

Seasonal Climate Forecast (Methodology)

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This product is published by the Oregon Department of Agriculture (ODA), in cooperation with the Oregon Department of Forestry (ODF).

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Seasonal Climate Forecast (Simple 3-Step Process)

- Find Past Years With Similar Characteristics (Analog Years).
- Find Common Events or Trends During Those “Analog Years.”
- Use That Information to Predict Future Events and/or Trends.

How Are “Analog Years” Picked?

- Top analog years are identified based on sea-surface temperature (SST) patterns across the Pacific Ocean.
- Southern Oscillation Index (SOI), Oceanic Niño Index (ONI), and Pacific Decadal Oscillation (PDO) data are analyzed to find past years with similar characteristics to the current year.

Southern Oscillation Index (SOI)

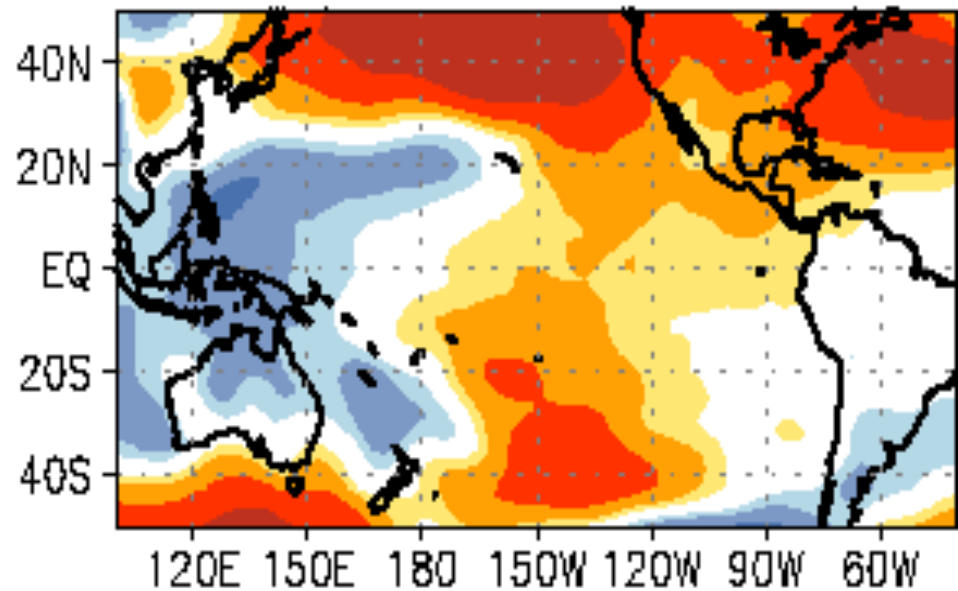
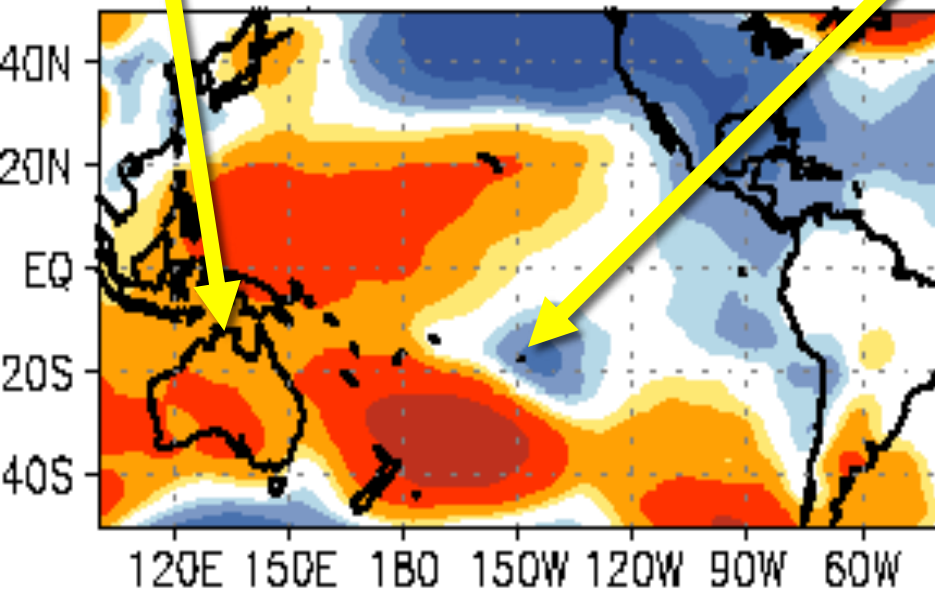
- An index calculated based on the differences in air pressure anomaly between Tahiti and Darwin, Australia.
- A proxy for the strength of the trade winds and highly correlated with sea-surface temperature (SST) anomalies in the tropical Pacific Ocean.

