El Niño-Southern Oscillation (ENSO) Update + What Might We Expect This Winter?

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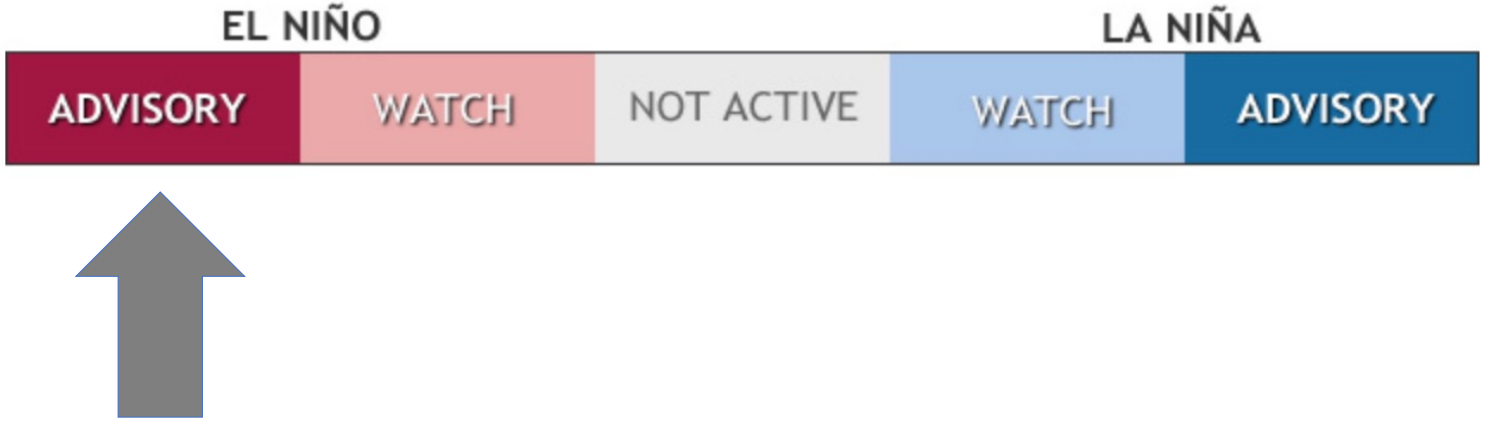
* ENSO blog affiliates

NOAA Eastern Region Climate Services Webinar
30 November 2023



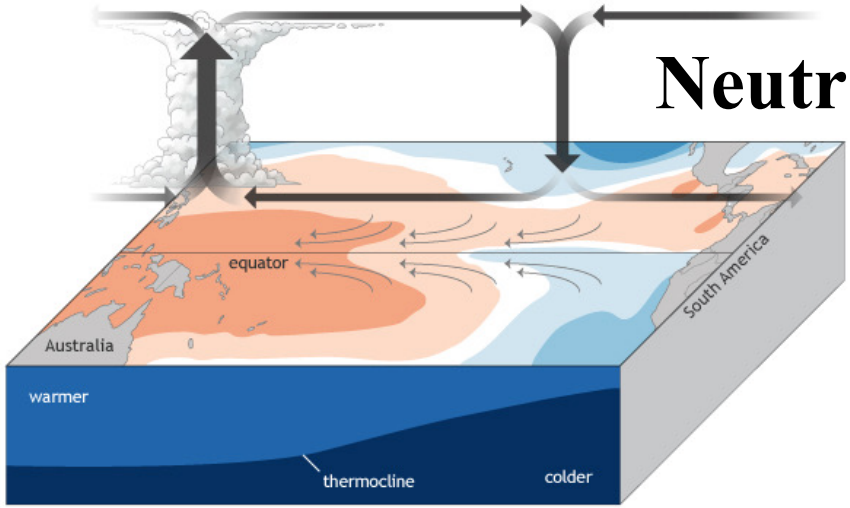
El Niño Advisory

9 November 2023 Update:

El Niño is anticipated to continue through the Northern Hemisphere spring (with a 62% chance during April-June 2024).

https://www.cpc.ncep.noaa.gov/products/analysis_monitoring/enso_advisory/ensodisc.shtml

