

# 2024 Spring/Fire Season Outlook

For Northern and Central NM



Albuquerque

WEATHER FORECAST OFFICE

Issued: 3/12/2024



Courtesy: NM Magazine



Courtesy: Elizabeth R Rose



Courtesy: Santa Fe Tourism



Courtesy: Ashley Rebecca Moore



Courtesy: Caitlin Atkinson



Courtesy: Gavin Bevis



Courtesy: Chris Corrie

The Pacific Ocean continues to be highly changeable, currently forecast to go back into a cool phase or a La Niña climate pattern. What does that mean for spring and summer weather in NM?



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Current ENSO Status



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ENSO Alert System Status from the Climate Prediction Center (CPC): **El Niño Advisory** / **La Niña Watch**

El Niño conditions are observed.

Equatorial sea surface temperatures (SSTs) are above average across the central and eastern Pacific Ocean.

The tropical Pacific atmospheric anomalies are consistent with El Niño.

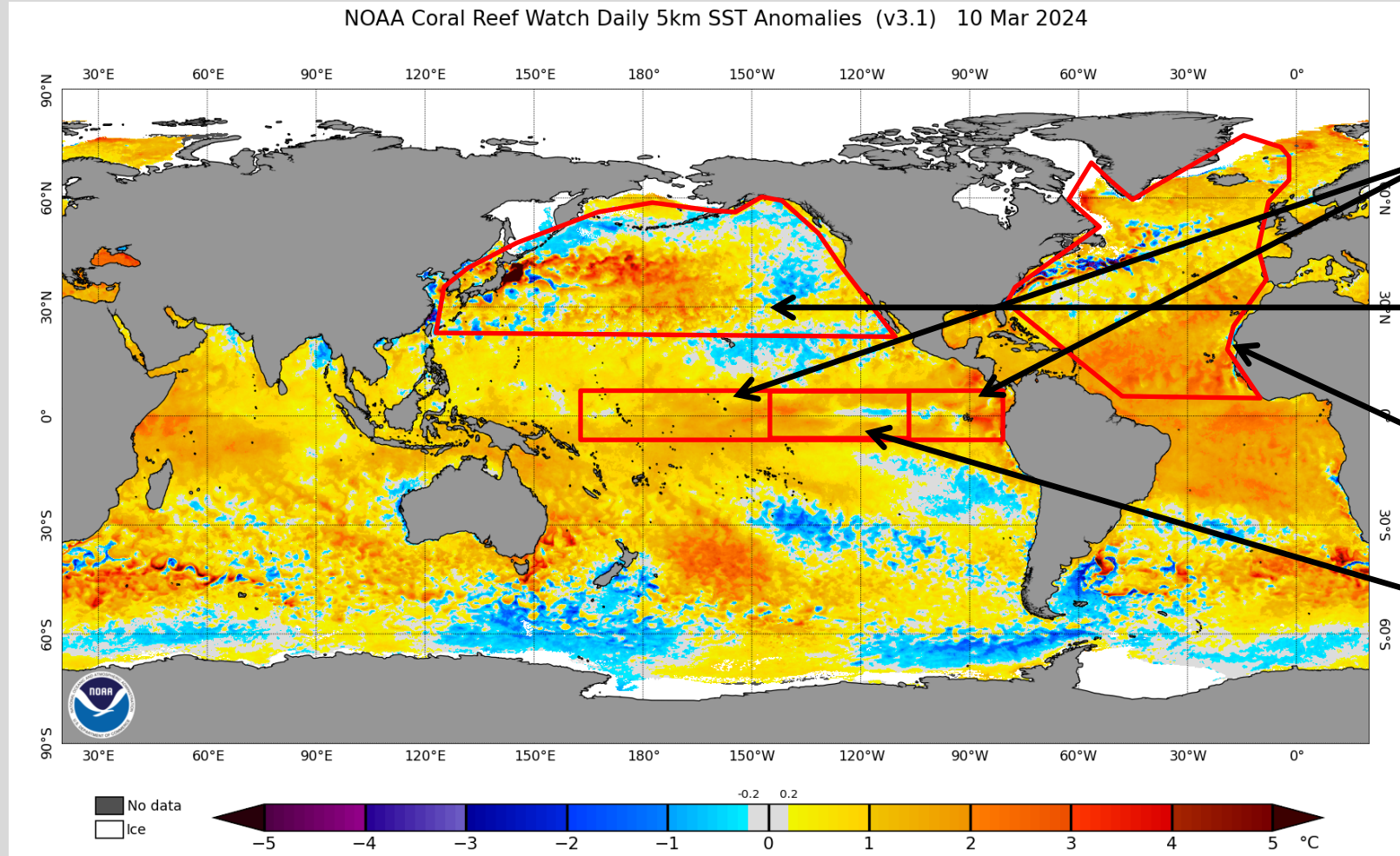
A transition from El Niño to ENSO-neutral is likely by April-June 2024 (79% chance), with increasing odds of La Niña developing in June-August 2024 (55% chance).

# 2024 Spring/Fire Season Outlook

## Sea Surface Temperature Anomalies or Difference from Average



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➤ Multivariate ENSO Index (MEI)  
for DEC-JAN 2024: **+0.7**

➤ Pacific Decadal Oscillation (PDO)  
for FEB 2024: **-0.44**

➤ Atlantic Multidecadal Oscillation (AMO)  
for FEB 2024: **+0.27**

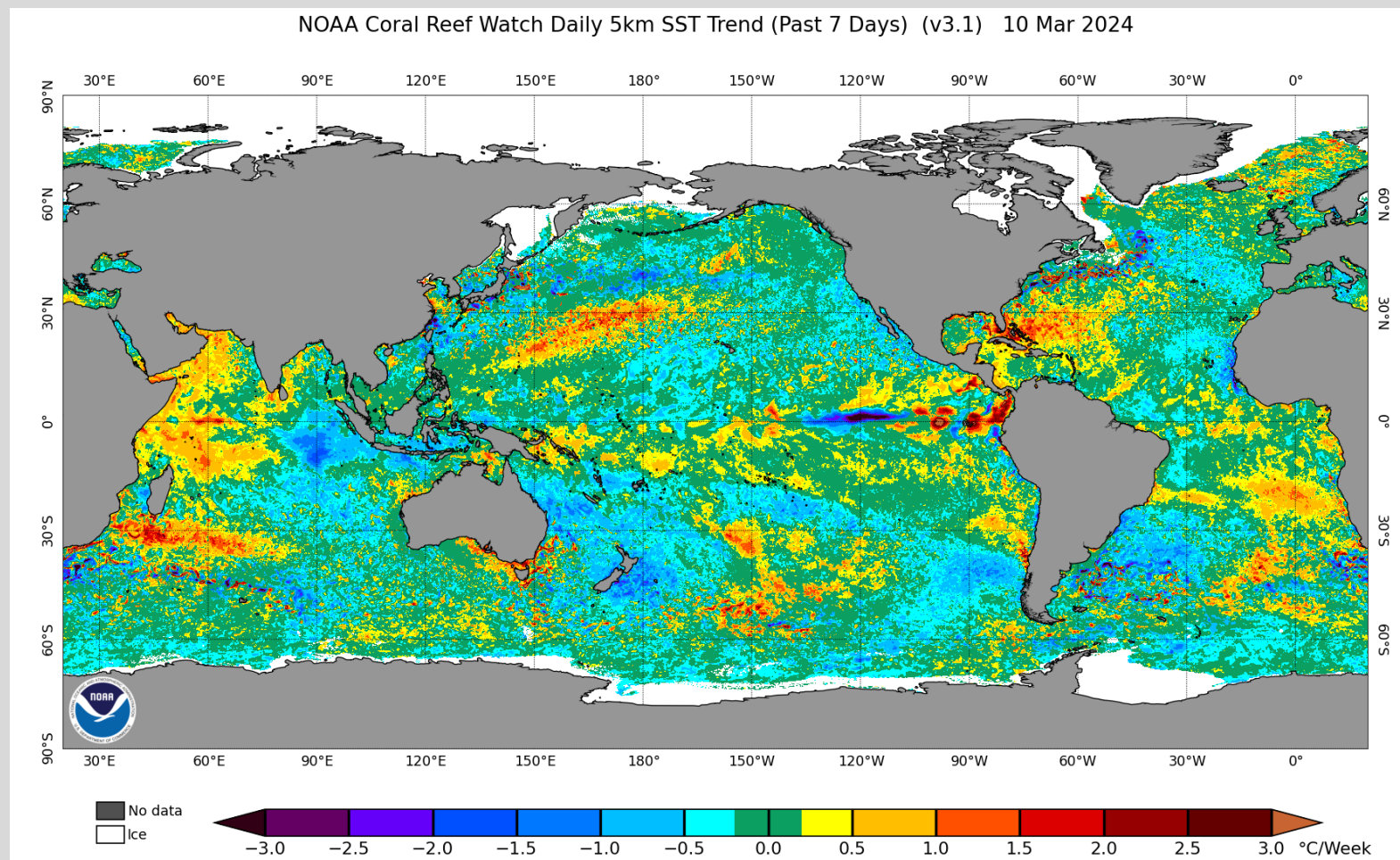
➤ Oceanic Niño Index (ONI) (uses  
Niño 3.4 region - inner rectangle)  
for DJF 2023-24: **+1.8** (<**+0.5** = El  
Niño)

Latest weekly global SST anomalies showing an area of warmer than average temperatures in the eastern equatorial Pacific continuing in El Niño territory, but fading (+0.5°C or warmer than average in Niño 3.4 region for 3 month period).

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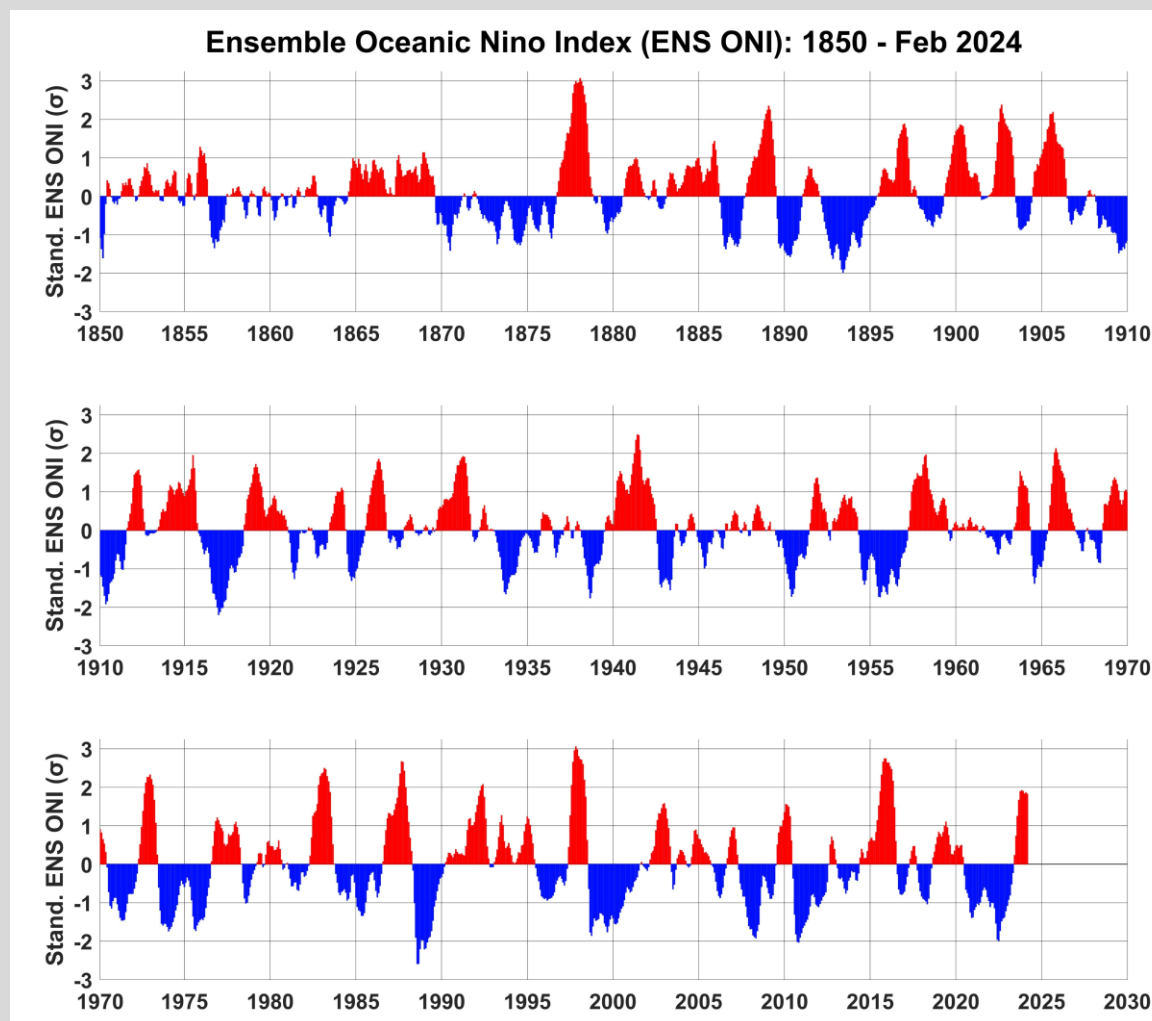
Sea Surface Temperature Past Week Trend



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The Ensemble Oceanic Nino Index (ENS ONI) through February 2024. The strong El Niño is beginning to weaken. This past winter's El Niño event ranked as the 8th strongest since the mid-1800s. (Webb & Magi 2022).

