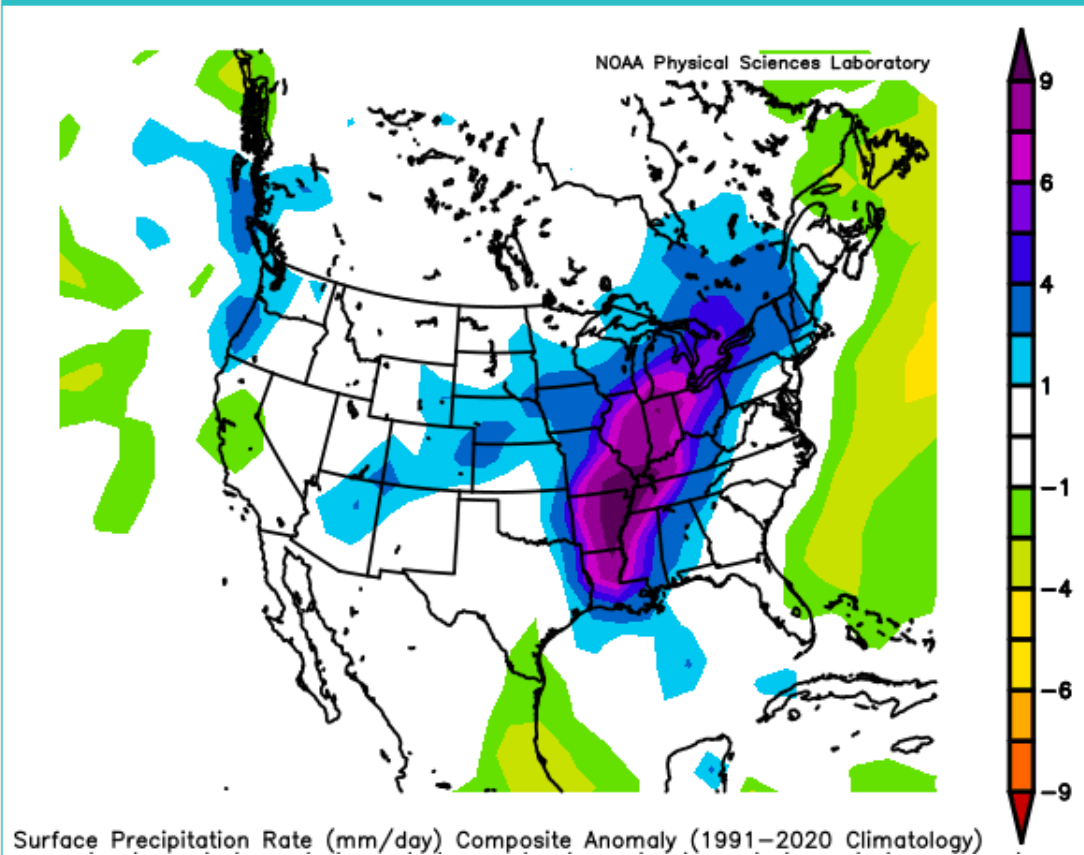


The background is a teal-colored image. The upper portion is filled with numerous small, white, out-of-focus dots that resemble falling snow or rain. The lower portion shows a dark, rolling landscape, possibly covered in snow or low-lying vegetation, under a hazy sky.