Atmosphere-ocean feedbacks during El Niño-Southern Oscillation
Neutral

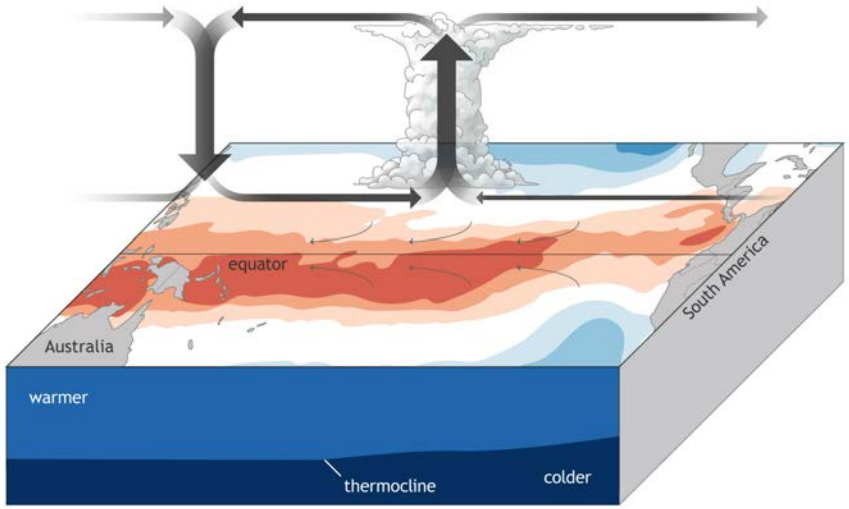


NOAA Climate.gov

Neutral

El Niño

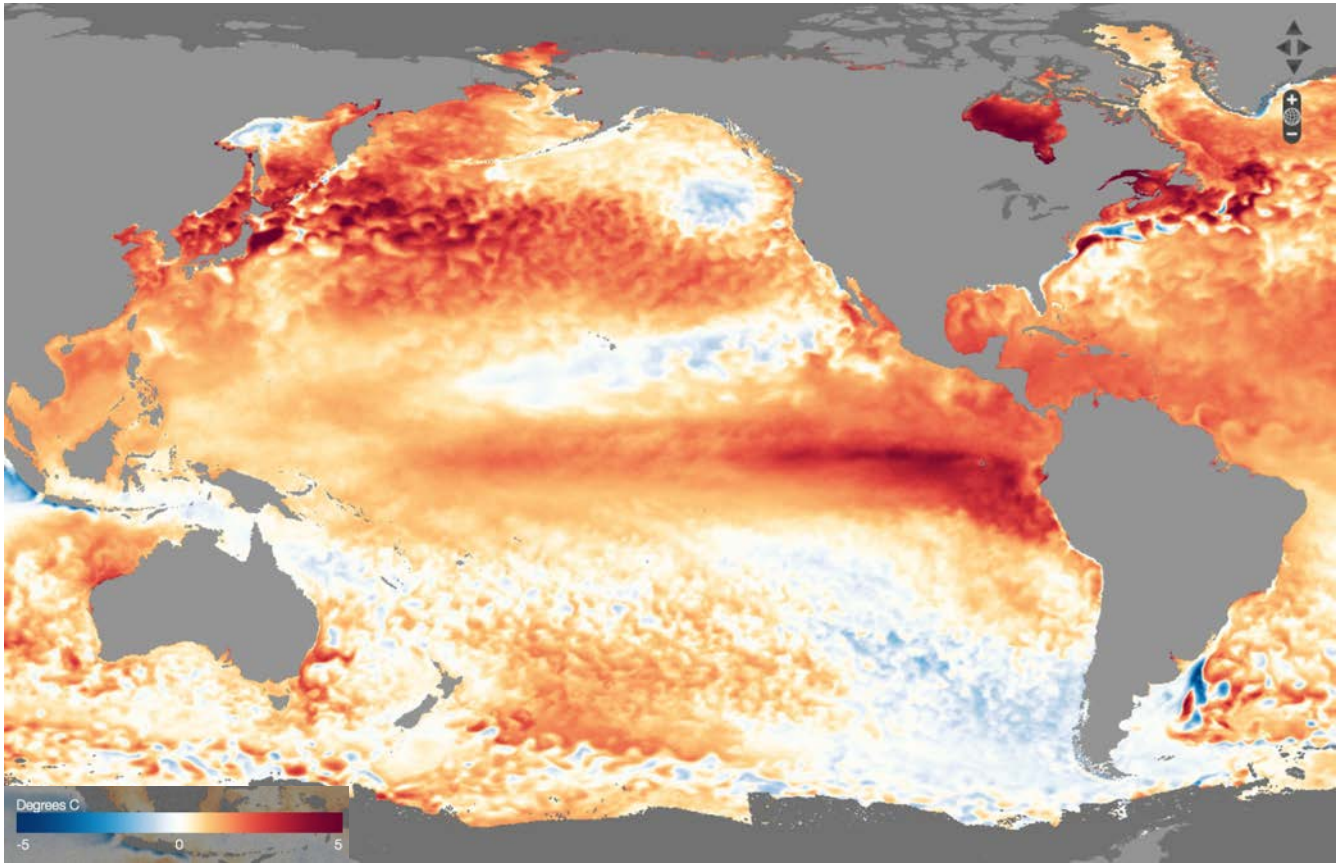
Atmosphere-ocean feedbacks during El Niño-Southern Oscillation
El Niño



NOAA Climate.gov

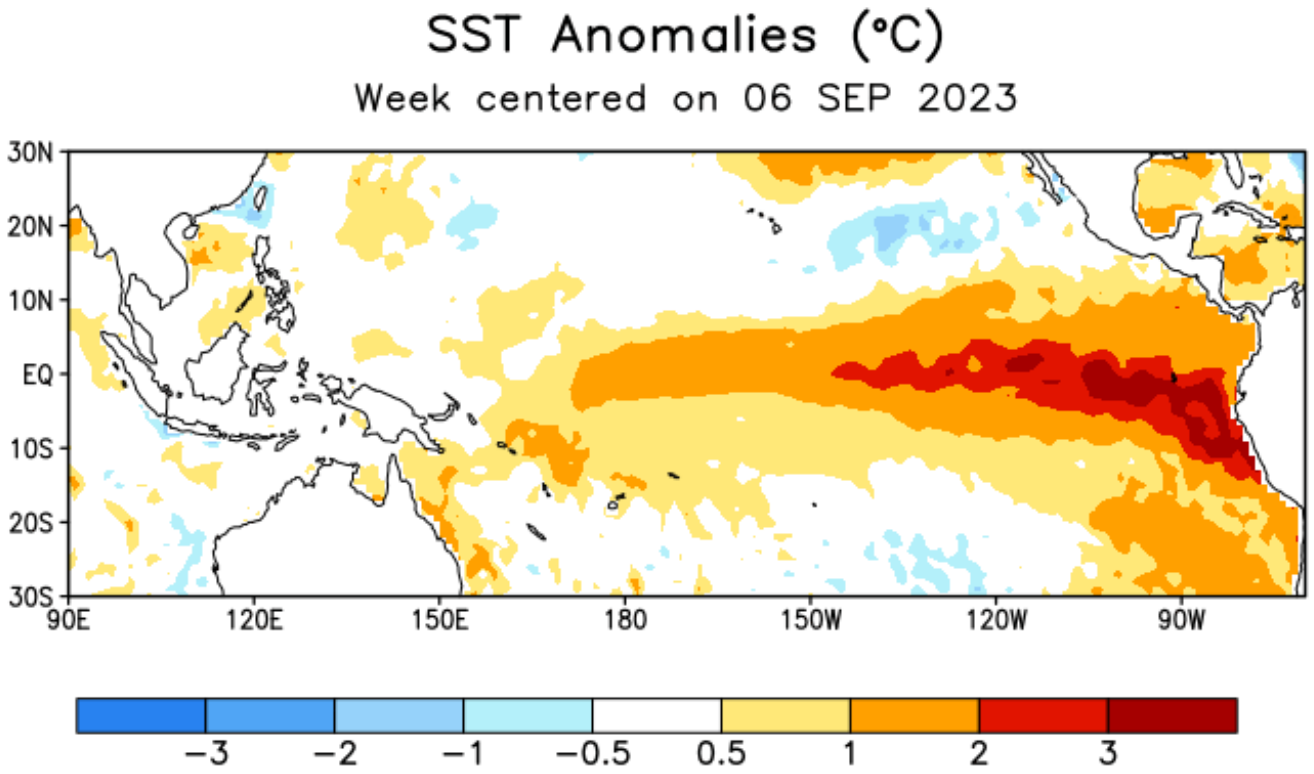
https://www.climate.gov/news-features/blogs/enso/rise-el-niño-and-la-niña