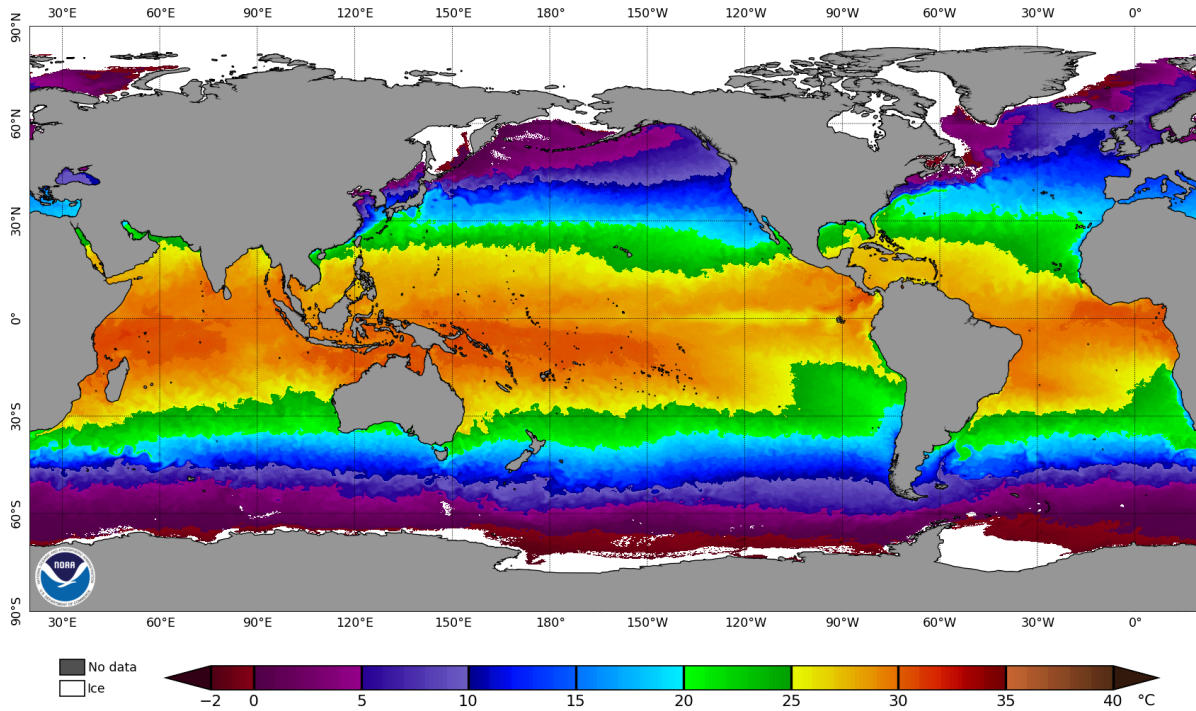
# 2024 Spring/Fire Season Outlook

## Current SSTs and SSTAs

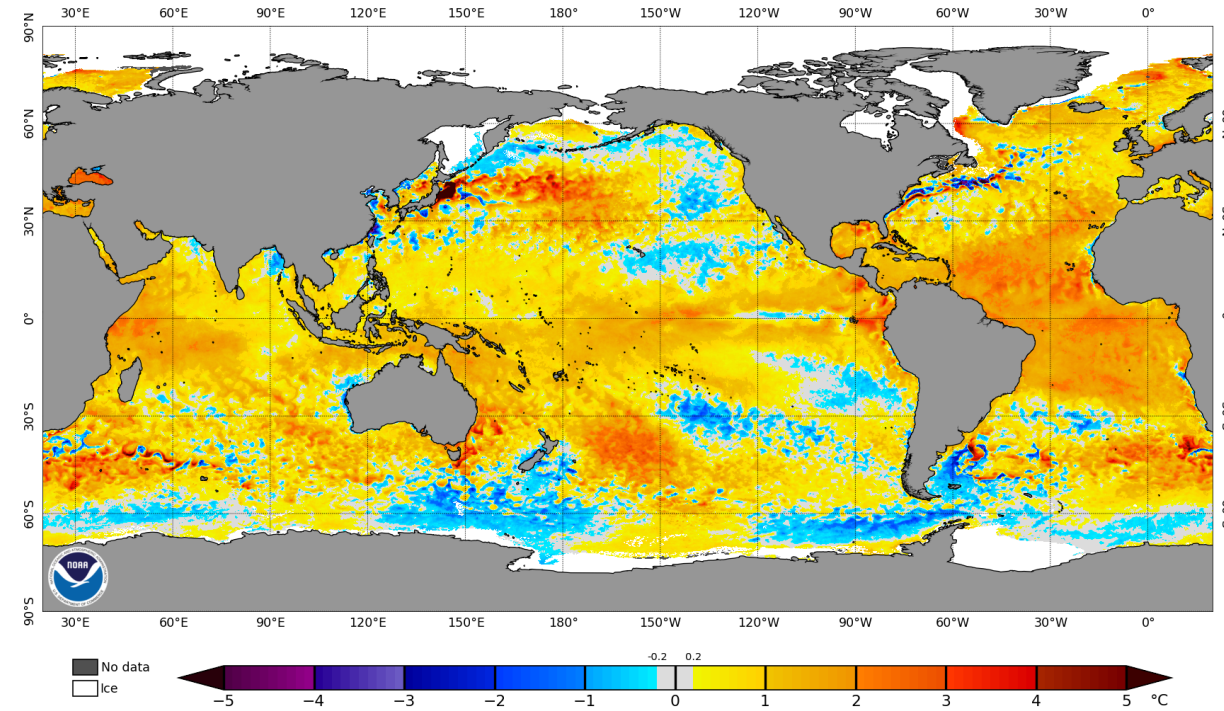


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NOAA Coral Reef Watch Daily 5km Sea Surface Temperatures (v3.1) 10 Mar 2024



NOAA Coral Reef Watch Daily 5km SST Anomalies (v3.1) 10 Mar 2024



Sea surface temperatures (SSTs) on the left with difference from average SSTAs on right. El Niño remains evident along with other areas of expansive above average SSTs in the northern hemisphere. Atmospheric Rivers (ARs) are long, narrow regions in the atmosphere – like rivers in the sky – that transport most of the water vapor outside of the tropics. Well above average SSTs in the northwest Pacific associated with a negative Pacific-Decadal Oscillation (PDO) allow for atmospheric rivers (ARs) to be more prolific and more frequent.

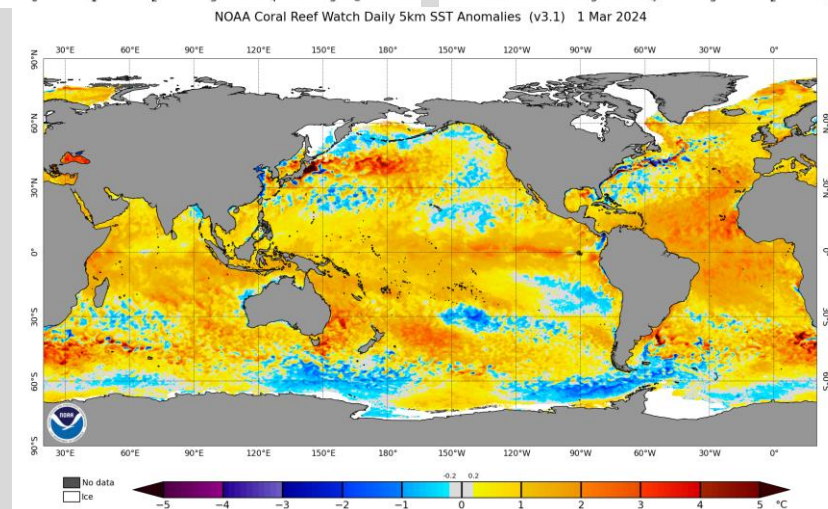
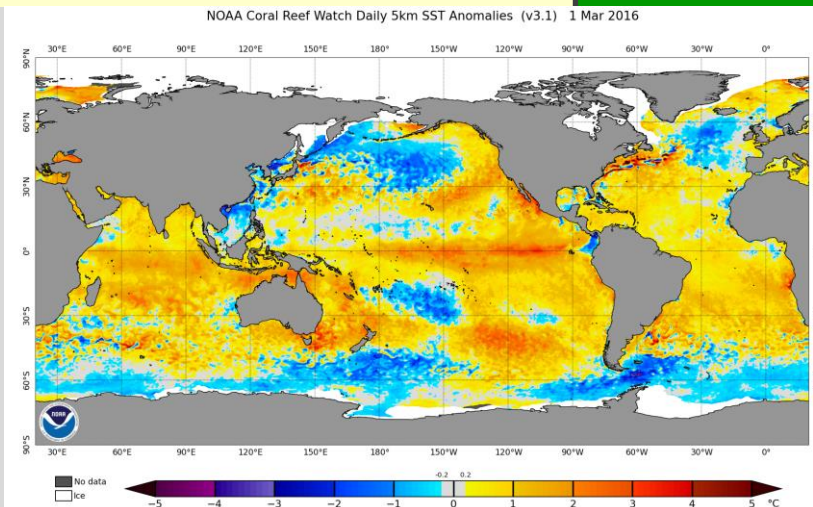
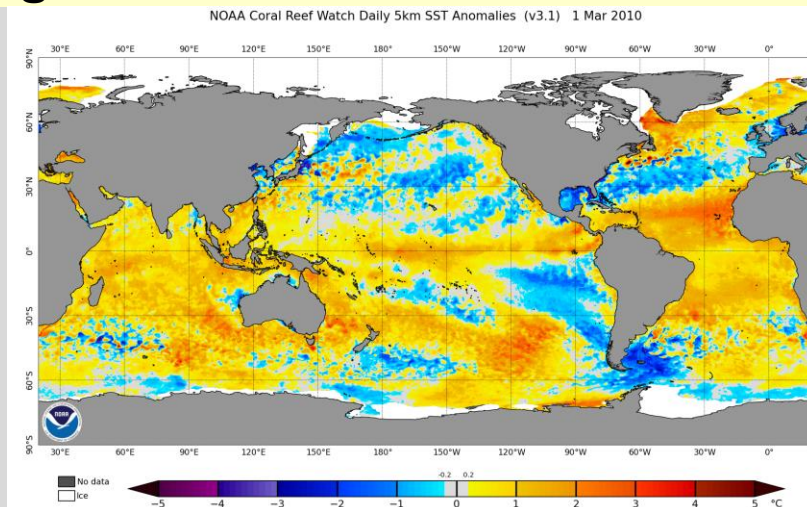


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## Looking at Analog Years



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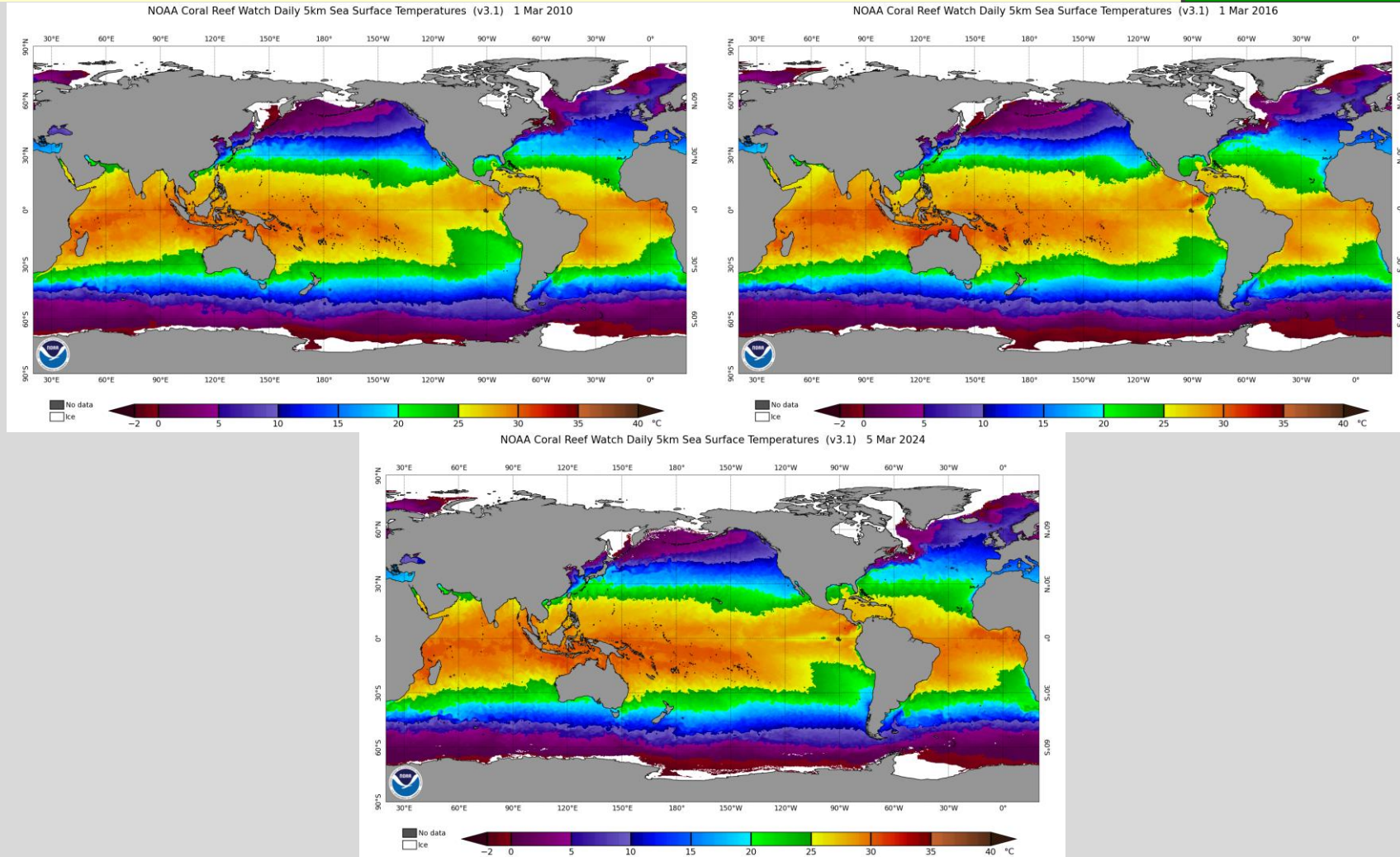
Comparing this year's El Niño weakening to recent moderate to strong events. SST gradients or difference from average are notably dissimilar when comparing 2023-24 event to the 2015-16 event. What does it mean? All El Niño climate events are different from one another. A negative PDO (warm water in the northwest PAC with relatively cool waters along the west coast of North America) is what separates this year compared to the strong El Niño of 2015-16. This year continues to look more like the moderate El Niño of 2009-10 due to the negative phase of the PDO.

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## SST Gradients



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ENSO prediction, after all, is all about the SST gradients. While warm water is necessary for thunderstorms to develop, surface convergence can be key to where deep convection in the tropics and subtropics develops most commonly during the upcoming spring season. 2024 is showing signals that are closer to 2010 than 2016 thanks to a negative or cool phase of the PDO.

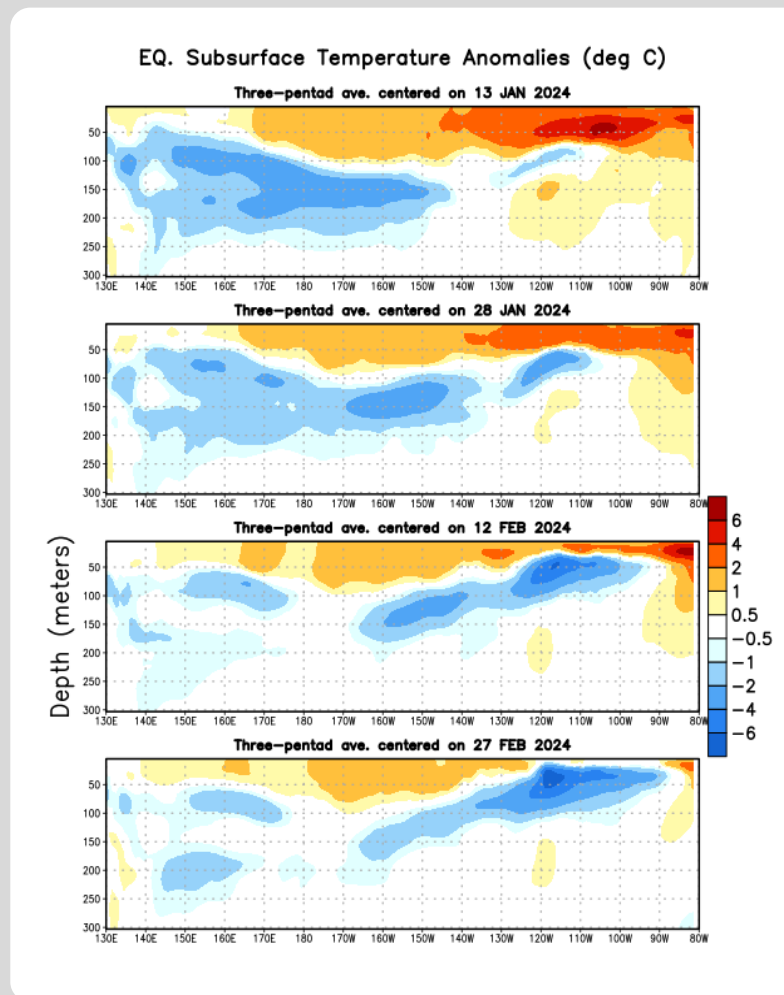
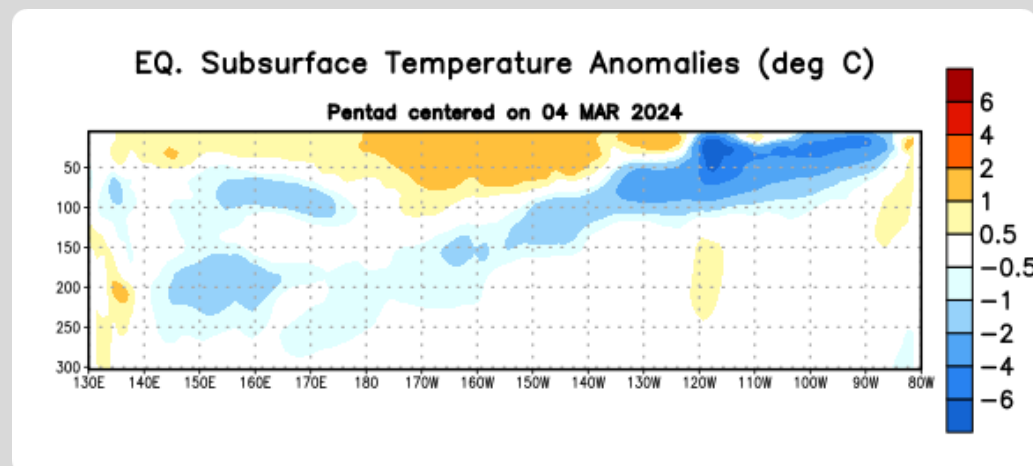