SOI is Based on Pressure Anomalies of Two Sites

PRESSURE DEPARTURES (mb)

Darwin EL NIÑO **Tahiti**
Jan-Mar 1998

LA NIÑA
Jan-Mar 1989



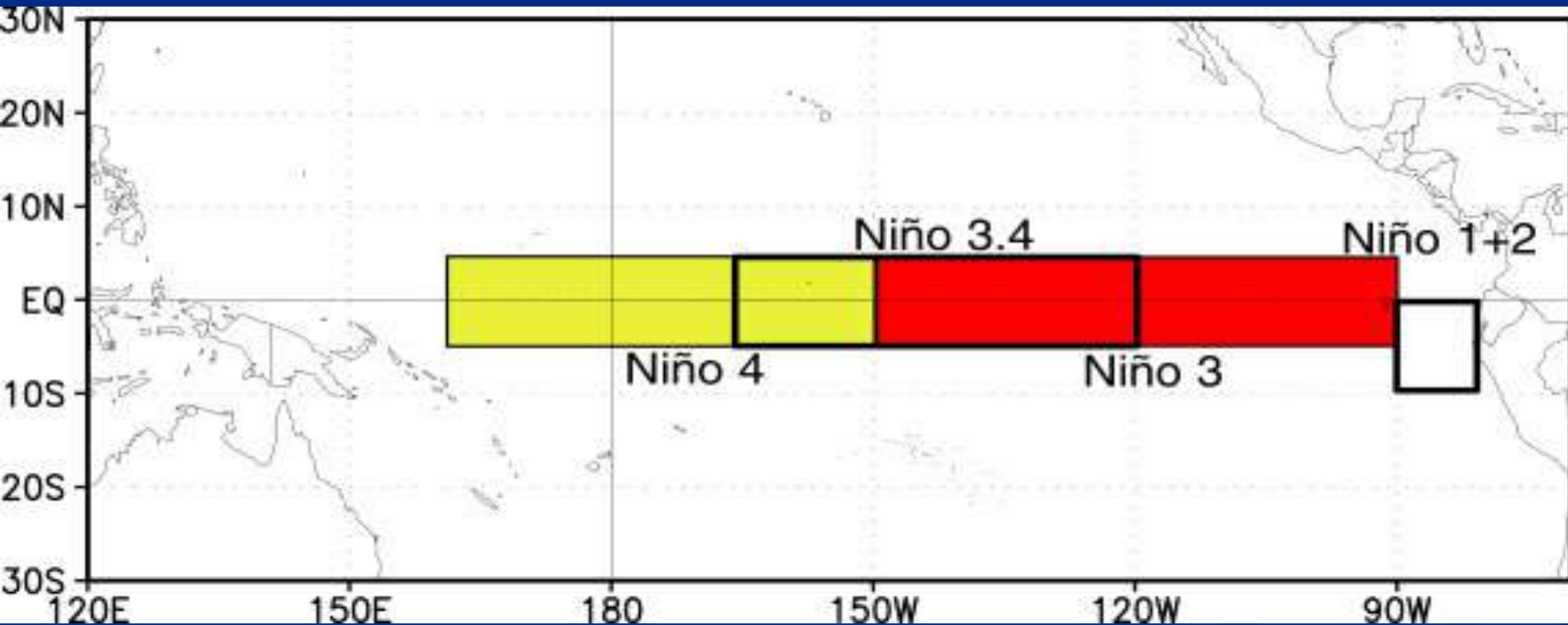
-4 -2 -1 -0.5 0.5 1 2 4

-4 -2 -1 -0.5 0.5 1 2 4

Oceanic Niño Index (ONI)

- Based on SST departures from normal in the Niño 3.4 region.
- Defined as the three-month running-mean (e.g. Aug. - Oct.) SST departures from normal.

Areas Covered by Various Niño Regions



Niño 3.4 Region: Area Inside of 5° S - 5° N Latitude
& 120° - 170° W Longitude

NOAA Operational Definitions for El Niño and La Niña are Based on the ONI

- El Niño: characterized by a *positive* ONI greater than or equal to $+0.5^{\circ}\text{C}$.
- La Niña: characterized by a *negative* ONI less than or equal to -0.5°C .
- To be classified as a full-fledged El Niño or La Niña episode these thresholds must be exceeded for a period of at least 5 consecutive overlapping 3-month seasons.
- CPC considers *El Niño* or *La Niña* conditions to occur when the monthly Niño3.4 SST departures meet or exceed $\pm 0.5^{\circ}\text{C}$ along with consistent atmospheric features.