October 2023 Sea Surface Temperature (SST) Anomalies

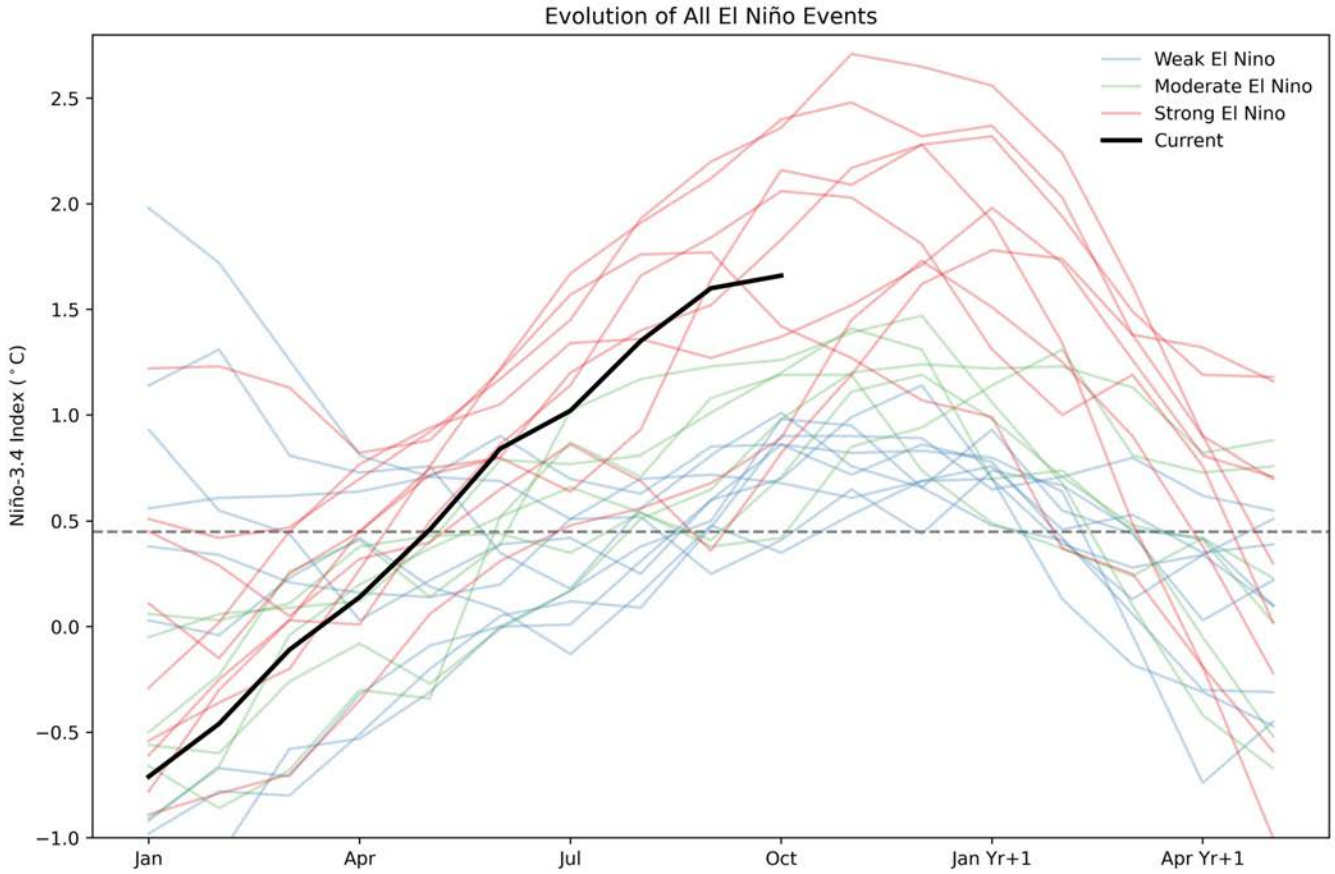


https://www.nnvl.noaa.gov/view/globaldata.html#SSTA

Weekly Average Sea Surface Temperatures
during early September through late November 2023