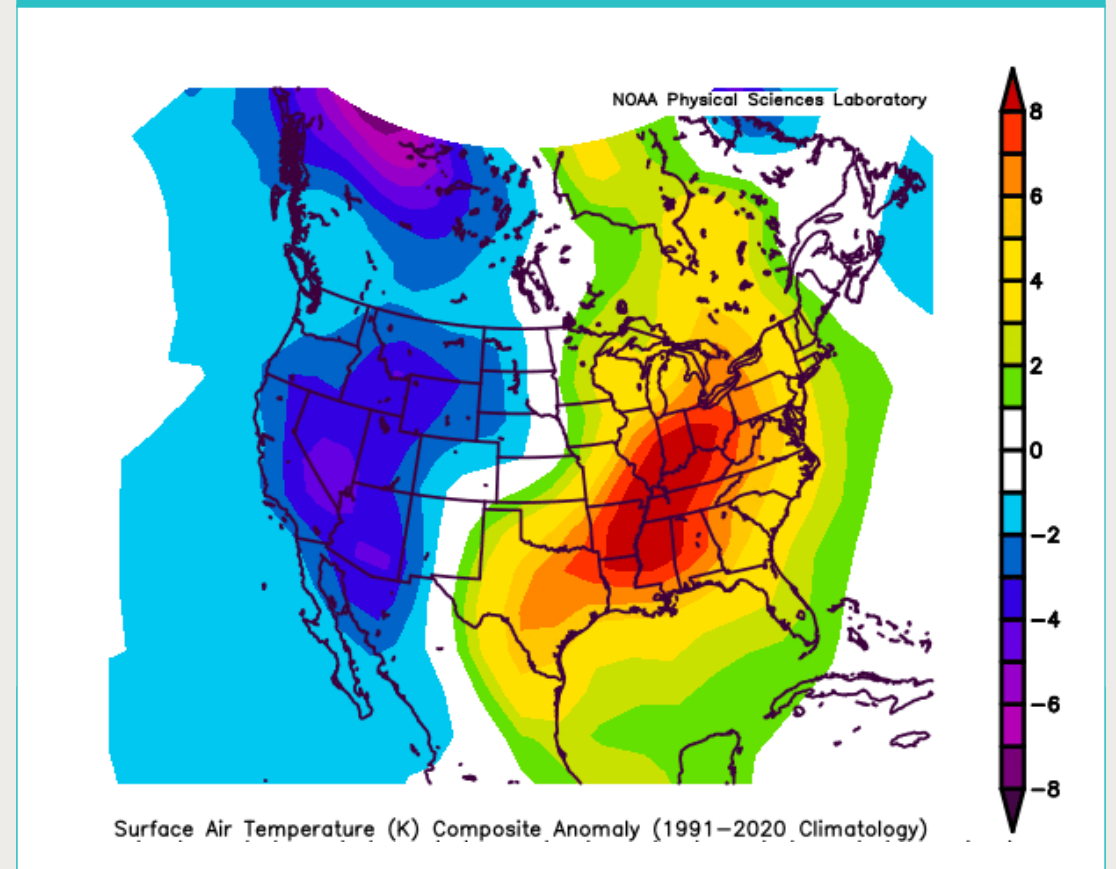
Wintertime severe thunderstorms & tornadoes

Top severe weather outbreaks of winter

PRECIPITATION



TEMPERATURE



Increased winter tornado risks in La Niña years

WINTER TORNADOES (EL NIÑO)

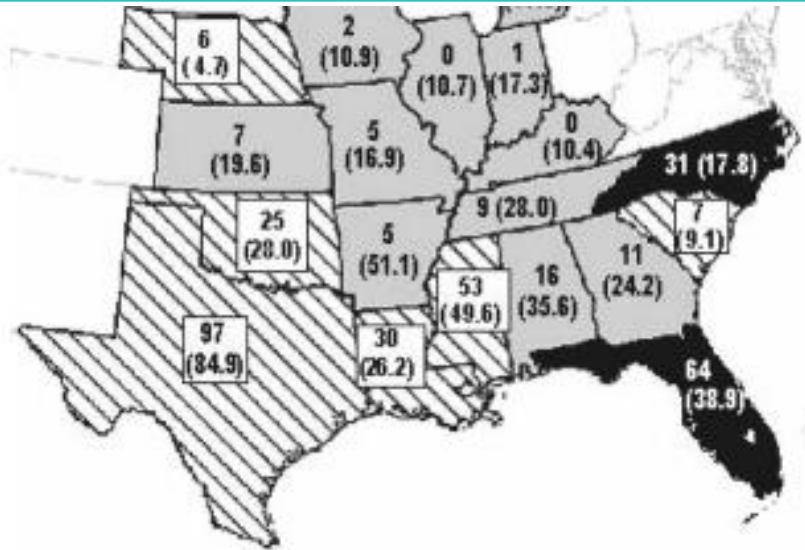


FIG. 10. Tornadoes occurring during EN winters by state. Numbers in parentheses are the expected values (independent of ENSO). Classifications of ENSO phase are made using the CPC ENSO phase classifications. States outlined in black experience greater than 125% of the expected number of tornadoes, while states outlined in gray experienced less than 75% of their expected value. States outlined in the stripes experience within 25% of the expected value of tornadoes.