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## Subsurface Pacific Ocean Temperatures



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Negative subsurface temperature anomalies are present for most of the equatorial Pacific Ocean at depth

# 2024 Spring/Fire Season Outlook

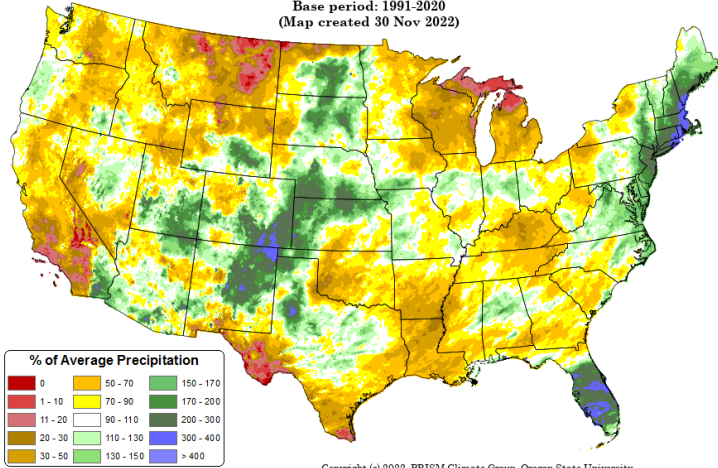
Analog Year - 2010



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Total Precipitation Anomaly: Mar 2010

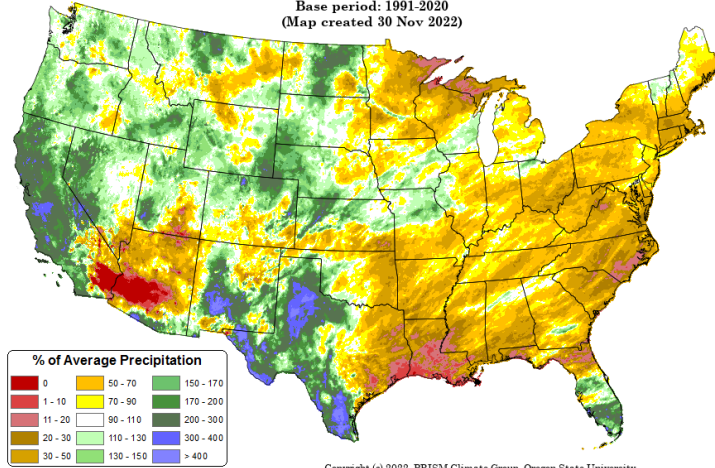
Period ending 31 Mar 2010  
Base period: 1991-2020  
(Map created 30 Nov 2022)



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Total Precipitation Anomaly: Apr 2010

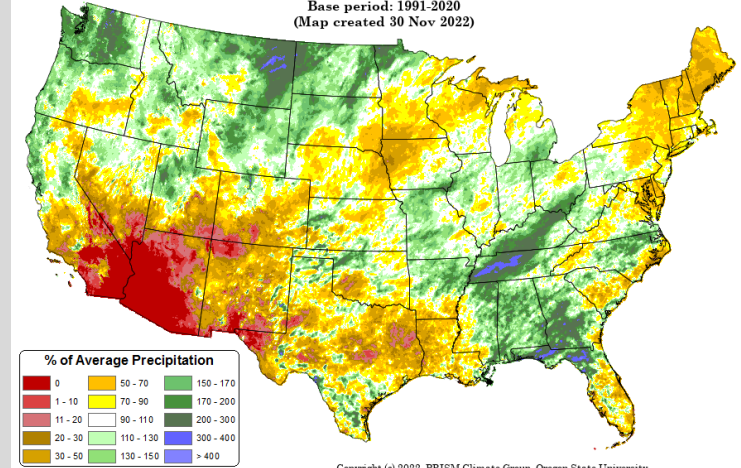
Period ending 30 Apr 2010  
Base period: 1991-2020  
(Map created 30 Nov 2022)



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Total Precipitation Anomaly: May 2010

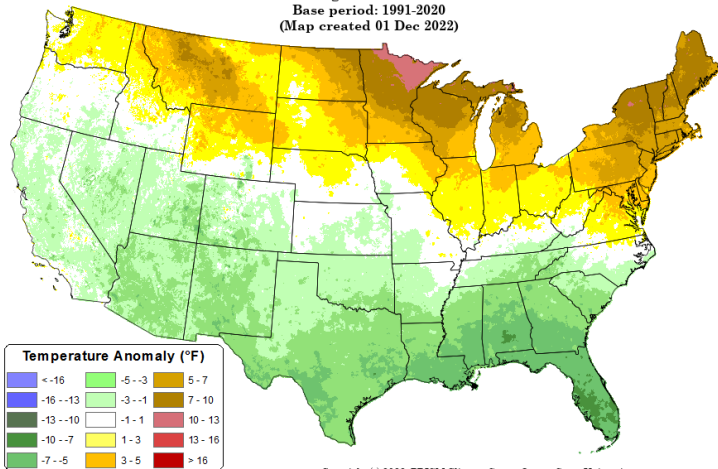
Period ending 31 May 2010  
Base period: 1991-2020  
(Map created 30 Nov 2022)



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Daily Mean Temperature Anomaly: Mar 2010

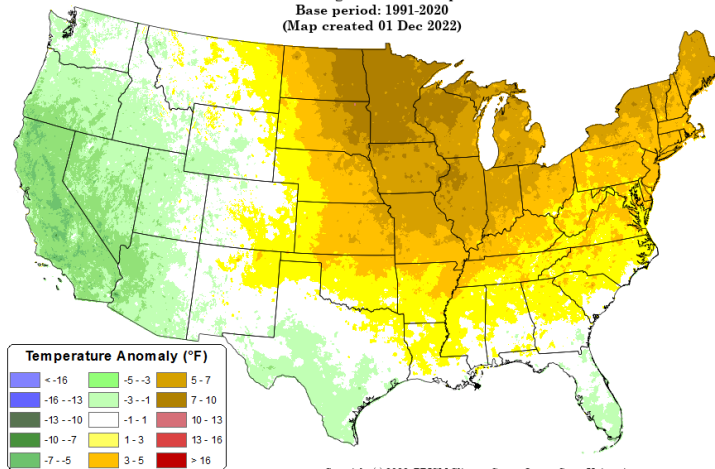
Period ending 7 AM EST 31 Mar 2010  
Base period: 1991-2020  
(Map created 01 Dec 2022)



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Daily Mean Temperature Anomaly: Apr 2010

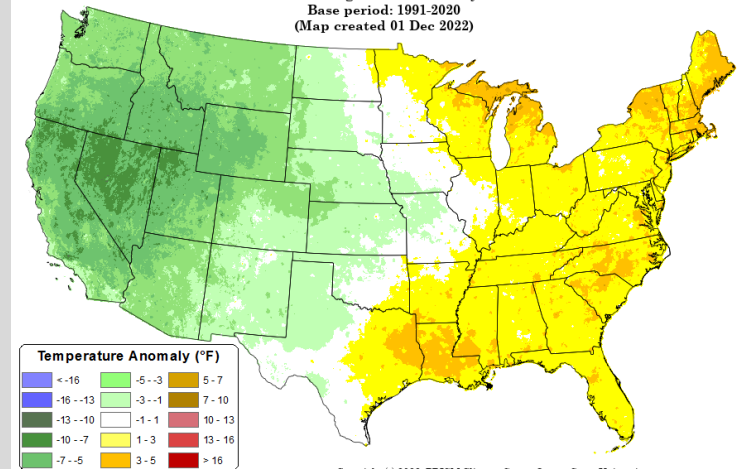
Period ending 7 AM EST 30 Apr 2010  
Base period: 1991-2020  
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Daily Mean Temperature Anomaly: May 2010

Period ending 7 AM EST 31 May 2010  
Base period: 1991-2020  
(Map created 01 Dec 2022)



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What were precipitation and temperatures like in spring during the last moderate to strong El Niño in 2009-10? A mixed bag with above average precipitation in some areas in March and April and below average in May. Temperatures ended up near to slightly below average. May is the “wild card” this spring/fire season forecast.



# 2024 Spring/Fire Season Outlook

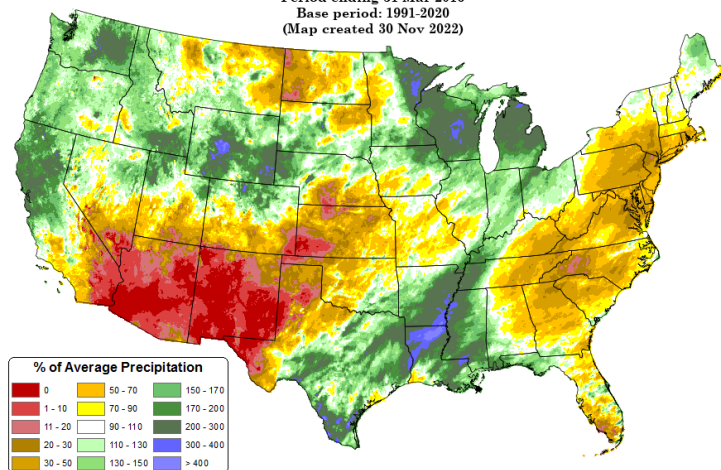
Most Recent Analog Year - 2016



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Total Precipitation Anomaly: Mar 2016

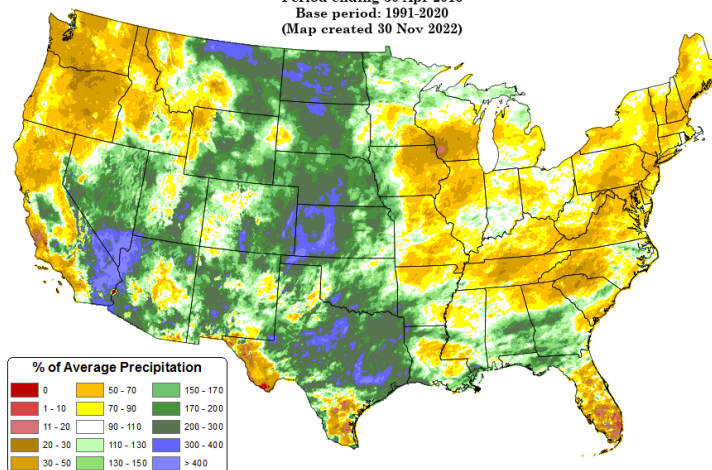
Period ending 31 Mar 2016  
Base period: 1991-2020  
(Map created 30 Nov 2022)



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Total Precipitation Anomaly: Apr 2016

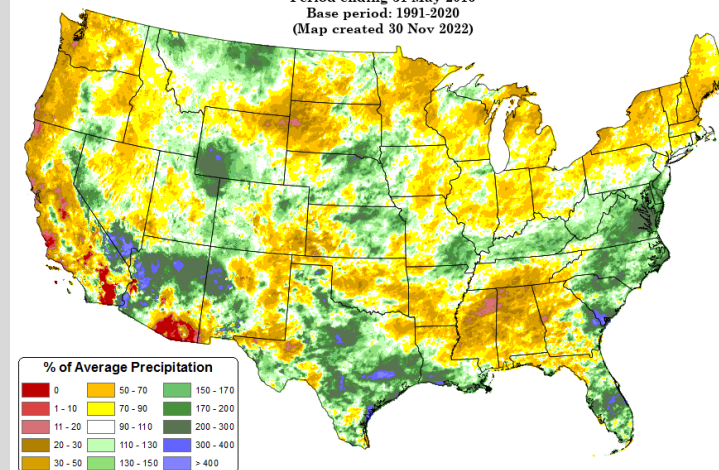
Period ending 30 Apr 2016  
Base period: 1991-2020  
(Map created 30 Nov 2022)



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Total Precipitation Anomaly: May 2016

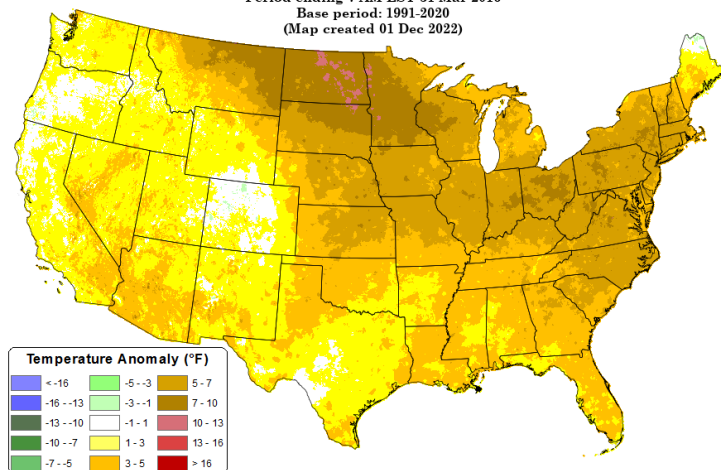
Period ending 31 May 2016  
Base period: 1991-2020  
(Map created 30 Nov 2022)



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Daily Mean Temperature Anomaly: Mar 2016

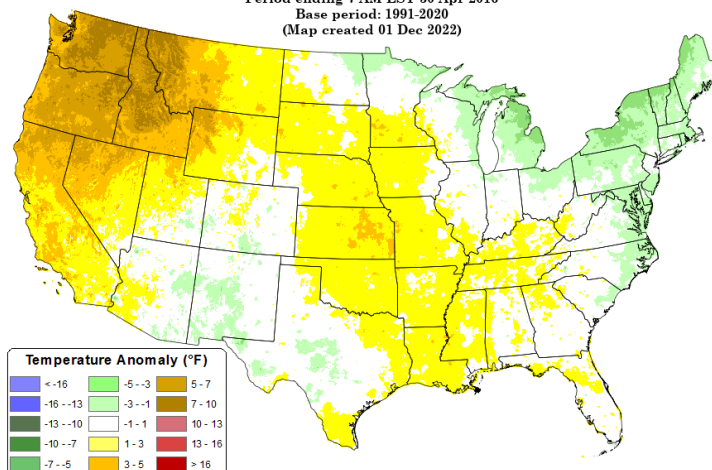
Period ending 7 AM EST 31 Mar 2016  
Base period: 1991-2020  
(Map created 01 Dec 2022)



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Daily Mean Temperature Anomaly: Apr 2016

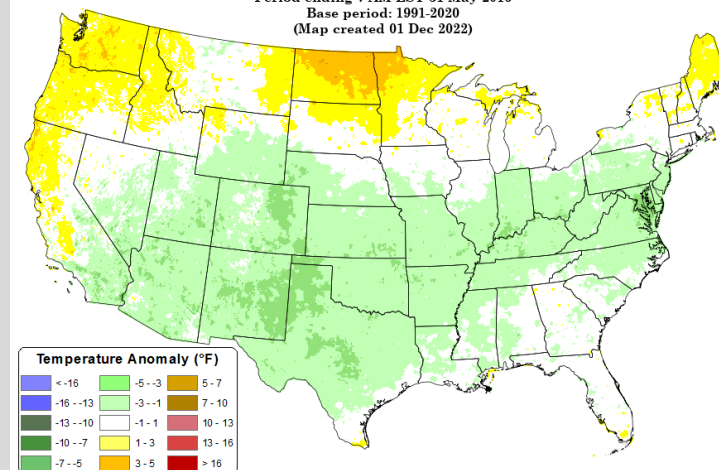
Period ending 7 AM EST 30 Apr 2016  
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Daily Mean Temperature Anomaly: May 2016

Period ending 7 AM EST 31 May 2016  
Base period: 1991-2020  
(Map created 01 Dec 2022)



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What was spring like after the last strong/super El Niño 2015-16? March ended up very dry, but precipitation ramped up in April and May. It's worth noting, however, that the upper level pattern in spring of 2016 was influenced by a positive PDO.