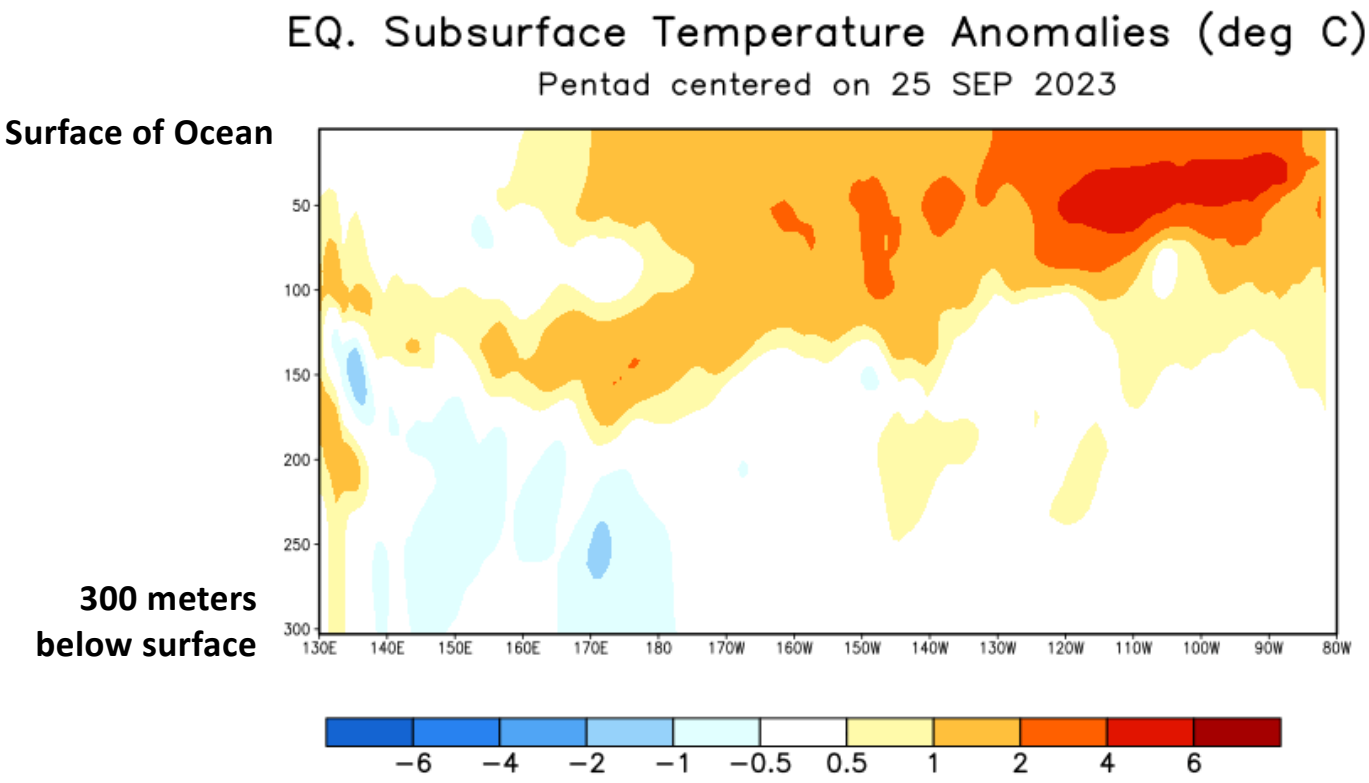


Evolution in the Niño-3.4 SST index for all El Niño episodes since 1950

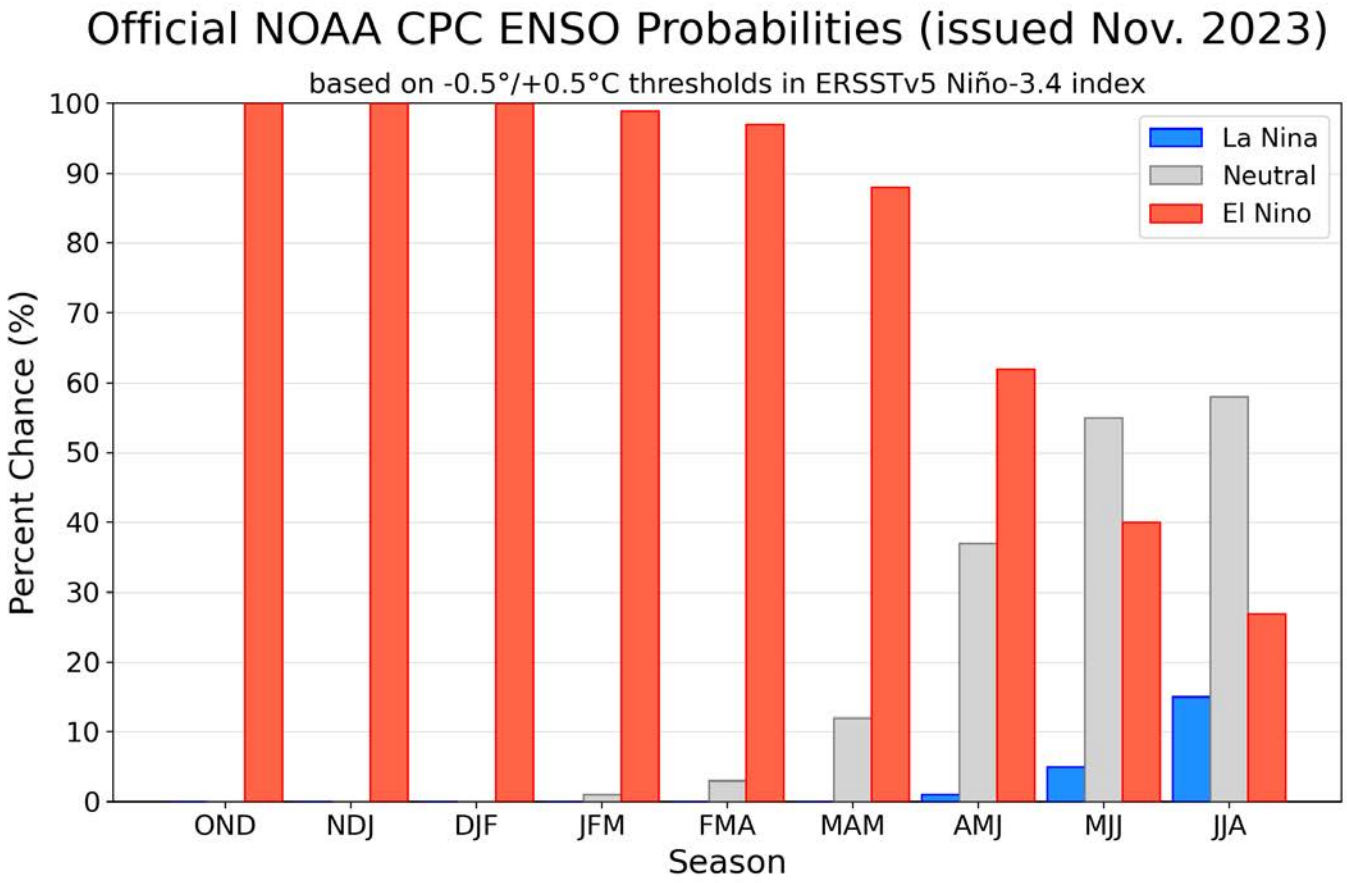


Data: NOAA ERSSTv5 (with 30-year moving climatologies)

Subsurface Temperature Departures
during late September through mid November 2023



ENSO Outlook (updated 9 November)



https://www.cpc.ncep.noaa.gov/products/analysis_monitoring/enso_advisory/ensodisc.shtml

Niño3.4 Index Strength Outlook (updated 9 November)

ENSO Strengths

This table shows the forecast probability (%) of Niño-3.4 index exceeding a certain threshold (in degrees Celsius).
For negative thresholds, the table shows the probability (%) of a Niño-3.4 index value that is less than (more negative) that value.