WINTER TORNADOES (LA NIÑA)

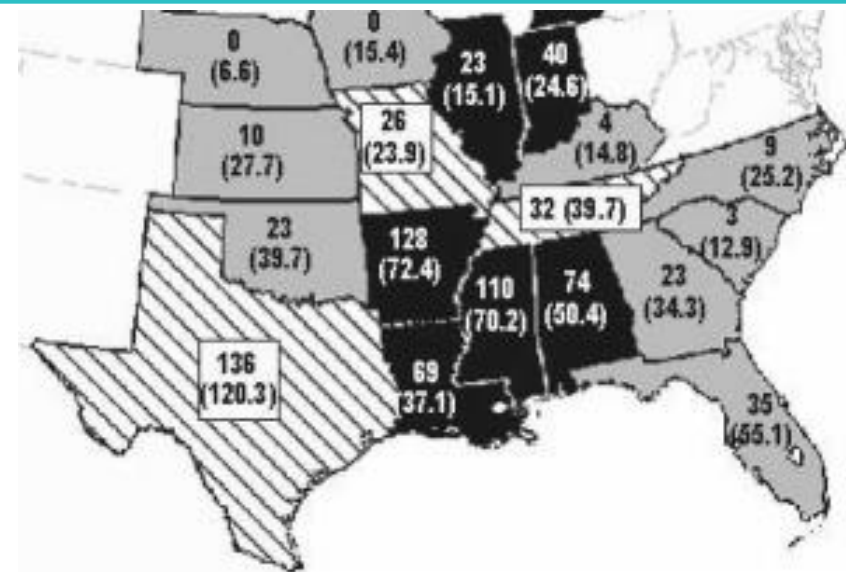
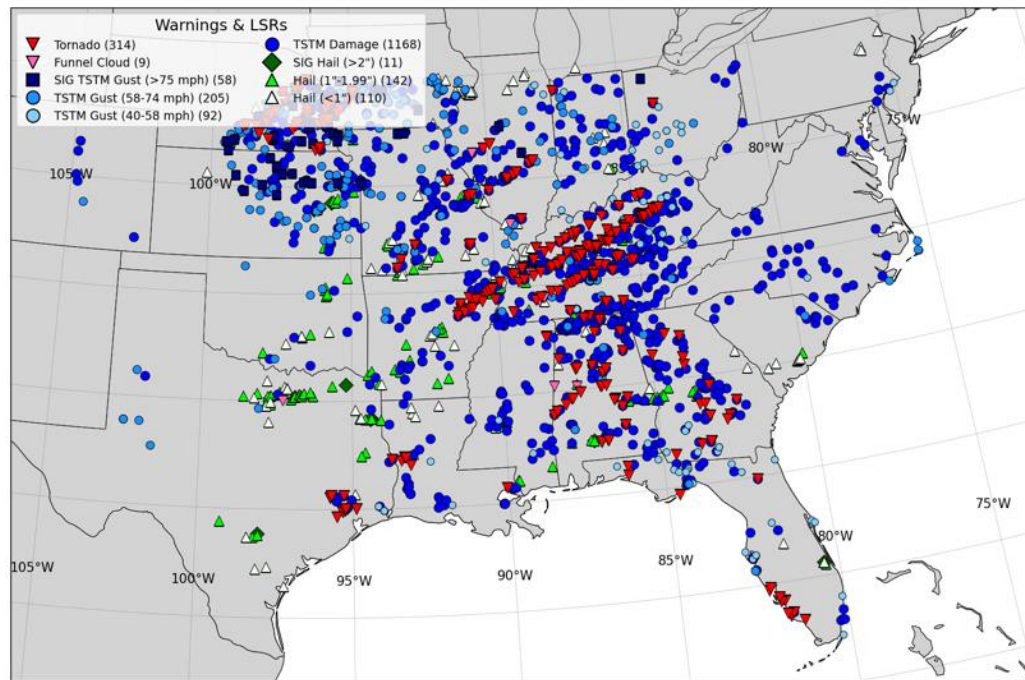


FIG. 12. Tornadoes occurring during LN winters by state, as in Fig. 10.