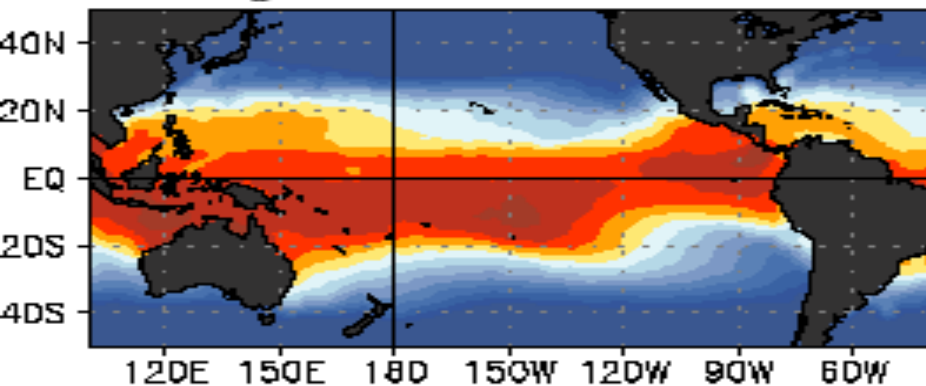
El Niño / Southern Oscillation (ENSO)

- Year-to-year variations in sea-surface temperatures, convective rainfall, surface air pressure, and atmospheric circulation across the equatorial Pacific Ocean.
- **El Niño** and **La Niña** represent opposite extremes in the ENSO cycle.

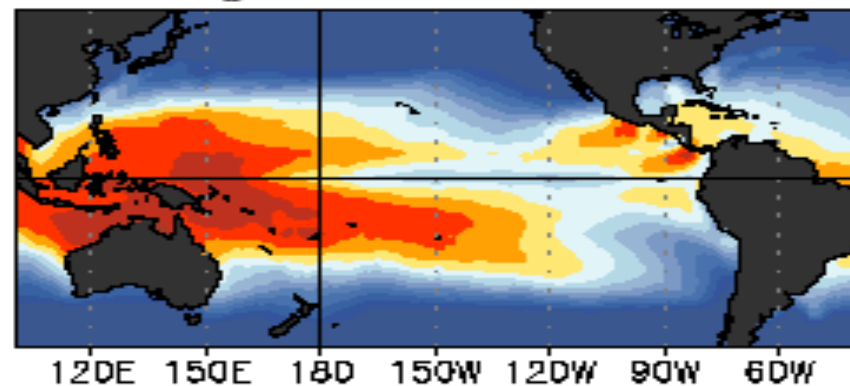
Typical ENSO Patterns

OCEAN TEMPERATURES (°C)

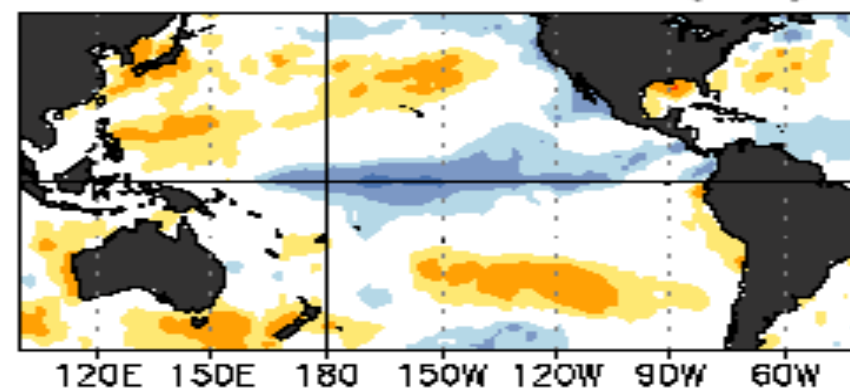
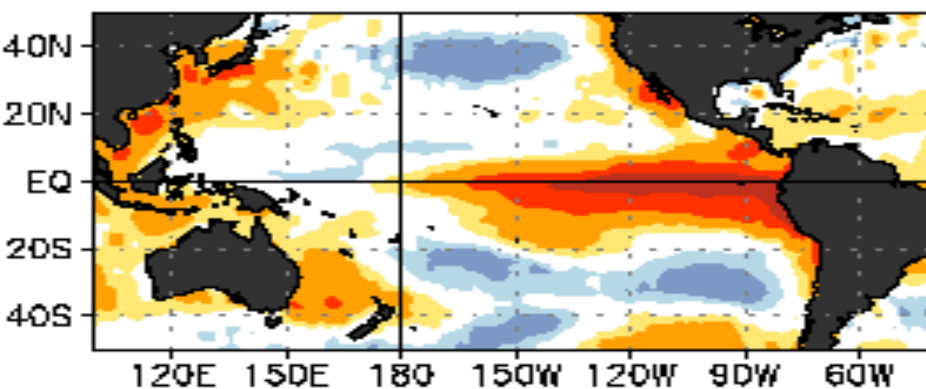
EL NIÑO
Jan-Mar 1998