For positive thresholds, the table shows the probability (%) of a Niño-3.4 index value that is greater than (more positive) that value.
This tool supports the official ENSO Diagnostic discussion updated on the 2nd Thursday of each month.

Target	≤ -2.0°C	≤ -1.5°C	≤ -1.0°C	≤ -0.5°C	≥ 0.5°C	≥ 1.0°C	≥ 1.5°C	≥ 2.0°C
OND	~0	~0	~0	~0	~100	~100	94	22
NDJ	~0	~0	~0	~0	~100	~100	87	35
DJF	~0	~0	~0	~0	~100	97	73	27
JFM	~0	~0	~0	~0	99	91	56	16
FMA	~0	~0	~0	~0	97	75	30	4
MAM	~0	~0	~0	~0	88	46	9	~0
AMJ	~0	~0	~0	1	62	19	2	~0
MJJ	~0	~0	~0	5	40	9	1	~0
JJA	~0	~0	2	15	27	6	1	~0
	≤ -2.0°C	≤ -1.5°C	≤ -1.0°C	≤ -0.5°C	≥ 0.5°C	≥ 1.0°C	≥ 1.5°C	≥ 2.0°C

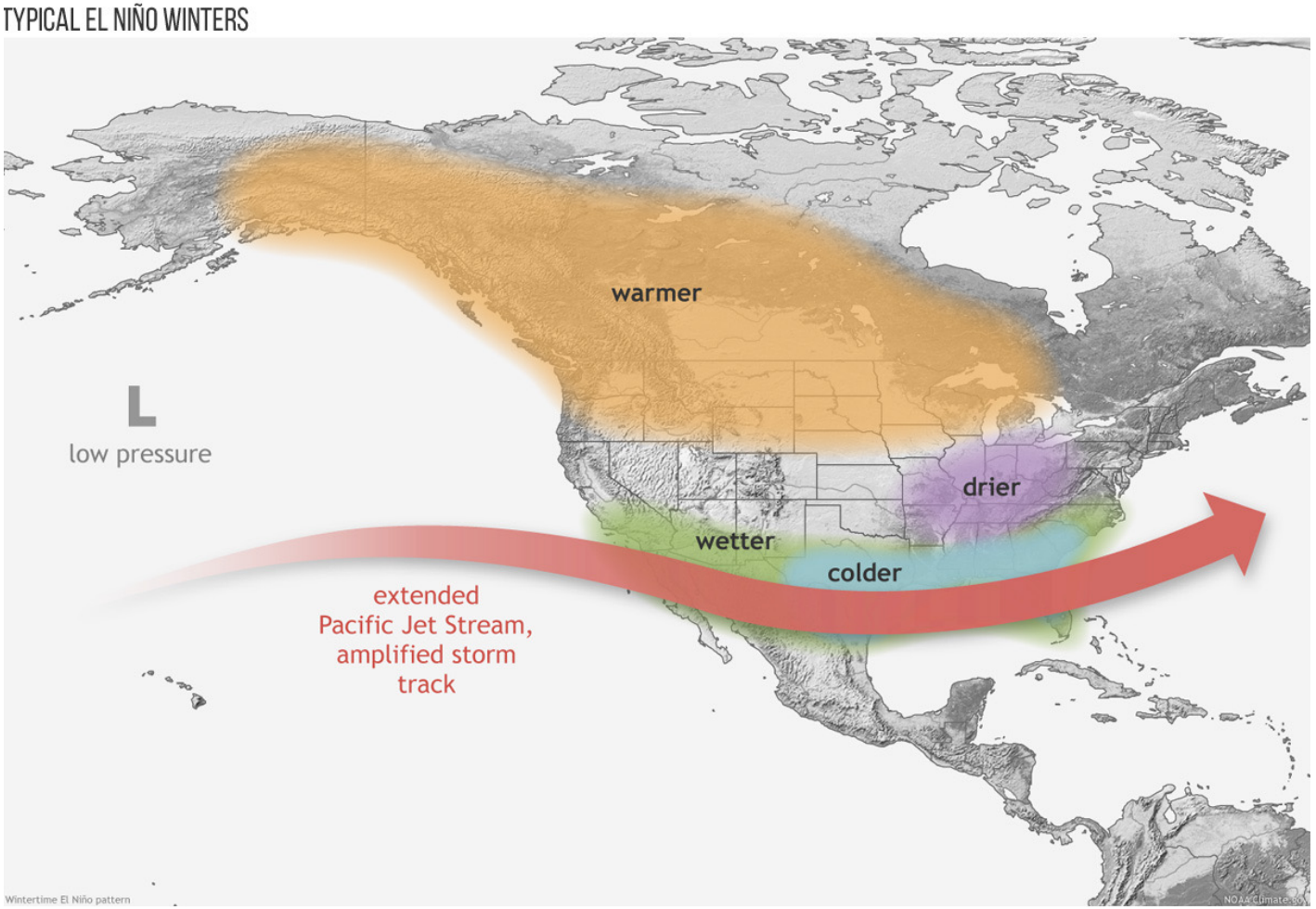
A strong El Niño is favored with greater than a 55% chance through January-March 2024.