Arkansas, Louisiana, Mississippi, Alabama, Illinois, Indiana, and Michigan have more than 125% of normal tornadoes in La Niña years

Some recent analog winter severe weather

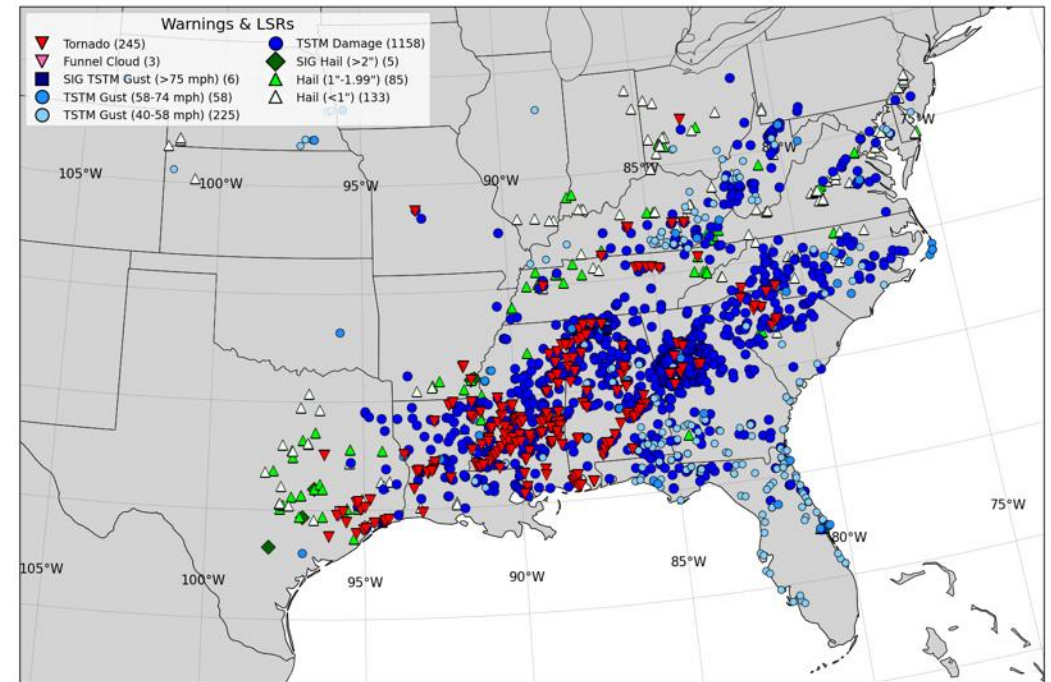
DECEMBER 2021 – FEBRUARY 2022



Data: SPC / Iowa State | Graphic: Steve Copertino

This was quite anomalous, but gives the idea of an extreme outlier in terms of its northward extent

DECEMBER 2024 – FEBRUARY 2025



Data: SPC / Iowa State | Graphic: Steve Copertino

A large number of these reports came from one outbreak 2/15 – 2/16/2025

At AEM, we empower communities and organizations to survive – and thrive – in the face of escalating environmental risks



System design
expertise



Reliable sensing
networks



Highest
quality data



Actionable
insights



Optimized
decisions

Resiliency & Positive Outcomes

An aerial photograph of a multi-lane highway filled with cars, creating a dense traffic jam. The image is overlaid with a semi-transparent teal color. A white rectangular box is positioned on the left side, containing the number '05'. To the right of this box, the text 'Audience Q&A' is written in white. The entire composition is framed by a thin white border.

05

Audience Q&A



Thank you

For more information, let's talk at:
info@aem.eco

aem.eco