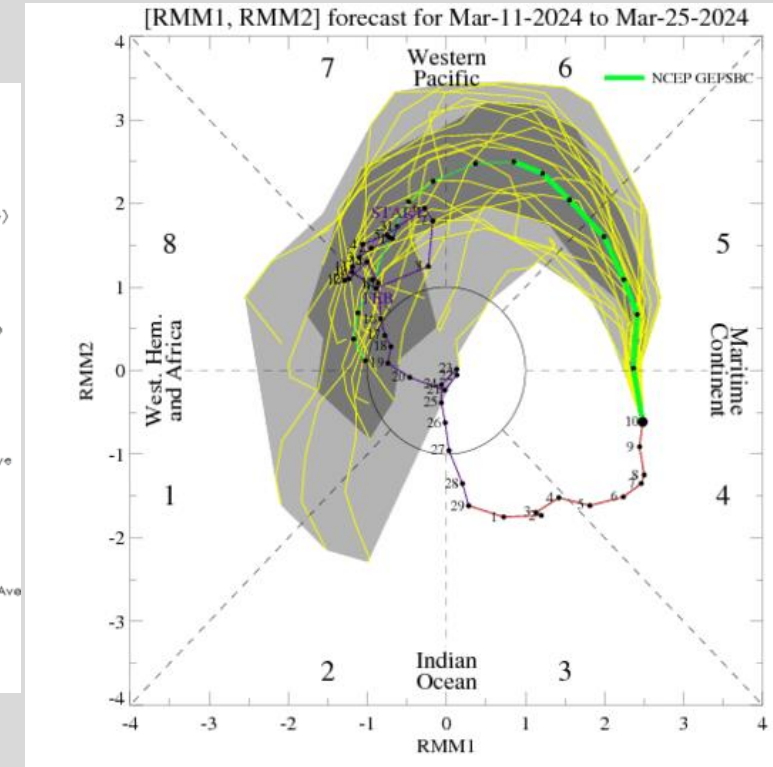
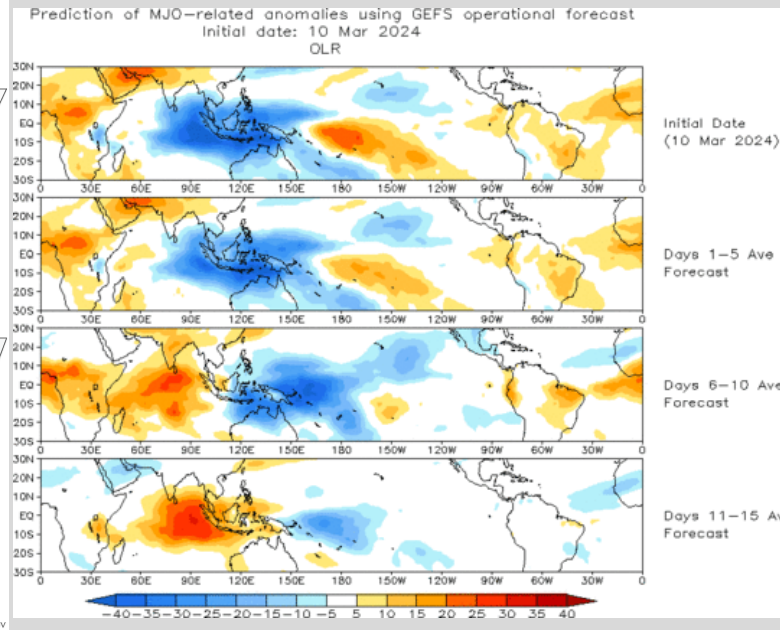
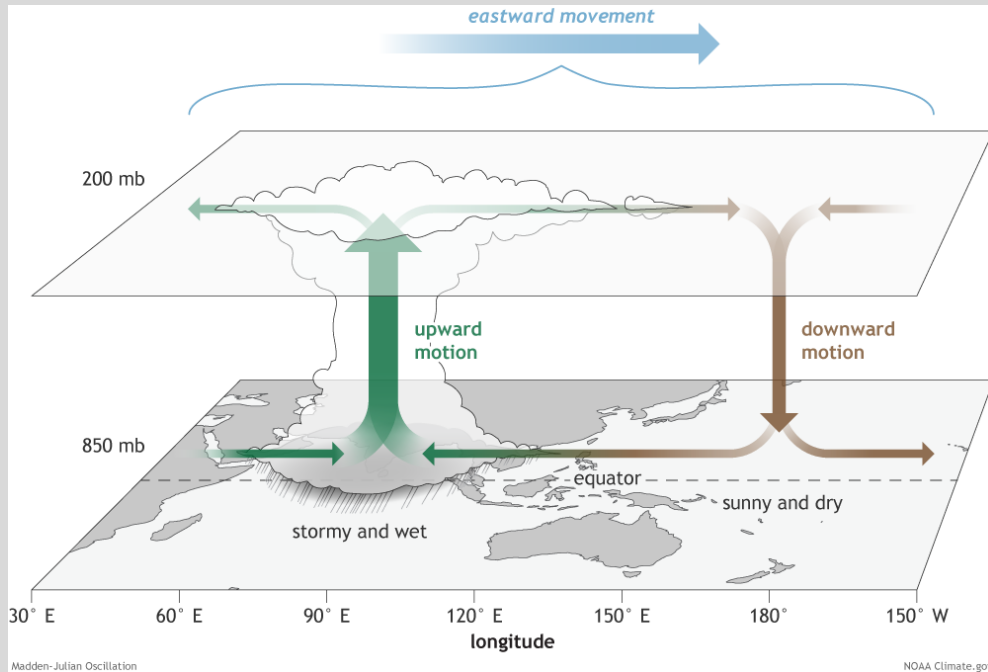
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## Madden-Julian Oscillation (MJO)



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The Madden-Julian Oscillation (MJO) is an area of enhanced thunderstorms that travels around the world every 30 to 60 days from west to east along/near the equator. Ahead and behind the active stormy area are areas of suppressed convection and drier conditions. The MJO affects near-surface wind patterns, because the rising air in the stormy region cause surface winds to blow toward the active area. During a developing La Niña, the trade winds are stronger than average, helping to bring cooler waters up to the surface. When La Niña comes to an end, the enhanced trade winds weaken, allowing warmer water to return to the eastern Pacific and either neutral conditions or an El Niño to develop. This warmer water allow thunderstorms related to the MJO to continue eastward into the EPAC, influencing the jet stream. This year, a returning MJO in the WPAC is forecast to help put an end to the El Niño climate pattern in the coming weeks and months.

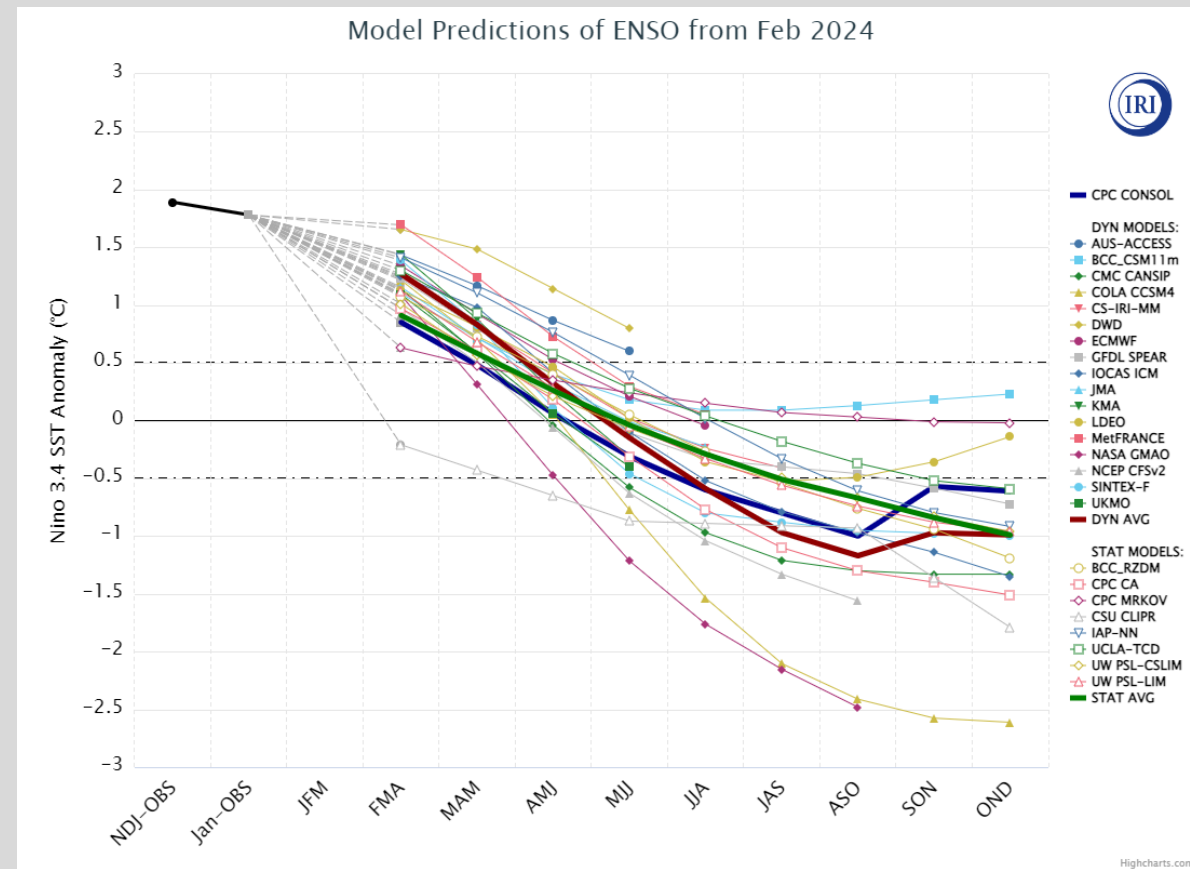
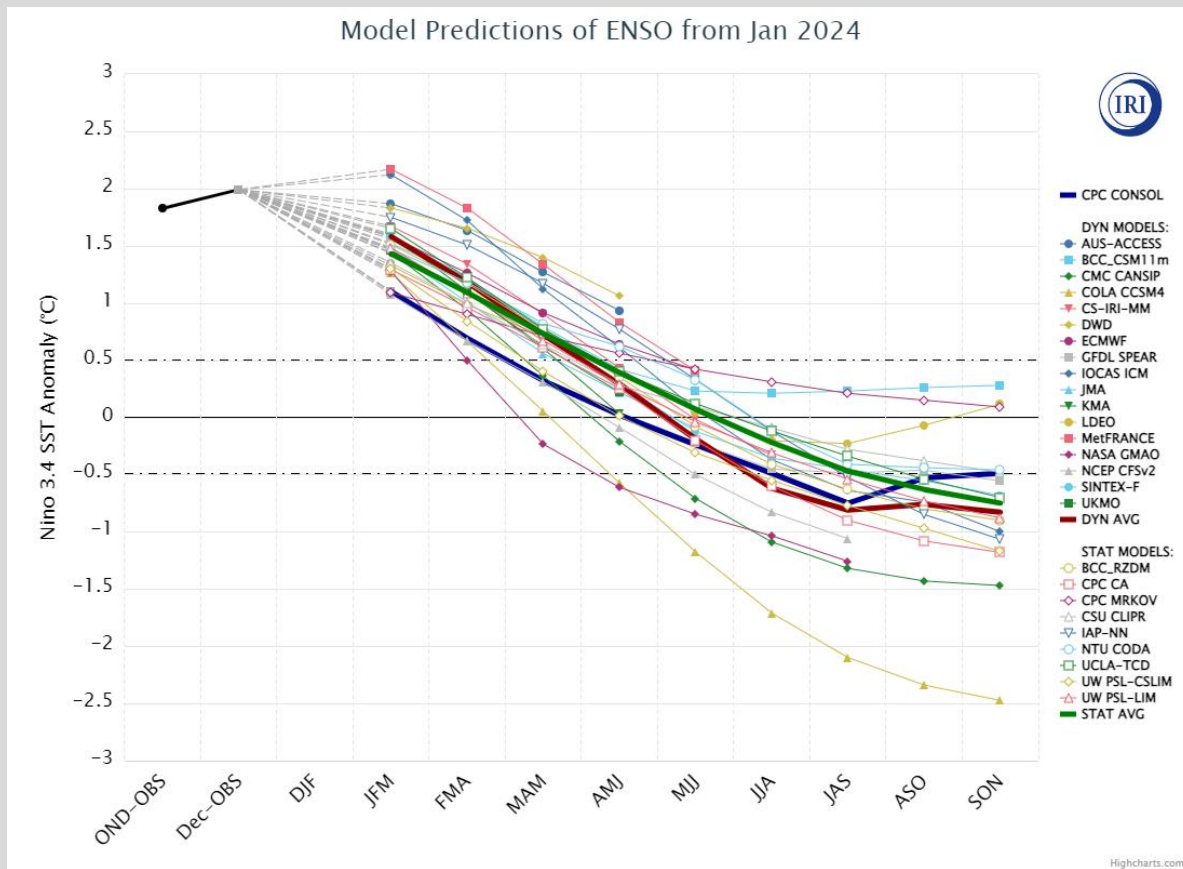


# 2024 Spring/Fire Season Outlook

## SST Model Predictions from IRI



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Model prediction of ENSO from January and February 2024. Dynamical model average cool SSTs below El Niño thresholds by late spring with La Niña possible in summer.