A "historically strong" El Niño has a ~1 in 3 chance during November-January.

https://www.cpc.ncep.noaa.gov/products/analysis_monitoring/enso_advisory/strengths/index.php

What Might We Expect Over the Northeast This Winter?

Schematic Version of El Niño Impacts

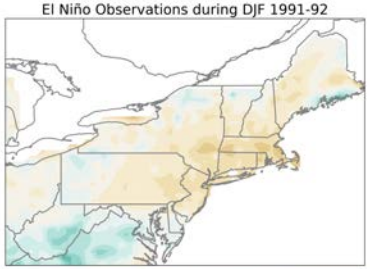


https://www.climate.gov/news-features/featured-images/how-el-niño-and-la-niña-affect-winter-jet-stream-and-us-climate

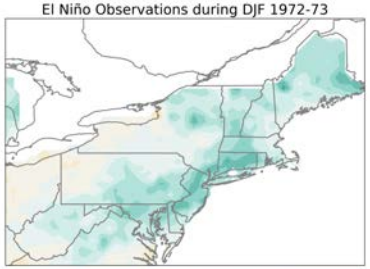
What Do Precipitation Anomalies look like for previous Strong El Niños?

Poorer Pattern Matches With Typical El Niño Pattern

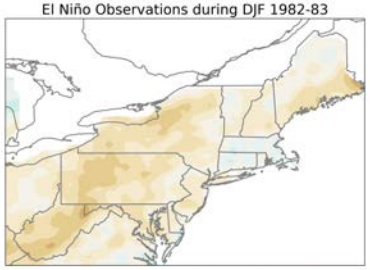
El Niño Observations during DJF 1991-92



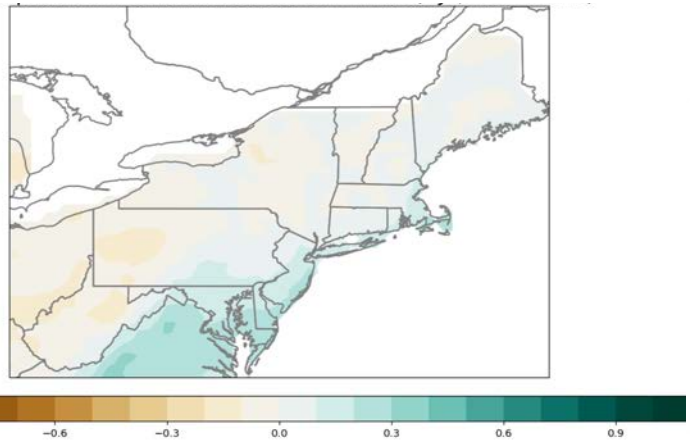
El Niño Observations during DJF 1972-73



El Niño Observations during DJF 1982-83



Expected or Typical El Nino precipitation pattern during December-February

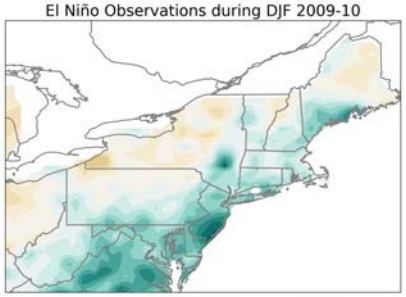


Below-average precipitation

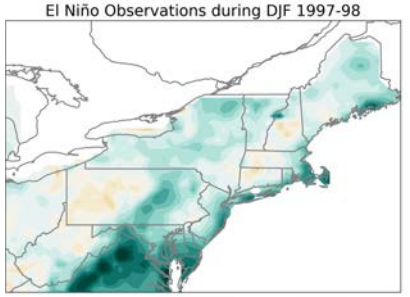
Above-average precipitation

Better Pattern Matches With Typical El Niño Pattern

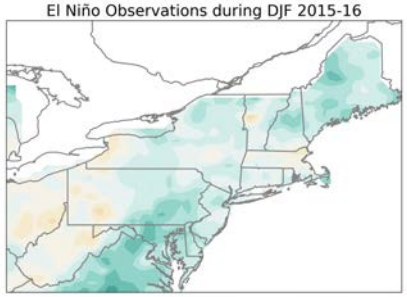
El Niño Observations during DJF 2009-10



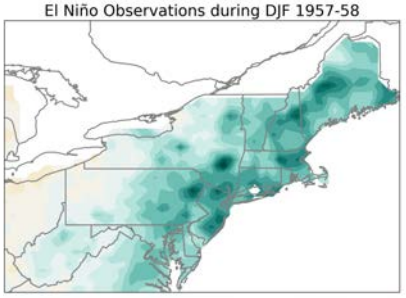
El Niño Observations during DJF 1997-98



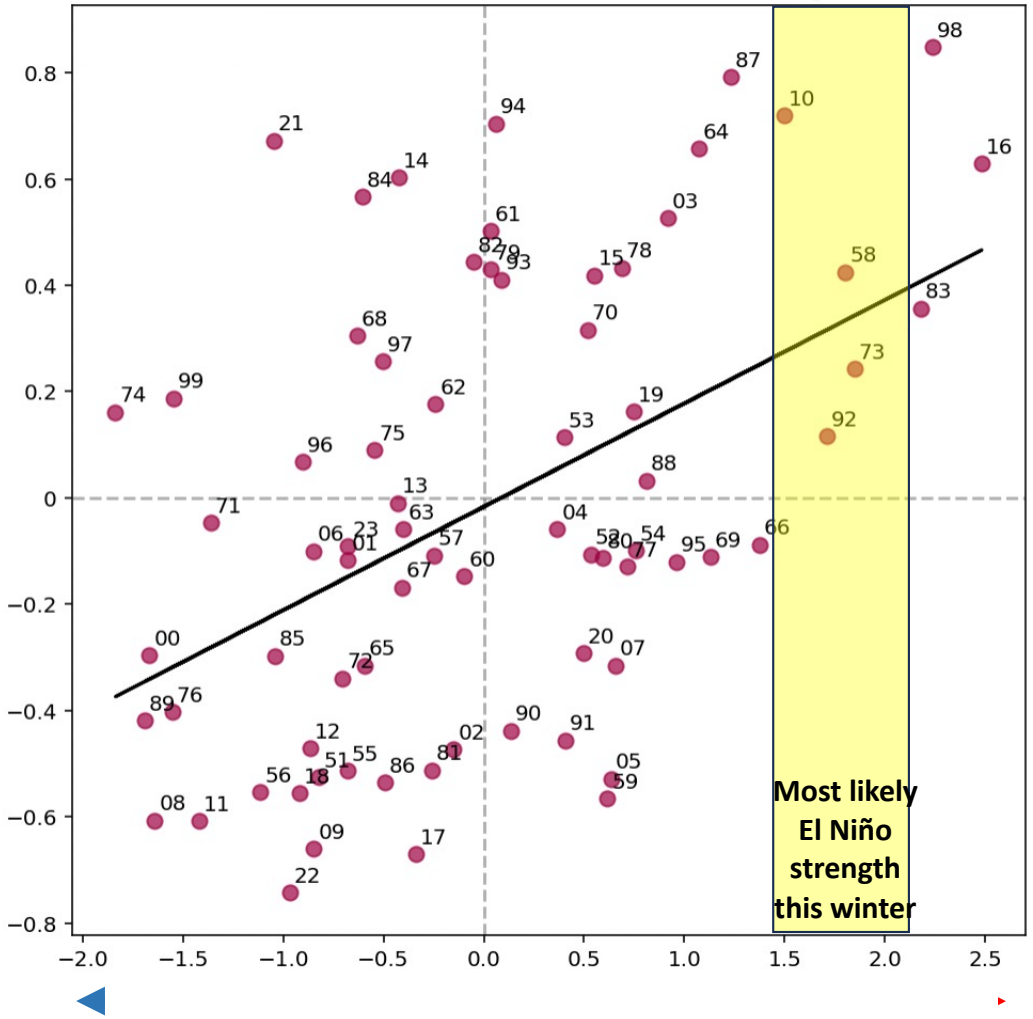
El Niño Observations during DJF 2015-16



El Niño Observations during DJF 1957-58



Match Score* With Typical El Niño Pattern



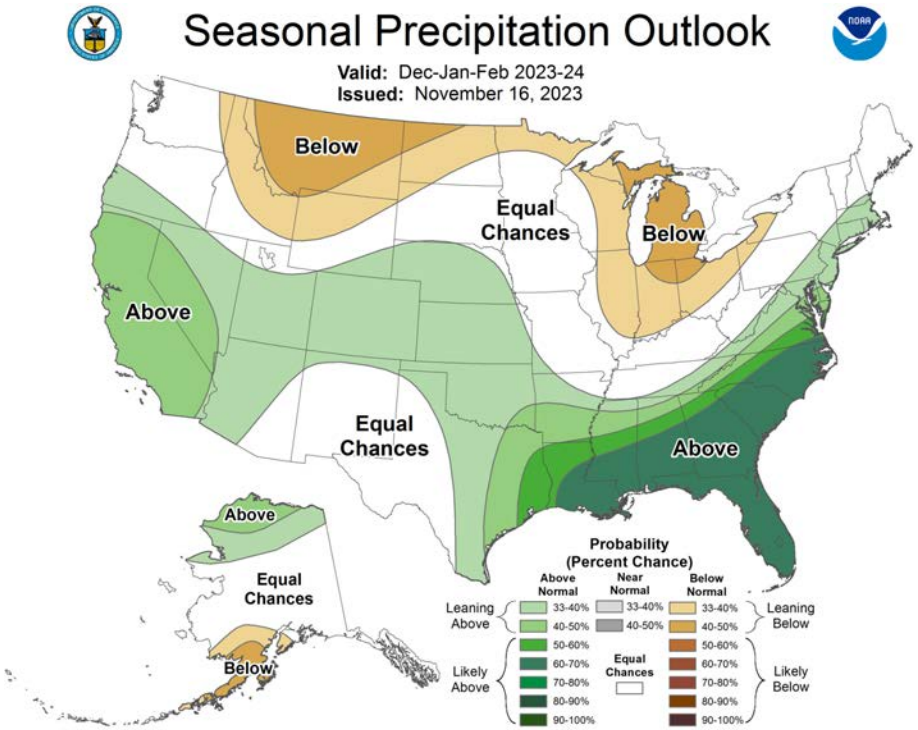
Niño-3.4/ONI values

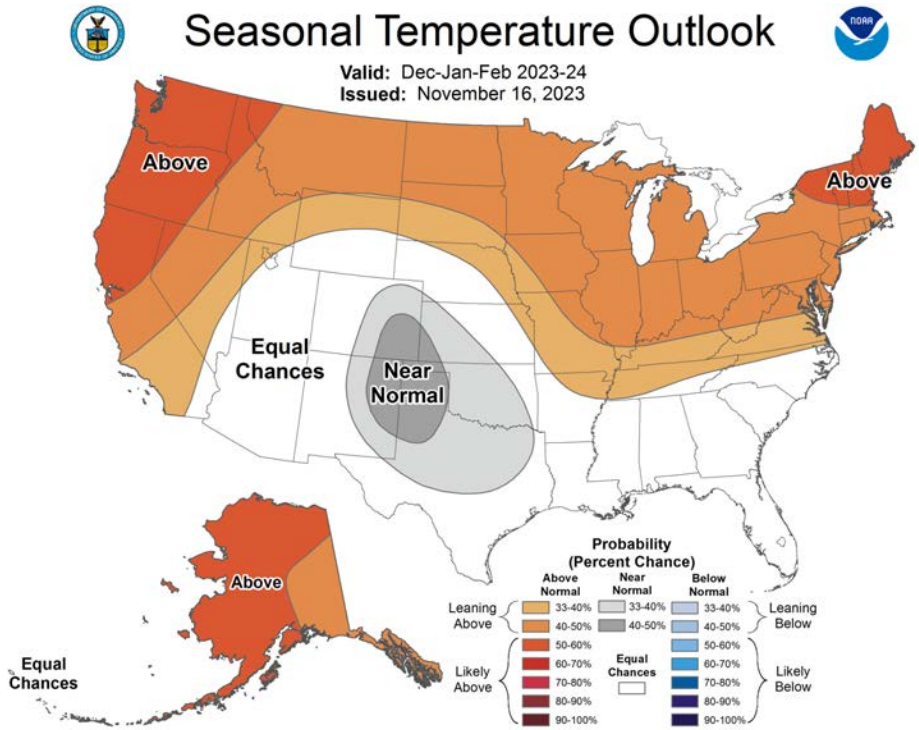
Larger values means winter precip pattern looks more like the typical El Niño pattern

#s next to dots refers to the year.
98= 1997-98 winter

** Spatial Pattern Correlation*

December 2023- February 2024 CPC Outlook
(updated 16 Nov.)