LA NIÑA
Jan-Mar 1989

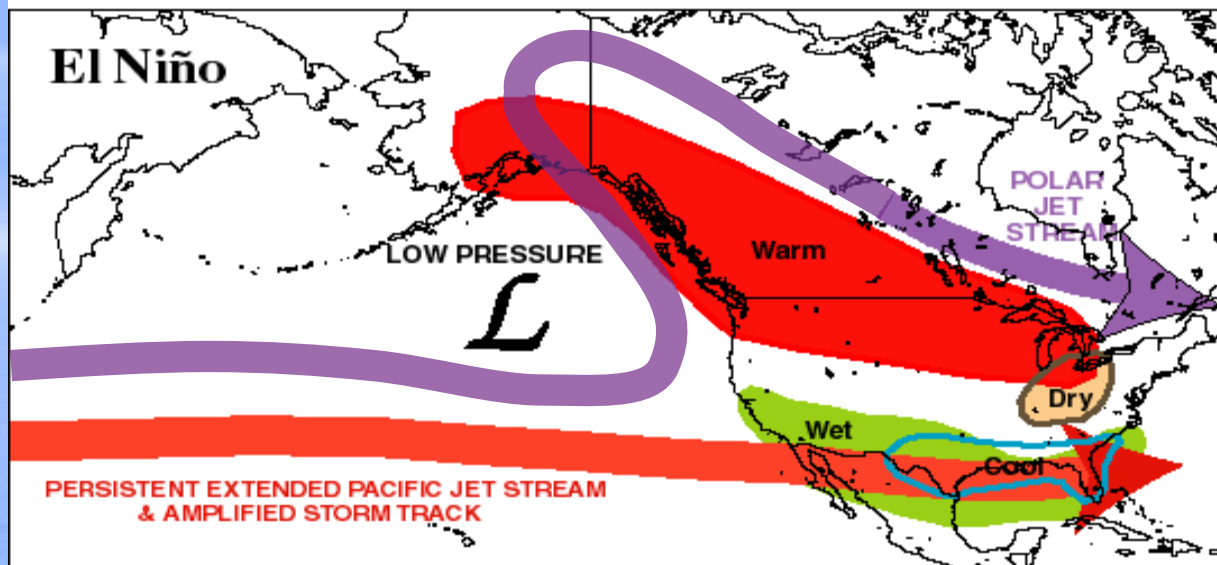


OCEAN TEMPERATURE DEPARTURES (°C)