# 2024 Spring/Fire Season Outlook

Climate Prediction Center (CPC)



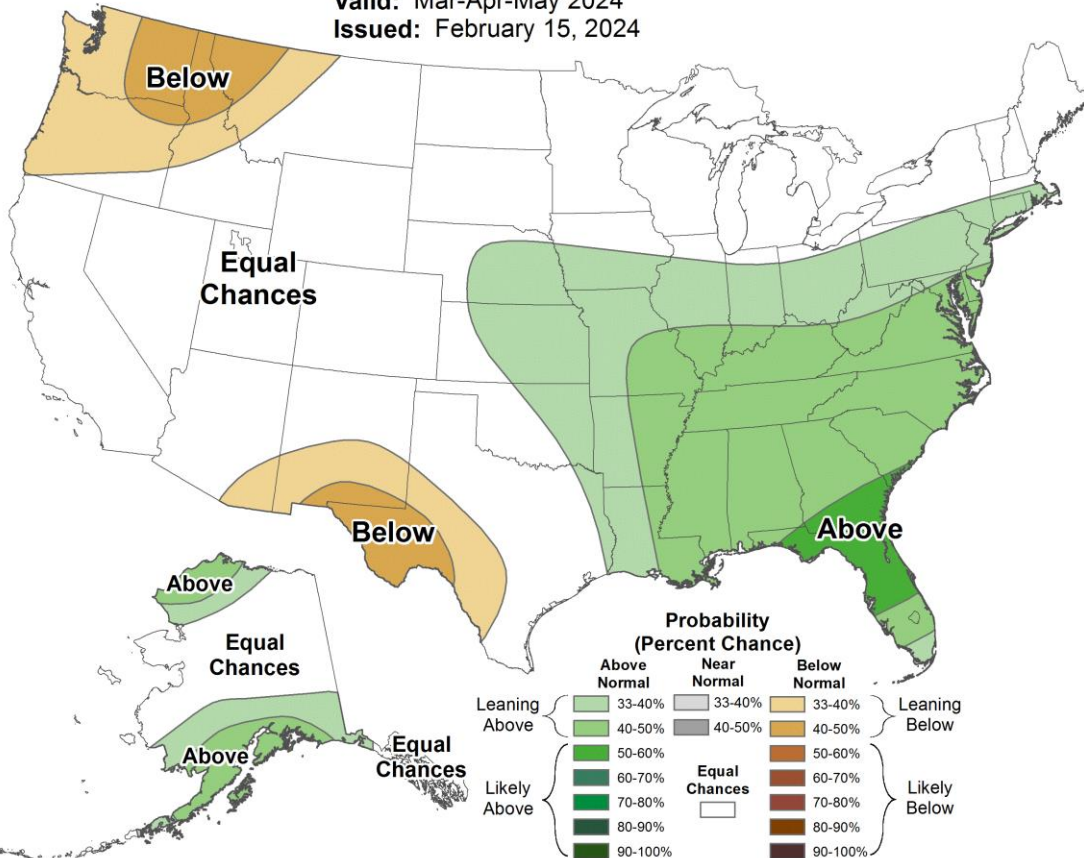
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## Seasonal Precipitation Outlook



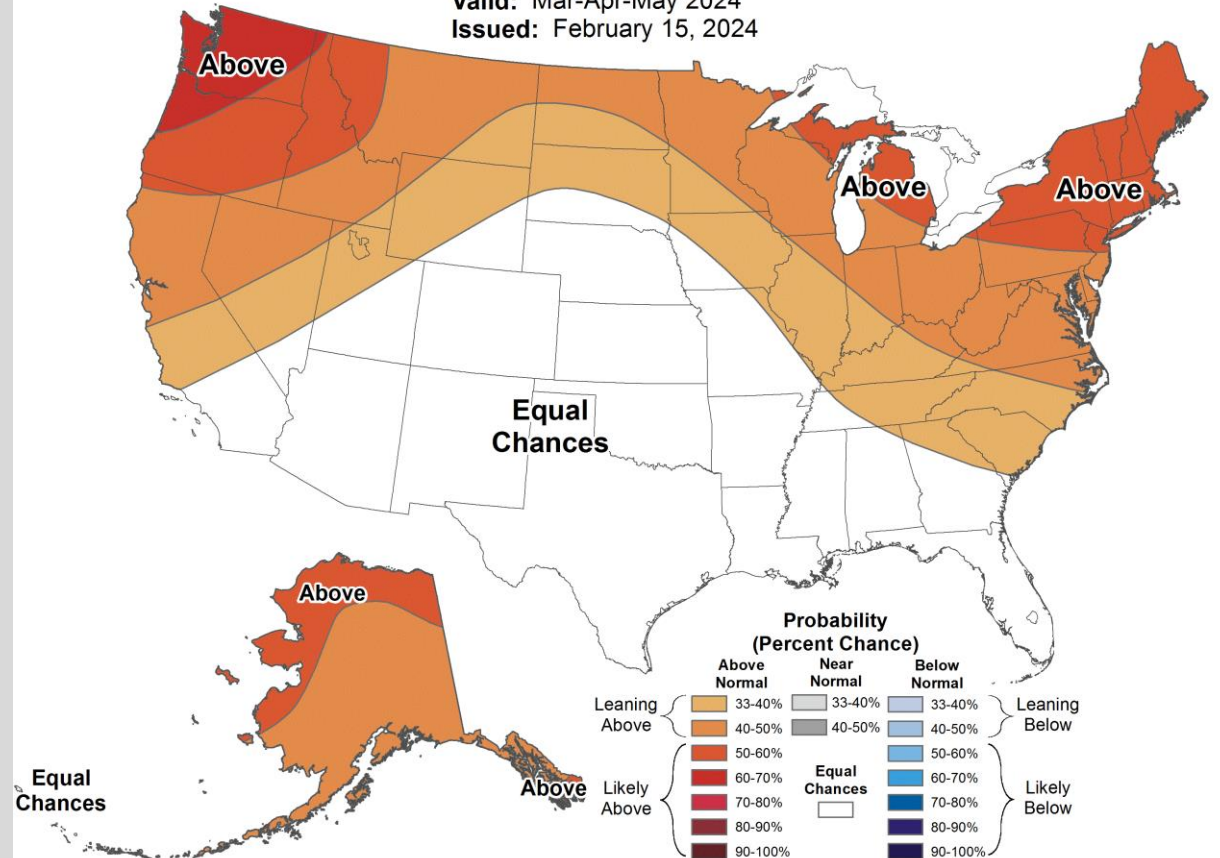
Valid: Mar-Apr-May 2024  
Issued: February 15, 2024



## Seasonal Temperature Outlook



Valid: Mar-Apr-May 2024  
Issued: February 15, 2024



NWS's Climate Prediction Center's Official 2023-24 Outlook for January, February and March 2024 showing probabilities leaning above average precipitation in northern NM with equal chances of slightly above or slightly below average temperatures.



# 2024 Spring/Fire Season Outlook

European Center for Medium Range Weather Forecasts (ECMWF)



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ECMWF Seasonal Forecast

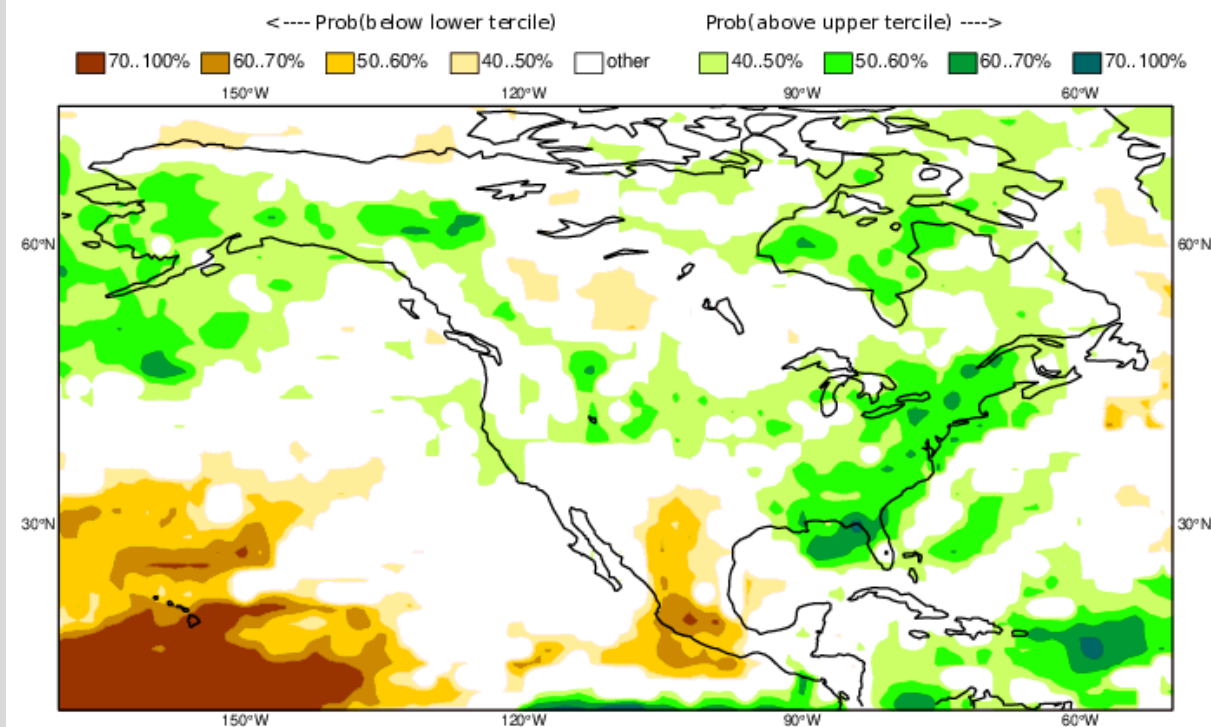
Prob(most likely category of precipitation)

Forecast start is 01/02/24, climate period is 1993-2016

Ensemble size = 51, climate size = 600

System 5

MAM 2024



ECMWF Seasonal Forecast

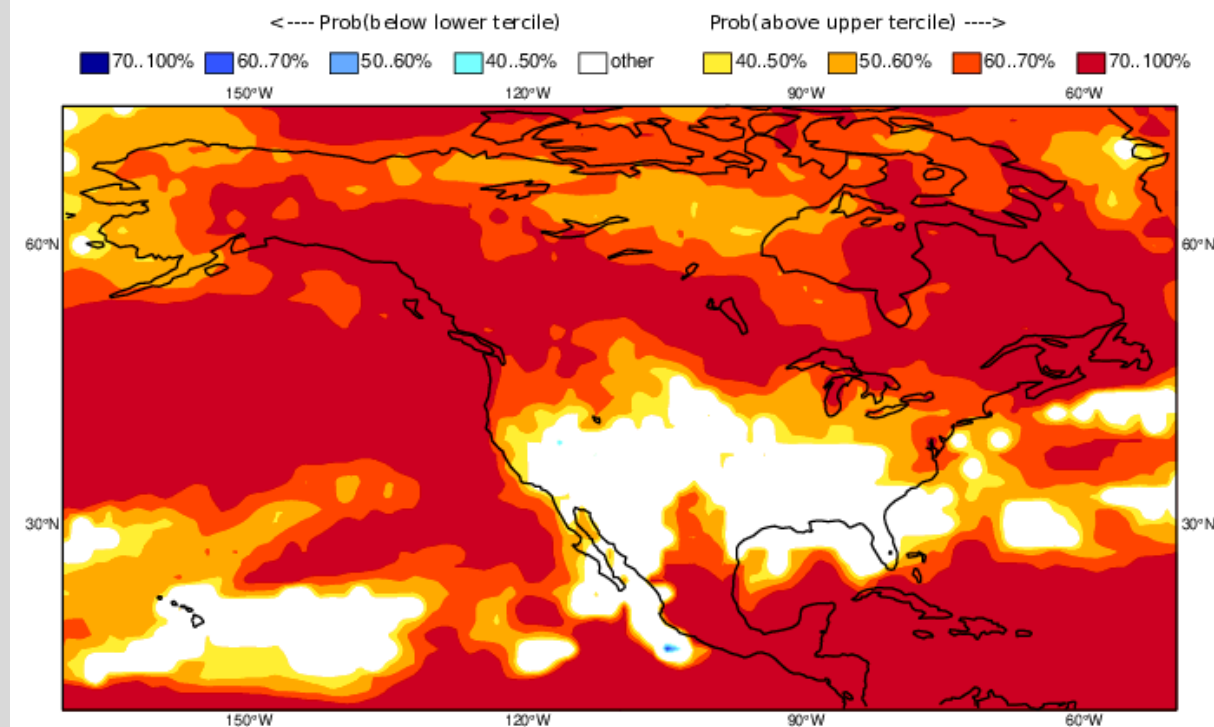
Prob(most likely category of 2m temperature)

Forecast start is 01/02/24, climate period is 1993-2016

Ensemble size = 51, climate size = 600

System 5

MAM 2024



Seasonal precipitation and temperature difference from average forecast from the European Center for Medium Range Weather Forecasts (ECMWF) model forecasting average precipitation for NM and near average temperatures.

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## ECMWF Seasonal Forecast

Prob(most likely category of precipitation)

Forecast start is 01/03/24, climate period is 1993-2016

Ensemble size = 51, climate size = 600

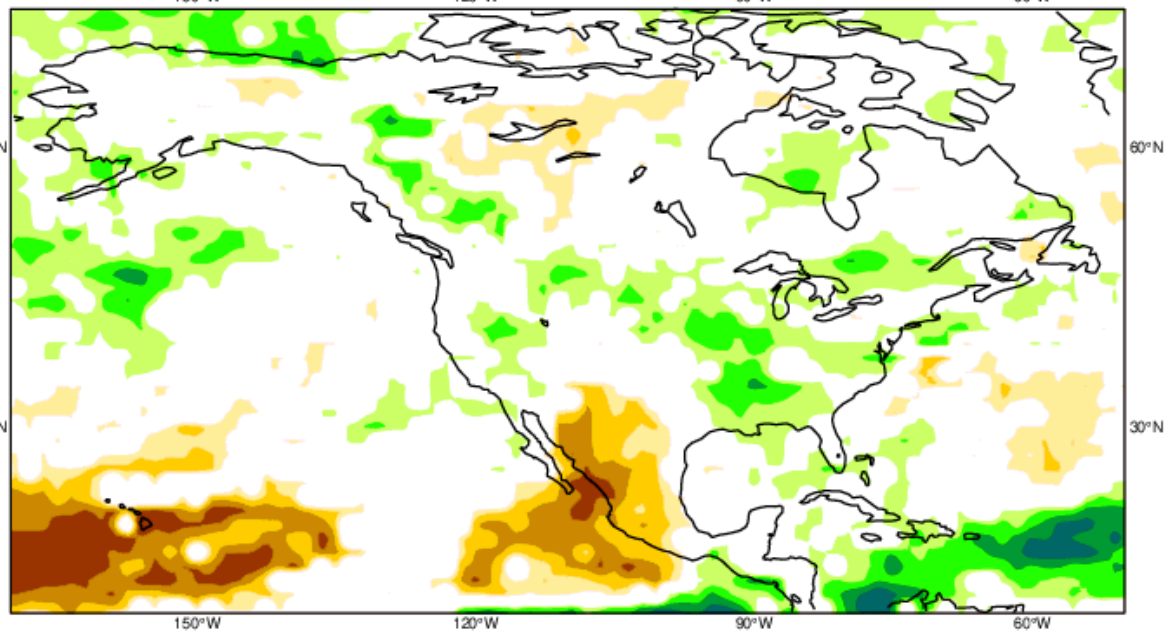
System 5

AMJ 2024

<---- Prob(below lower tercile)

Prob(above upper tercile) ---->

70..100% 60..70% 50..60% 40..50% other 40..50% 50..60% 60..70% 70..100%



## ECMWF Seasonal Forecast

Prob(most likely category of 2m temperature)