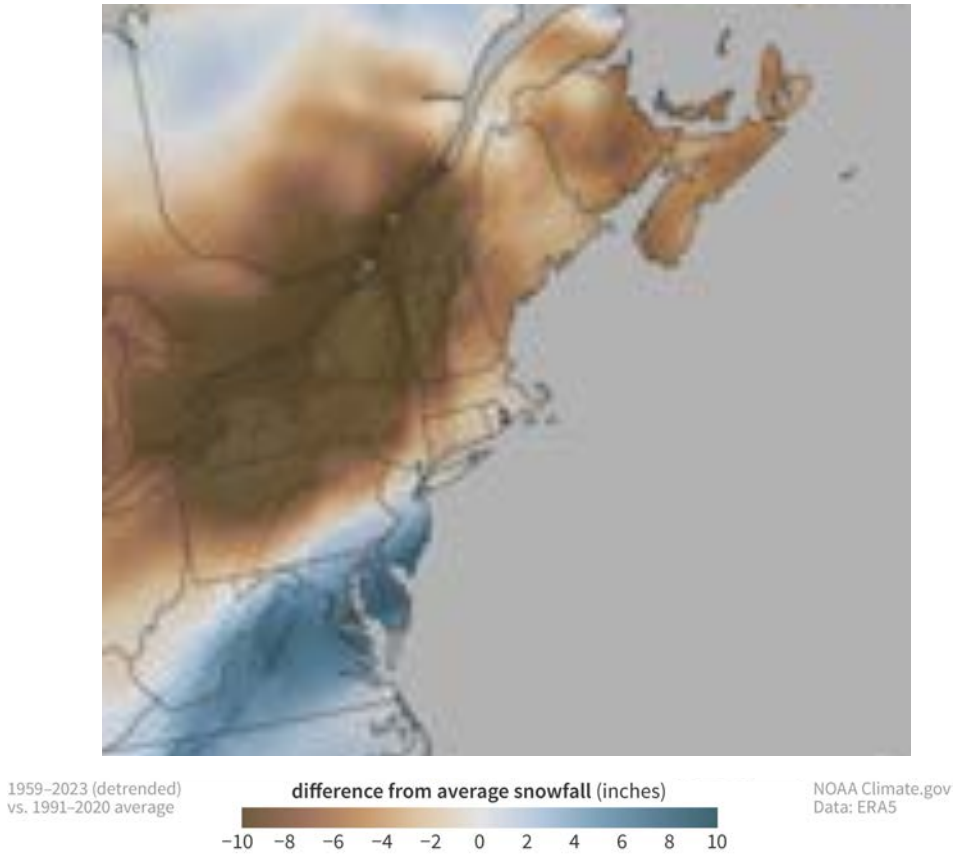


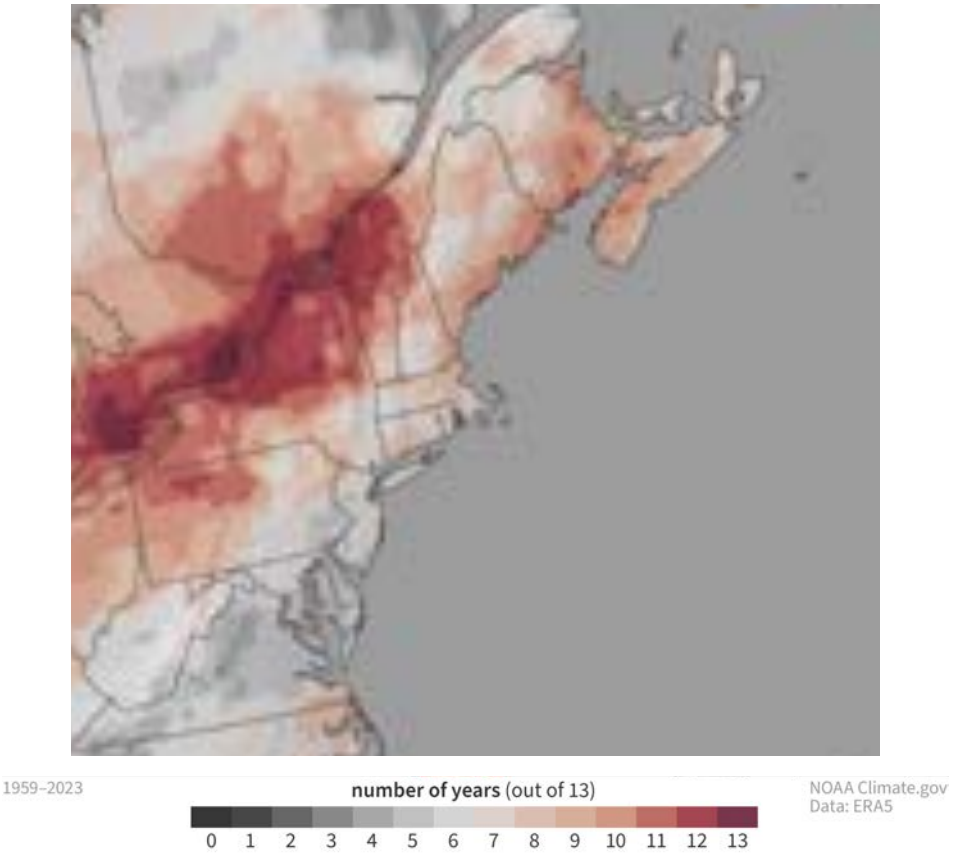


For the northeast region, the overall patterns look fairly similar through February-April

CPC Seasonal Outlooks for all upcoming seasons:
https://www.cpc.ncep.noaa.gov/products/predictions/long_range/

January-March Average Snowfall Anomalies (ERA5 data) for Moderate & Strong El Niños



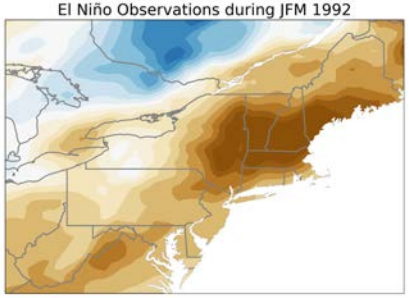


https://www.climate.gov/news-features/blogs/snow-pain-snow-gain-how-does-el-nino-affect-snowfall-over-north-america

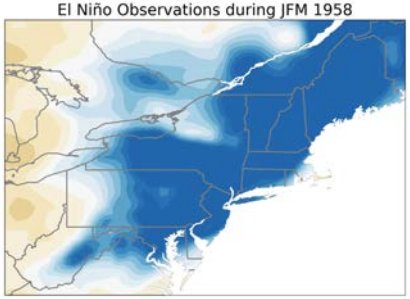
What Do Snowfall Anomalies look like for previous Strong El Niños?