Forecast start is 01/03/24, climate period is 1993-2016

Ensemble size = 51, climate size = 600

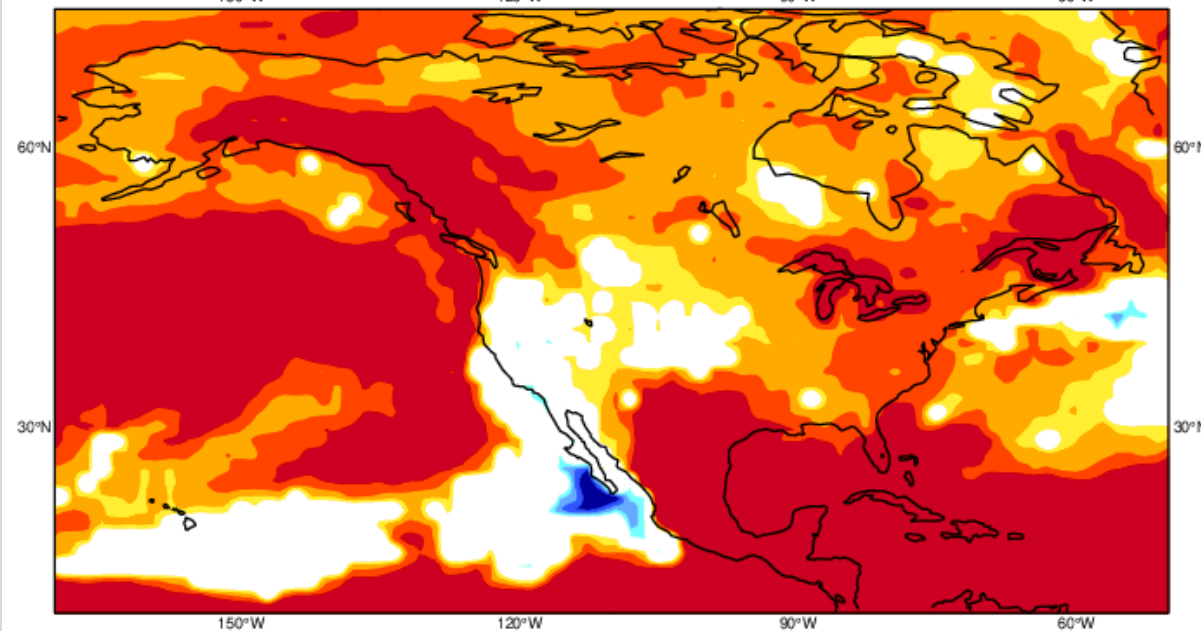
System 5

AMJ 2024

<---- Prob(below lower tercile)

Prob(above upper tercile) ---->

70..100% 60..70% 50..60% 40..50% other 40..50% 50..60% 60..70% 70..100%





# 2024 Spring/Fire Season Outlook

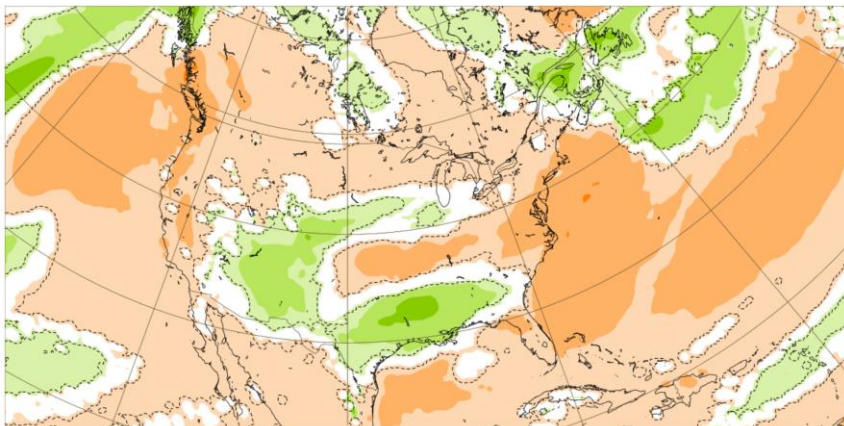
## ECMWF (ENS) - Precipitation



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Precipitation: Weekly mean anomalies

Base time: Mon 11 Mar 2024 Valid time: Mon 11 Mar 2024 - Mon 18 Mar 2024 (+168h) Area : North America

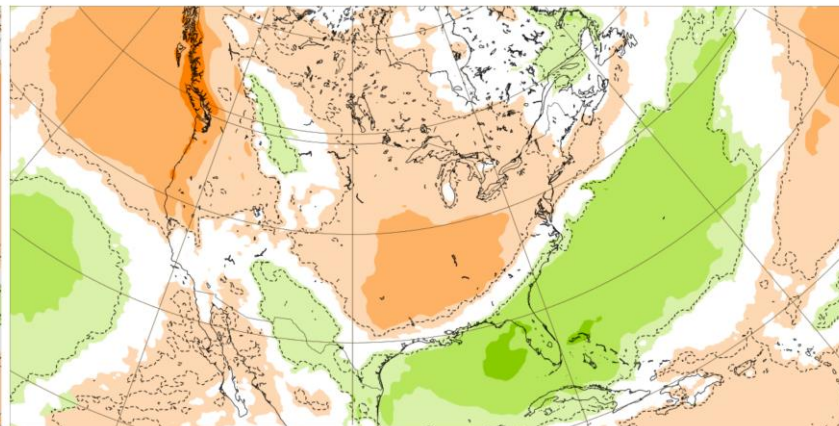


Extended range: Precipitation weekly mean anomaly, significance level: 10 % (mm)

<-90 -80 -60 -40 -20 0 10 20 30 40 50 60 70 80 90 >+90

Precipitation: Weekly mean anomalies

Base time: Mon 11 Mar 2024 Valid time: Mon 18 Mar 2024 - Mon 25 Mar 2024 (+336h) Area : North America

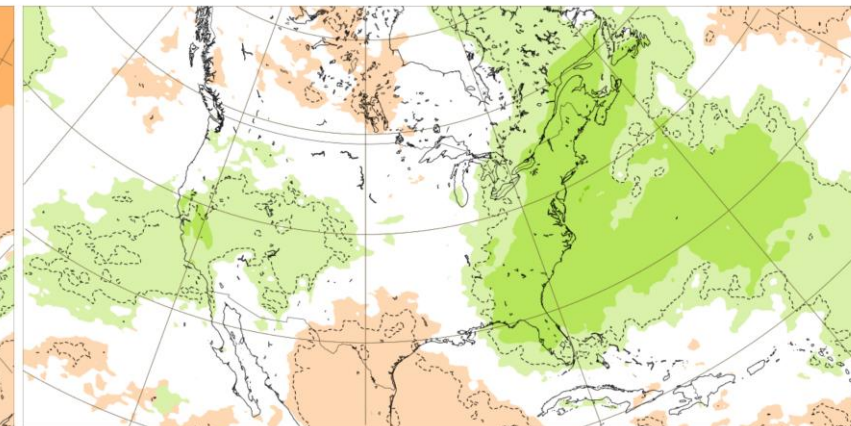


Extended range: Precipitation weekly mean anomaly, significance level: 10 % (mm)

<-90 -80 -60 -40 -20 0 10 20 30 40 50 60 70 80 90 >+90

Precipitation: Weekly mean anomalies

Base time: Mon 11 Mar 2024 Valid time: Mon 25 Mar 2024 - Mon 01 Apr 2024 (+504h) Area : North America



Extended range: Precipitation weekly mean anomaly, significance level: 10 % (mm)

<-90 -80 -60 -40 -20 0 10 20 30 40 50 60 70 80 90 >+90

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Created at 2024-03-11T23:54:49.822Z



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Created at 2024-03-11T22:24:22.146Z



ECMWF ENS model is forecasting near to slightly above average precipitation for much of NM through early to mid March. Keep in mind that the weather/climate signal from the skilled ENS model is often subtle.

# 2024 Spring/Fire Season Outlook

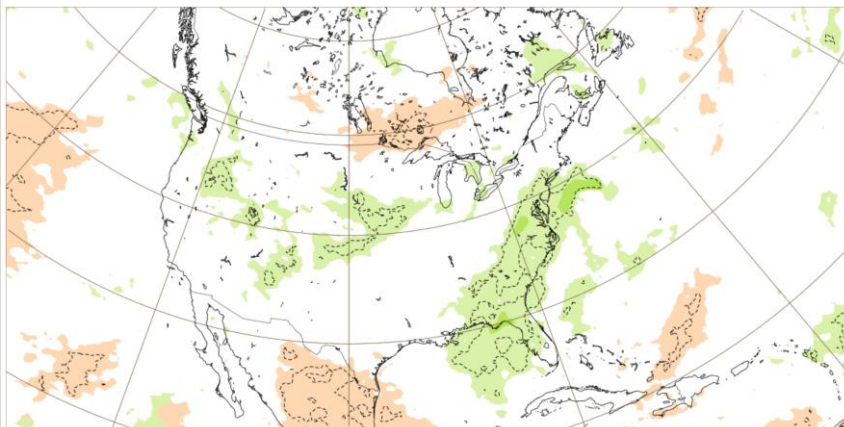
## ECWMF (ENS) - Precipitation



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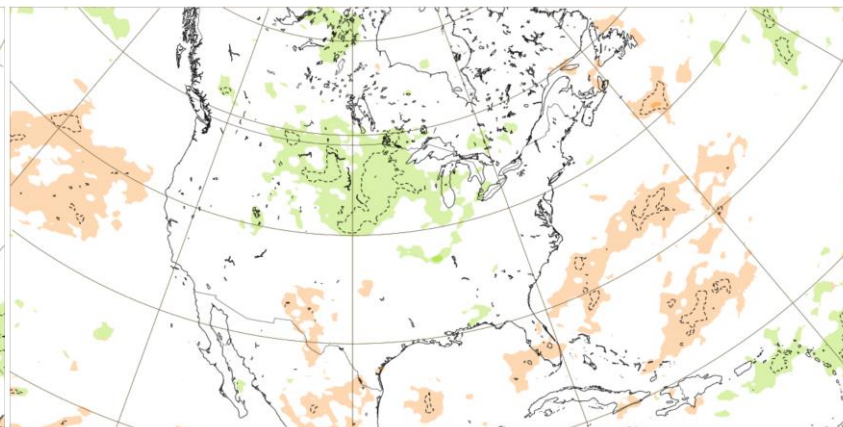
Precipitation: Weekly mean anomalies

Base time: Mon 11 Mar 2024 Valid time: Mon 01 Apr 2024 - Mon 08 Apr 2024 (+672h) Area: North America



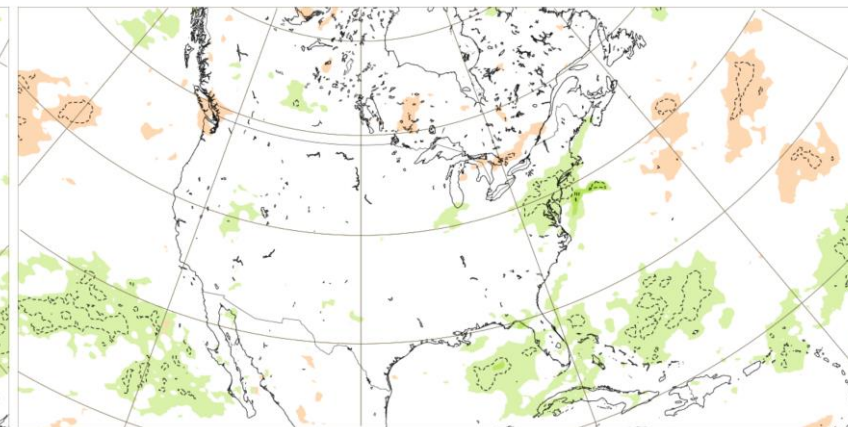
Precipitation: Weekly mean anomalies

Base time: Mon 11 Mar 2024 Valid time: Mon 08 Apr 2024 - Mon 15 Apr 2024 (+840h) Area: North America



Precipitation: Weekly mean anomalies

Base time: Mon 11 Mar 2024 Valid time: Mon 15 Apr 2024 - Mon 22 Apr 2024 (+1008h) Area: North America



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Created at 2024-03-11T00:06:11.211Z



Weekly difference from average precipitation forecasts from the ECMWF for April 2024. The ensemble model is forecasting near average precipitation for portions of the Southwest U.S. during the first three weeks of April.



# 2024 Spring/Fire Season Outlook

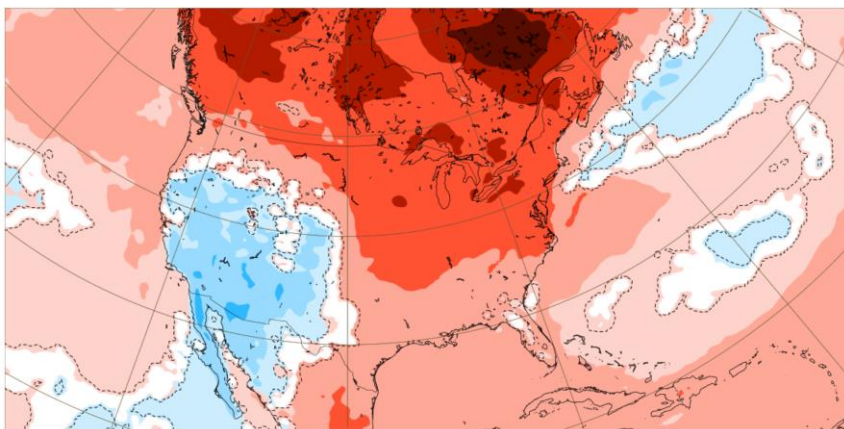
## ECWMF (ENS) - Temperature



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2 m temperature: Weekly mean anomalies

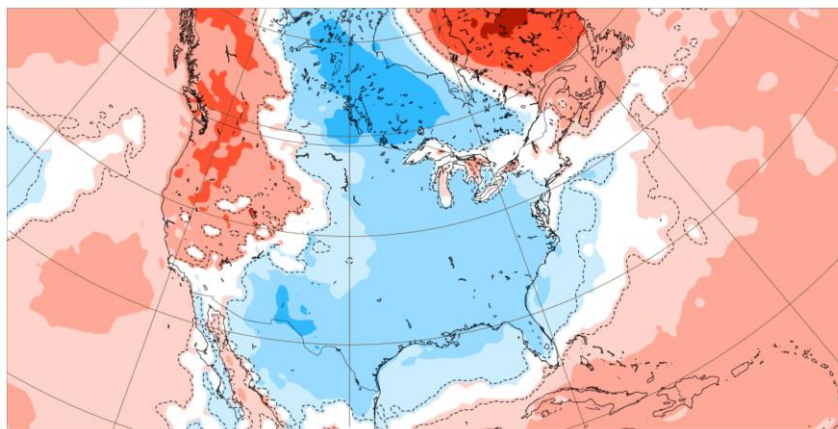
Base time: Mon 11 Mar 2024 Valid time: Mon 11 Mar 2024 - Mon 18 Mar 2024 (+168h) Area : North America



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2 m temperature: Weekly mean anomalies

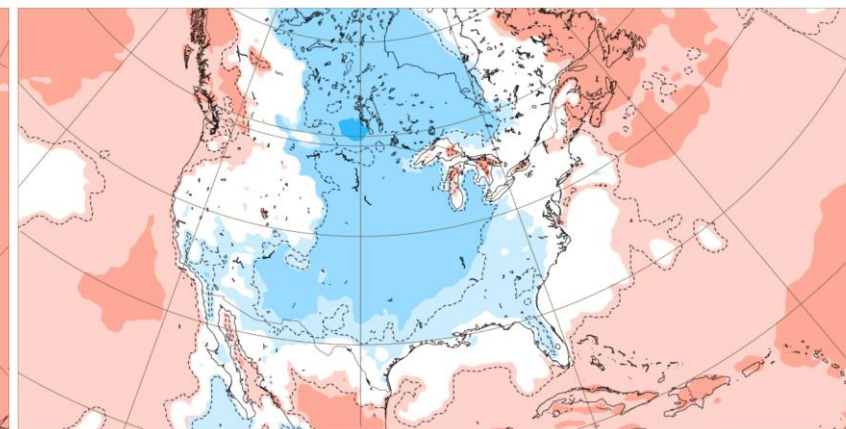
Base time: Mon 11 Mar 2024 Valid time: Mon 18 Mar 2024 - Mon 25 Mar 2024 (+336h) Area : North America



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Created at 2024-03-11T21:00:08 GMT

2 m temperature: Weekly mean anomalies

Base time: Mon 11 Mar 2024 Valid time: Mon 25 Mar 2024 - Mon 01 Apr 2024 (+504h) Area : North America



Weekly difference from average temperature forecasts from the European Center for Medium Range Weather Forecasts (ECMWF) for late November into early December 2023. ECMWF's extended ensemble model keeps the Southwest U.S. cooler than average during late November and into early December.