Poorer Pattern Matches With Typical El Niño Pattern

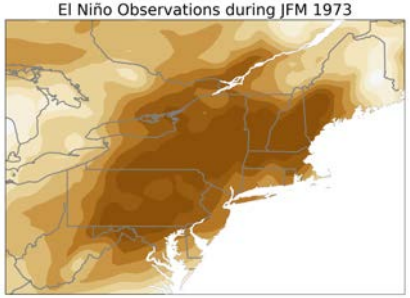
El Niño Observations during JFM 1992



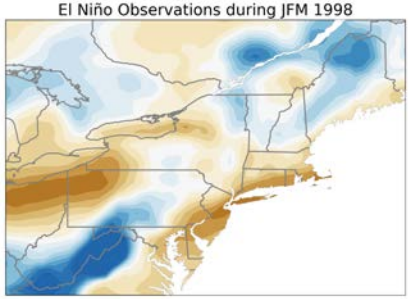
El Niño Observations during JFM 1958



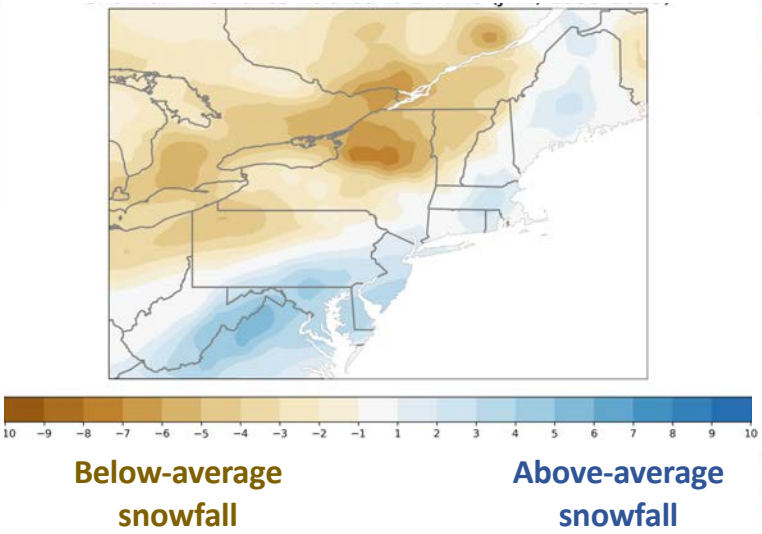
El Niño Observations during JFM 1973



El Niño Observations during JFM 1998



Expected or Typical El Nino precipitation pattern during January-March

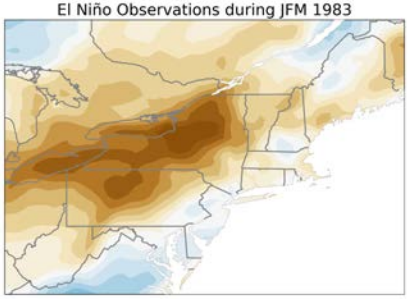


Below-average snowfall

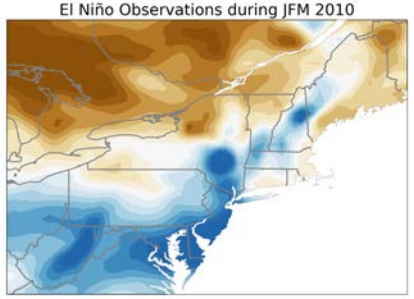
Above-average snowfall

Better Pattern Matches With Typical El Niño Pattern

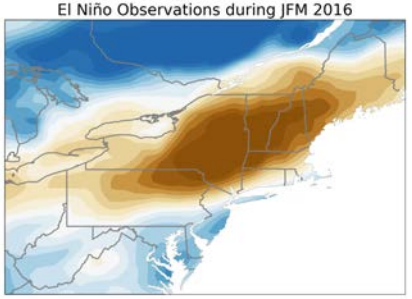
El Niño Observations during JFM 1983



El Niño Observations during JFM 2010



El Niño Observations during JFM 2016



Key Takeaways

- A strong El Niño is already in place and is currently strengthening. There is a 1 in 3 chance of a historically strong El Niño that rivals our strongest El Niño events.

- The expected peak (of sea surface temperatures in the Niño-3.4 region) is during the November-January season, but impacts over the United States will lag into the spring seasons.

- For coastal regions, there is a lean toward above-average precipitation (rainfall + snow). For regions adjacent to the Great Lakes, below-average precipitation is favored. Above-average temperatures are favored over the entire region.

- Expected seasonal impacts are always probabilistic ("% chance of") and never guaranteed. In the northeast, remember the precipitation "bust" in 1991-92!

- During strong El Niño events, only the below-average snowfall near the Great Lakes is statistically significant. Other regions are closer to a coin toss.

ENSO Diagnostics Discussion (updated on the 2nd Thursday of each month)

http://www.cpc.ncep.noaa.gov/products/analysis_monitoring/enso_advisory/ensodisc.html

ENSO Blog (updated twice a month)

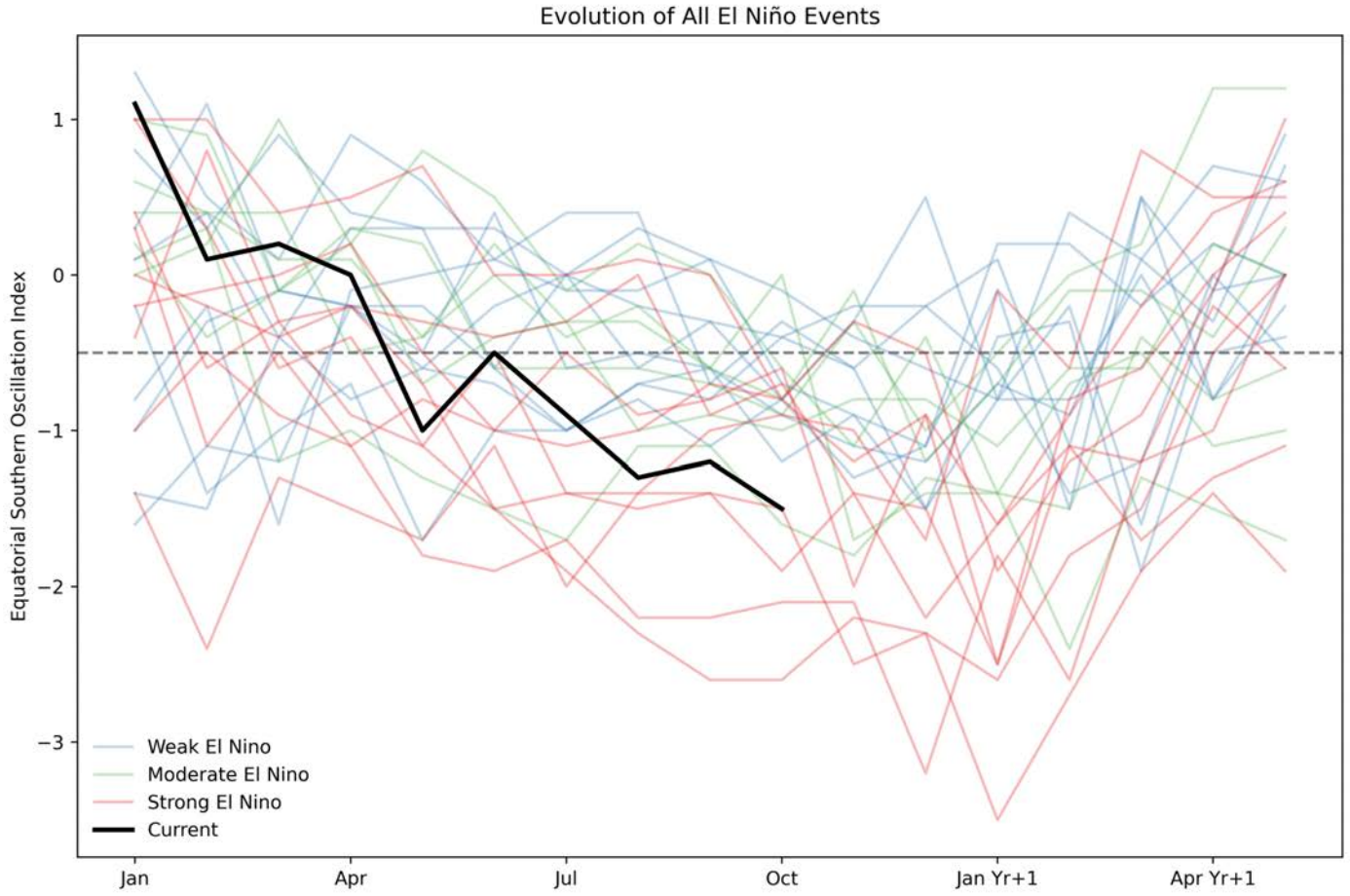
https://www.climate.gov/news-features/blogs/enso [or just google “ENSO Blog”]

CPC Seasonal Outlook (updated on the 3rd Thursday of each month)

https://www.cpc.ncep.noaa.gov/products/predictions/long_range/

Extra Slides

Evolution in the Equatorial Southern Oscillation index for all El Niño episodes since 1950



Evolution in the Central Pacific OLR (cloudiness/convection) index for all El Niño episodes since 1991