# 2024 Spring/Fire Season Outlook

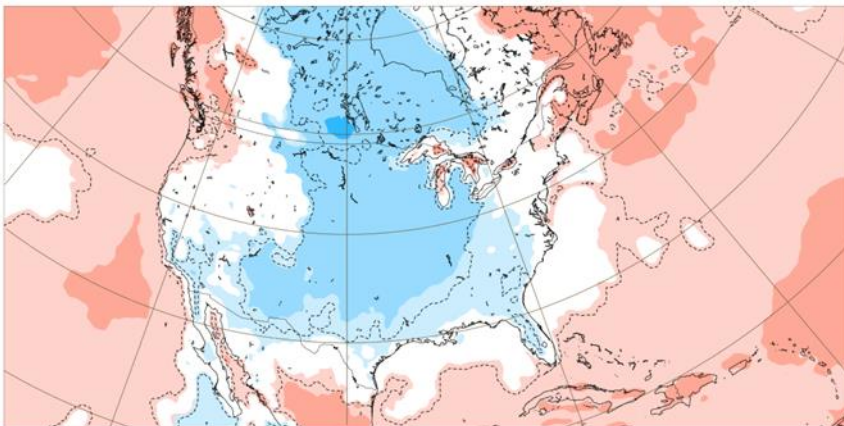
## ECMWF (ENS) - Temperature



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2 m temperature: Weekly mean anomalies

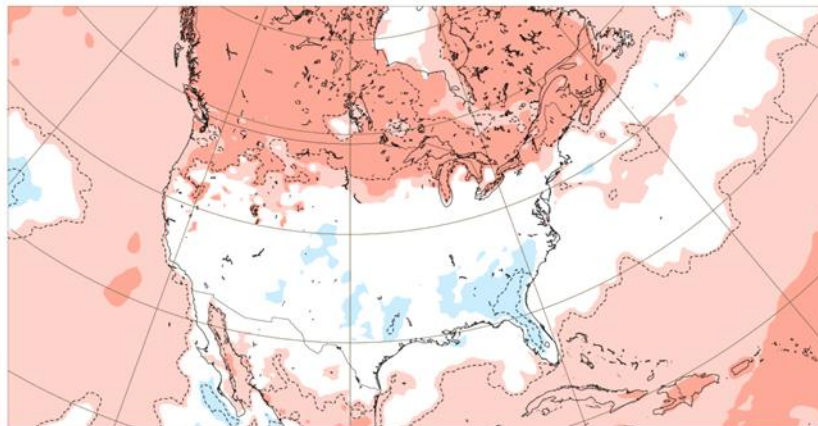
Base time: Mon 11 Mar 2024 Valid time: Mon 25 Mar 2024 - Mon 01 Apr 2024 (+504h) Area: North America



Extended range: 2m T weekly mean anomaly, significance level: 10 % (°C)

2 m temperature: Weekly mean anomalies

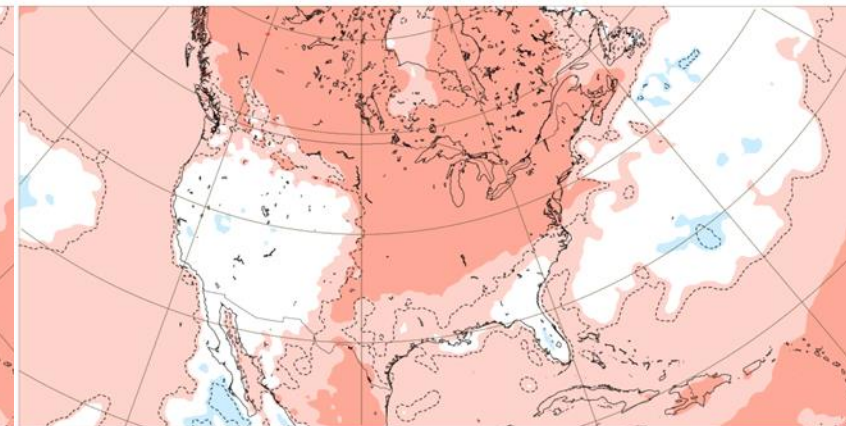
Base time: Mon 11 Mar 2024 Valid time: Mon 01 Apr 2024 - Mon 08 Apr 2024 (+672h) Area: North America



Extended range: 2m T weekly mean anomaly, significance level: 10 % (°C)

2 m temperature: Weekly mean anomalies

Base time: Mon 11 Mar 2024 Valid time: Mon 08 Apr 2024 - Mon 15 Apr 2024 (+840h) Area: North America



Extended range: 2m T weekly mean anomaly, significance level: 10 % (°C)

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Created at 2024-03-12T00:11:54.016Z



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Created at 2024-03-12T00:12:46.147Z



Weekly difference from average temperature forecasts from the European Center for Medium Range Weather Forecasts (ECMWF) for late March and early April. ECMWF's extended ensemble model keeps the Southwest U.S. temperatures near to slightly below average during this timeframe.



# 2024 Spring/Fire Season Outlook

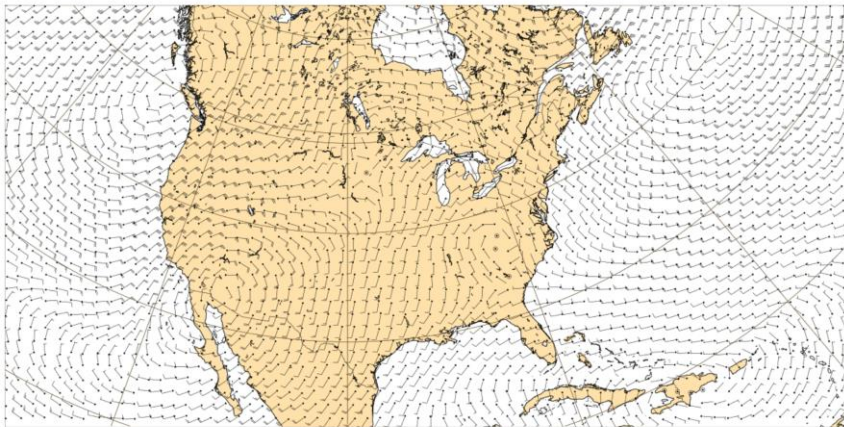
## Wind



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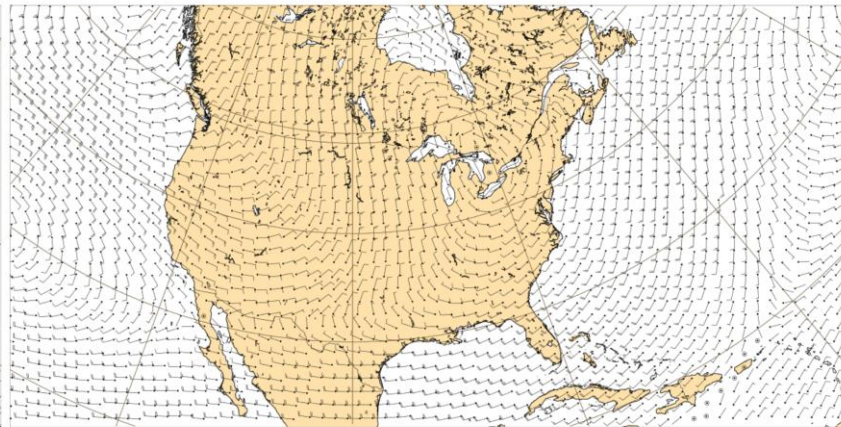
Winds at various levels: Weekly mean anomalies

Base time: Mon 11 Mar 2024 00 UTC Valid time: Mon 11 Mar 2024 00 UTC - Mon 18 Mar 2024 00 UTC (+168h) Area : North America Parameters : 500 hPa



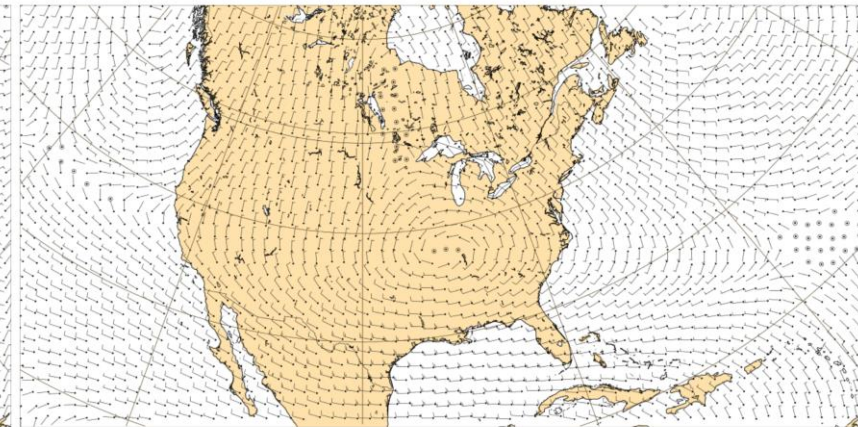
Winds at various levels: Weekly mean anomalies

Base time: Mon 11 Mar 2024 00 UTC Valid time: Mon 18 Mar 2024 00 UTC - Mon 25 Mar 2024 00 UTC (+336h) Area : North America Parameters : 500 hPa



Winds at various levels: Weekly mean anomalies

Base time: Mon 11 Mar 2024 00 UTC Valid time: Mon 25 Mar 2024 00 UTC - Mon 01 Apr 2024 00 UTC (+504h) Area : North America Parameters : 500 hPa



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Created at 2024-03-12T00:22:46.484Z



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Created at 2024-03-12T00:23:00.081Z



What about wind? Wind anomaly forecasts from the ECMWF ENS model for mid to late March 2024 are indicative of below average wind speeds at 500 mb or 18,000 feet MSL during MAM. It will still be plenty windy, but thanks to a fading El Niño, not quite as windy relative to MAM averages and the past three spring seasons.



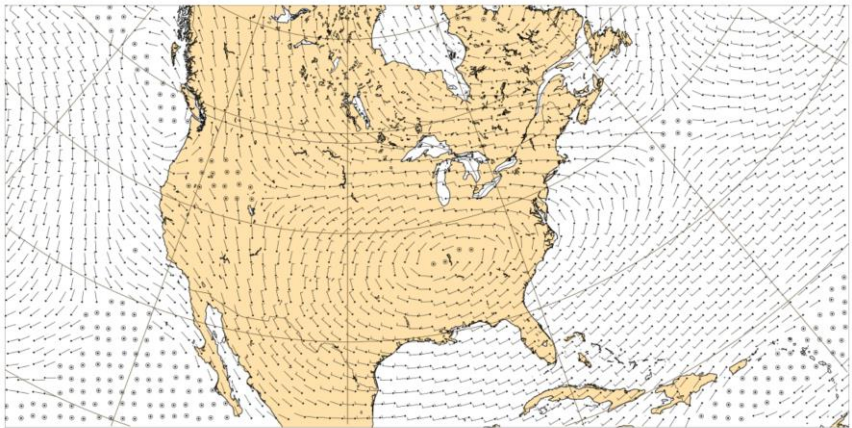
# 2024 Spring/Fire Season Outlook

## Wind



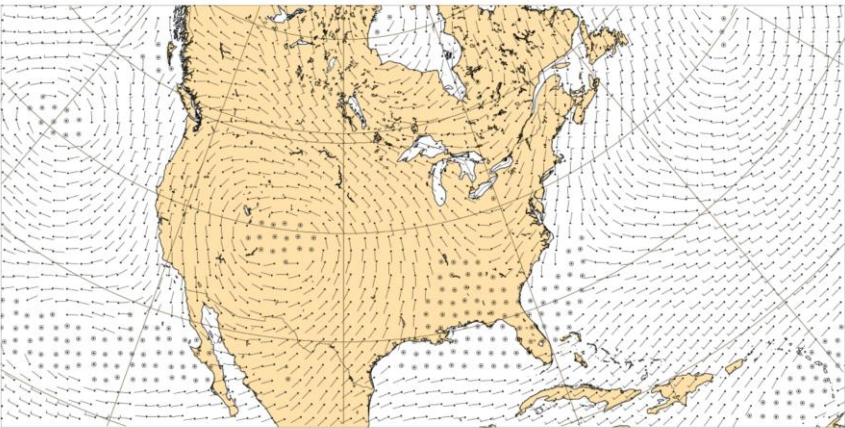
Winds at various levels: Weekly mean anomalies

Base time: Mon 11 Mar 2024 00 UTC Valid time: Mon 01 Apr 2024 00 UTC - Mon 08 Apr 2024 00 UTC (+672h) Area : North America Parameters : 500 hPa



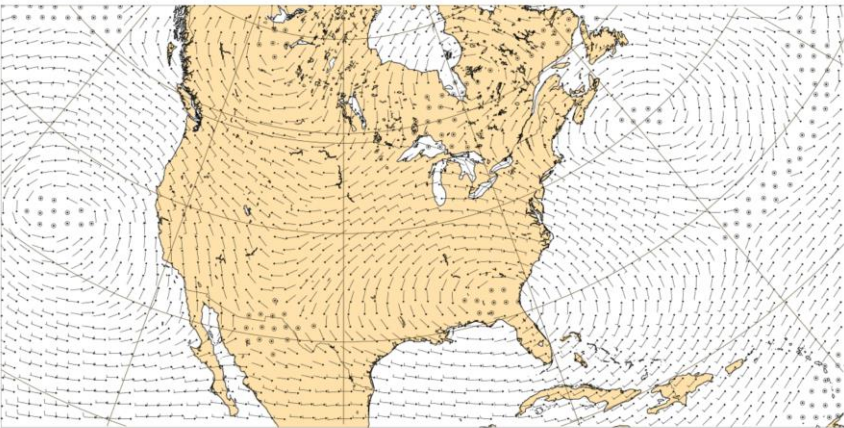
Winds at various levels: Weekly mean anomalies

Base time: Mon 11 Mar 2024 00 UTC Valid time: Mon 08 Apr 2024 00 UTC - Mon 15 Apr 2024 00 UTC (+840h) Area : North America Parameters : 500 hPa



Winds at various levels: Weekly mean anomalies

Base time: Mon 11 Mar 2024 00 UTC Valid time: Mon 15 Apr 2024 00 UTC - Mon 22 Apr 2024 00 UTC (+1008h) Area : North America Parameters : 500 hPa



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Created at 2024-03-12T00:23:27.757Z



Wind anomaly forecasts from the ECMWF ENS model are indicative of slightly below to below average March and April winds.

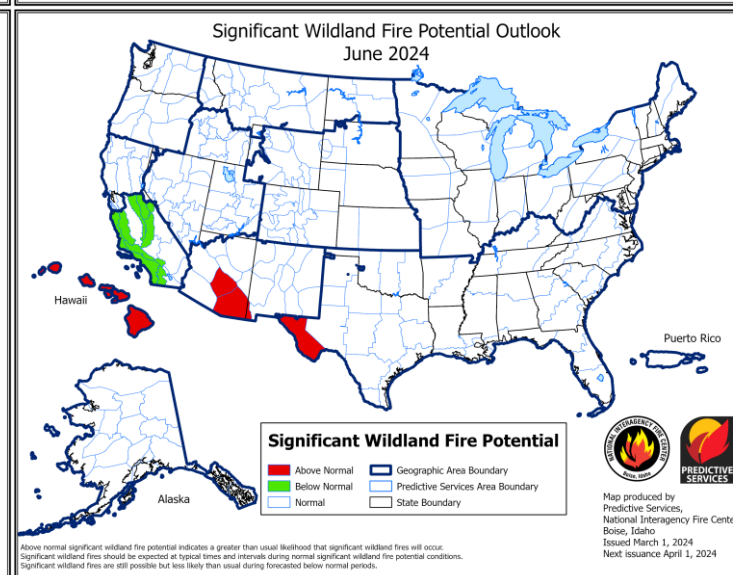
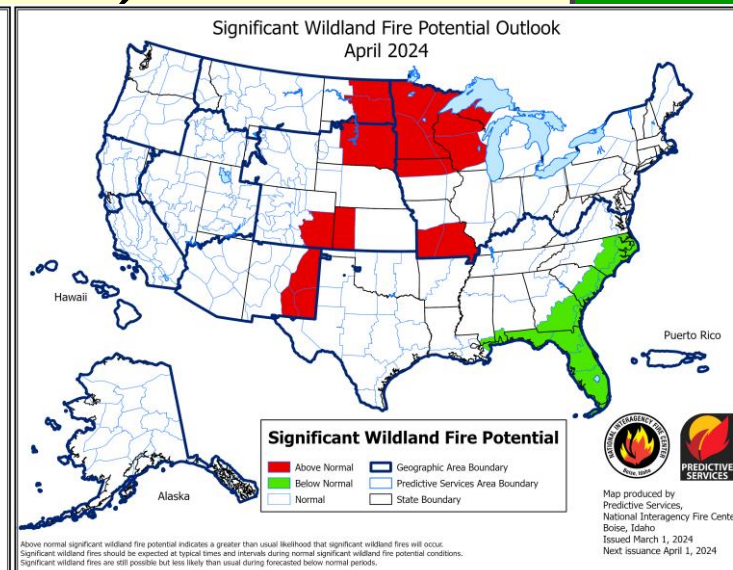
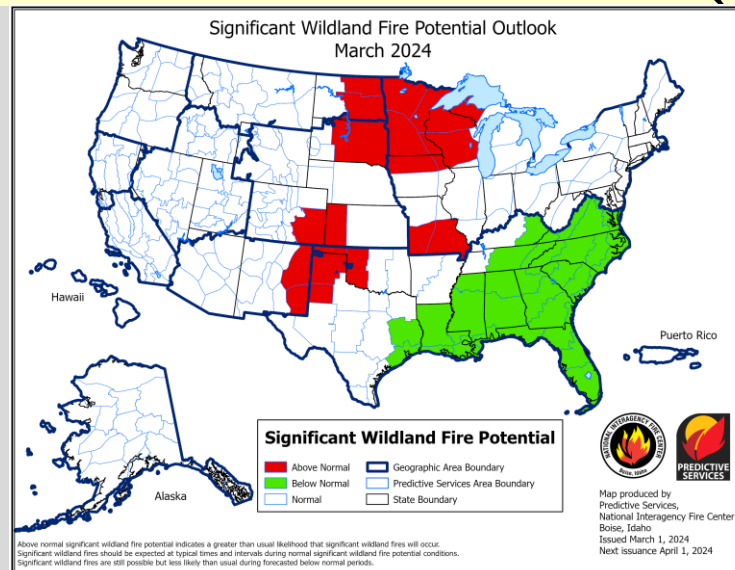


# 2024 Spring/Fire Season Outlook

## Fire Danger Outlooks from Predictive Services (NIFC)



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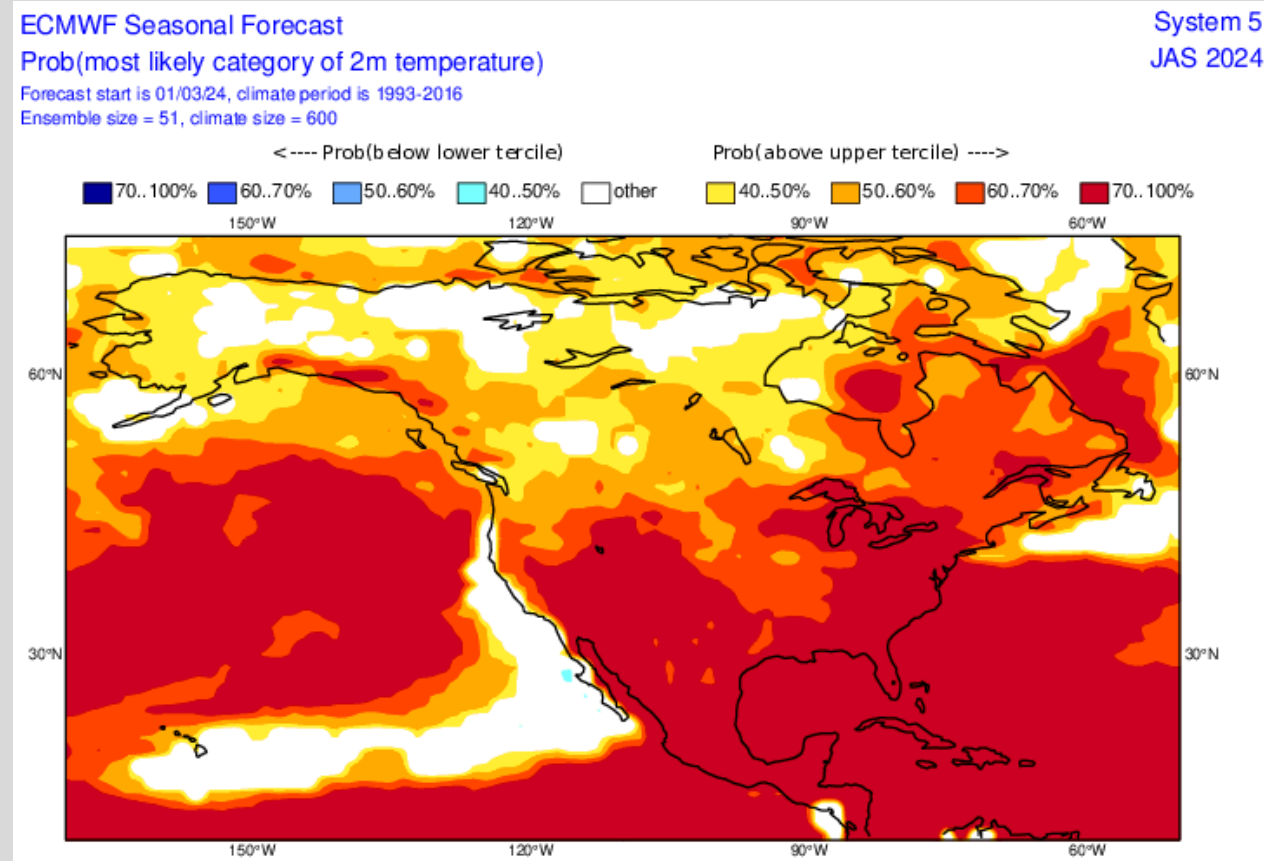
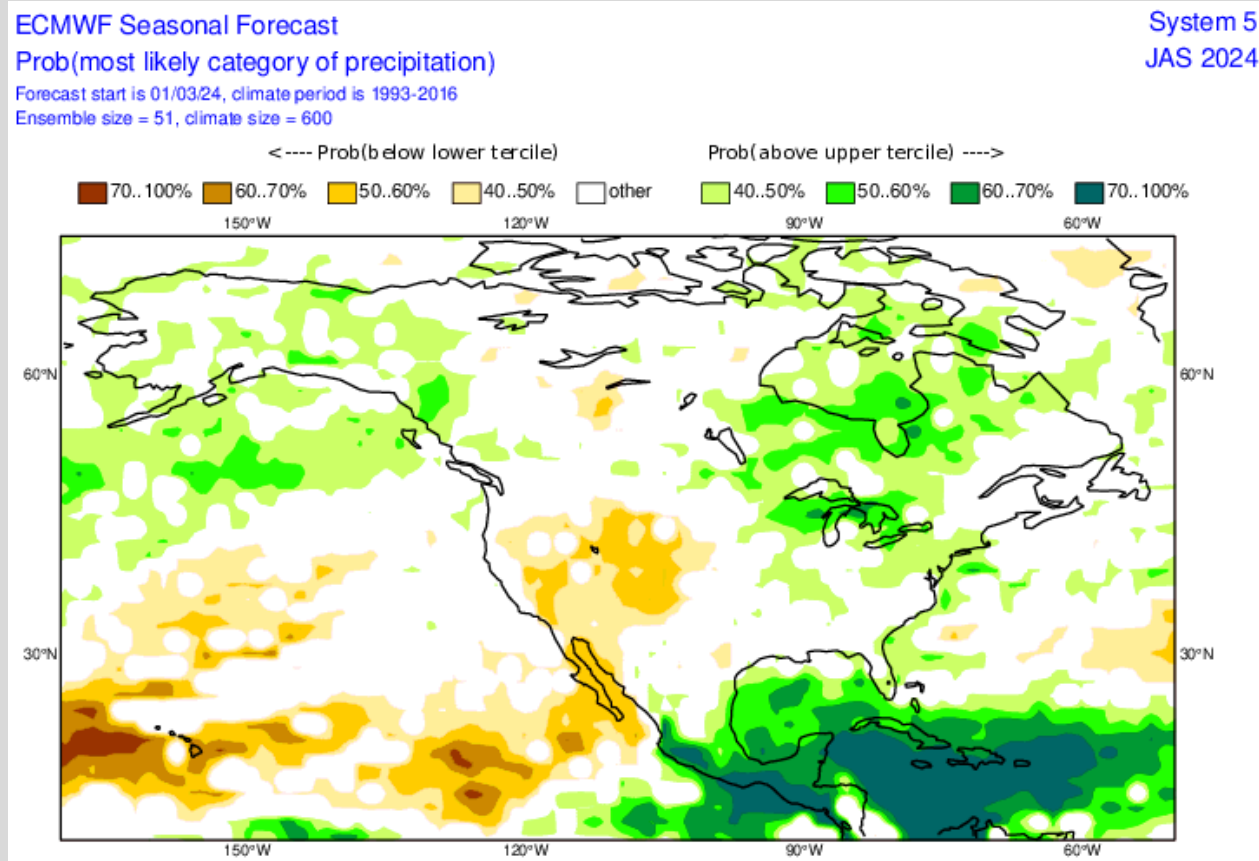
Significant Wildland Fire Potential Outlooks from the National Interagency Fire Center (NIFC) through June 2024

# 2024 Spring/Fire Season Outlook

## Monsoon?



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How about the monsoon? While the forecast above from the ECMWF does not look all that impressive, slide 19 shows us that the equatorial Pacific will likely continue to cool and that's almost always a good thing for the monsoon. Why? Thunderstorm activity related to the subtropical jet stream are generally below average and so is the wind strength. Fewer or weaker dry air intrusions from the west during JAS typically bodes well for monsoon season.



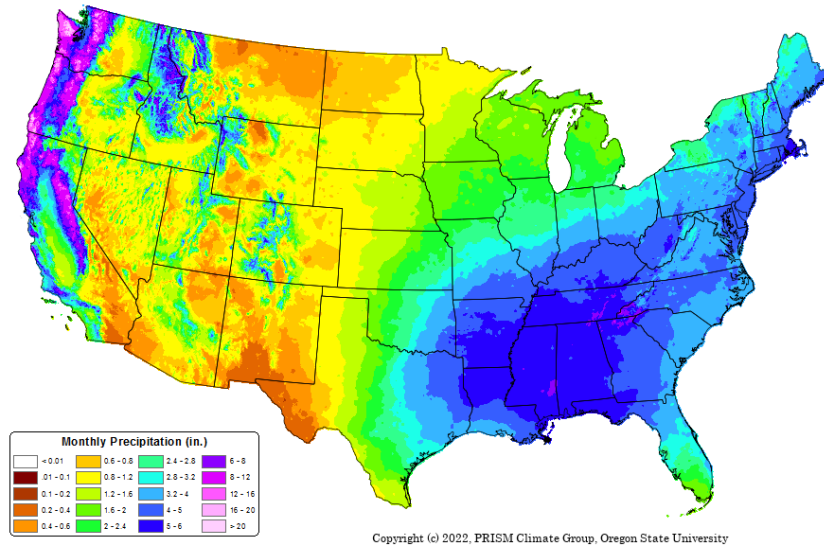
# 2024 Spring/Fire Season Outlook

## What is Average?

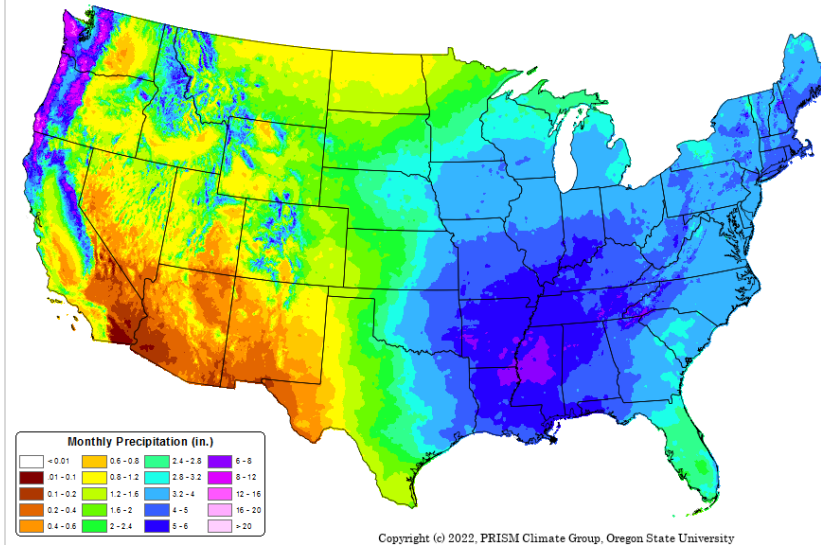


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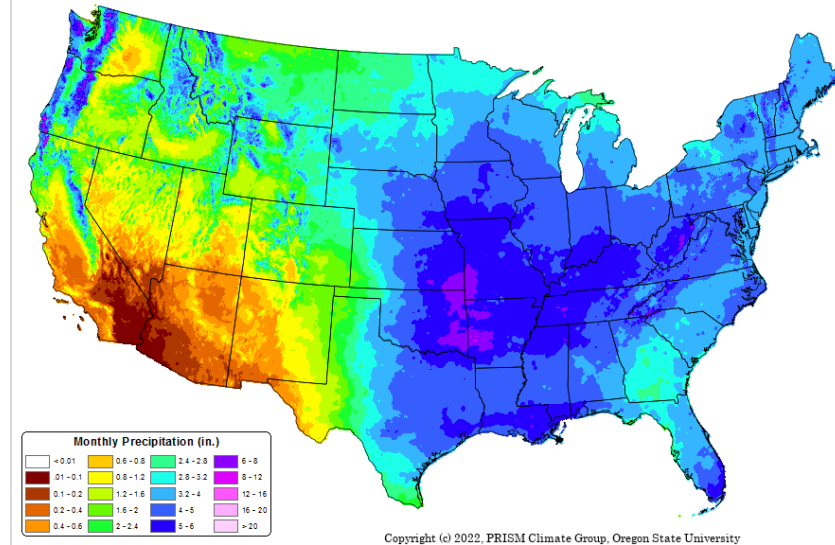
30-yr Normal Precipitation: March  
Period: 1991-2020



30-yr Normal Precipitation: April  
Period: 1991-2020



30-yr Normal Precipitation: May  
Period: 1991-2020



What is average or “normal” precipitation for each spring month? These charts show normal or average precipitation for MAM.

# 2024 Spring/Fire Season Outlook

2023-24 Winter Forecast



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**March:** Forecast confidence is high for above average precipitation. Forecast confidence is high for below average temperatures.

**April:** Forecast confidence is moderate to high for near to slightly above precipitation and near average temperatures for central and northern NM.

**May:** Forecast confidence is low to moderate for near average precipitation and near average temperatures. Once again, May has the lowest forecast confidence.

**Wind:** Forecast confidence is moderate to high for below average wind speeds in March and April and near average in May.



# 2024 Spring/Fire Season Outlook



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- Outlook provided by National Weather Service Forecast Office Albuquerque, NM.
- For further information contact Andrew Church: [andrew.church@noaa.gov](mailto:andrew.church@noaa.gov) (505) 244-9150