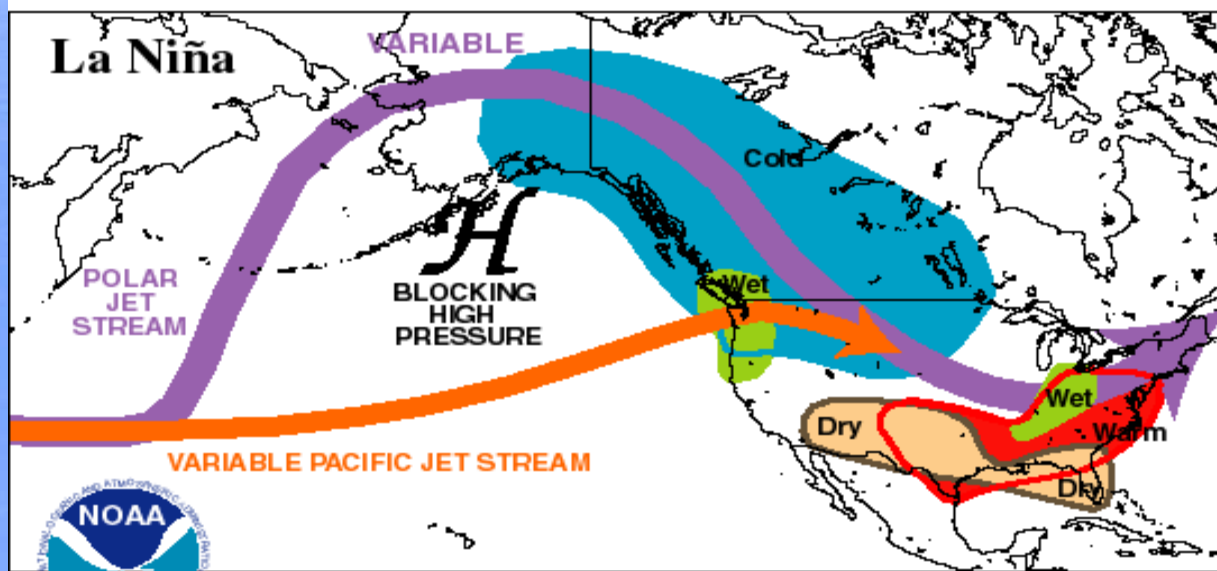


TYPICAL JANUARY-MARCH WEATHER ANOMALIES
AND ATMOSPHERIC CIRCULATION
DURING MODERATE TO STRONG
EL NIÑO & LA NIÑA

Warm
Event



Cold
Event

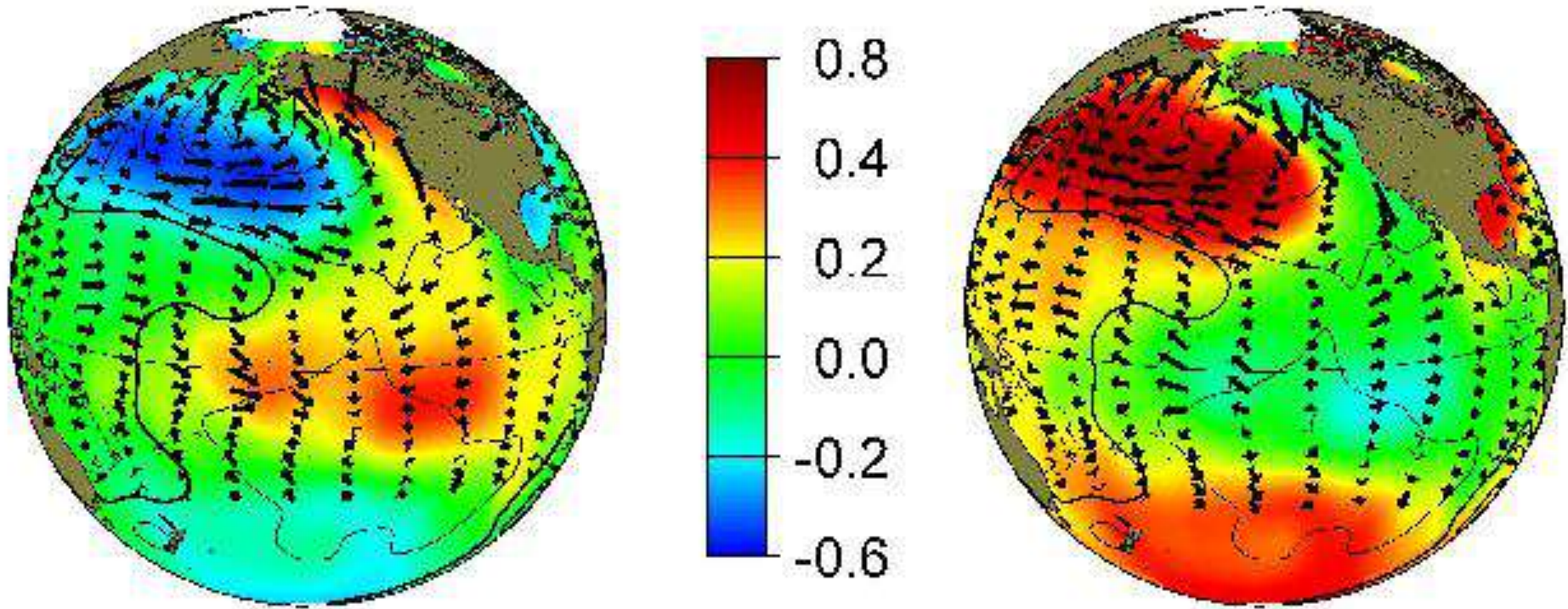


Pacific Decadal Oscillation (PDO)

(Fluctuations in the Northern Pacific Ocean SSTs)

Warm Phase

Cool Phase



Courtesy: <http://jisao.washington.edu/pdo/>

Pacific Decadal Oscillation (PDO)

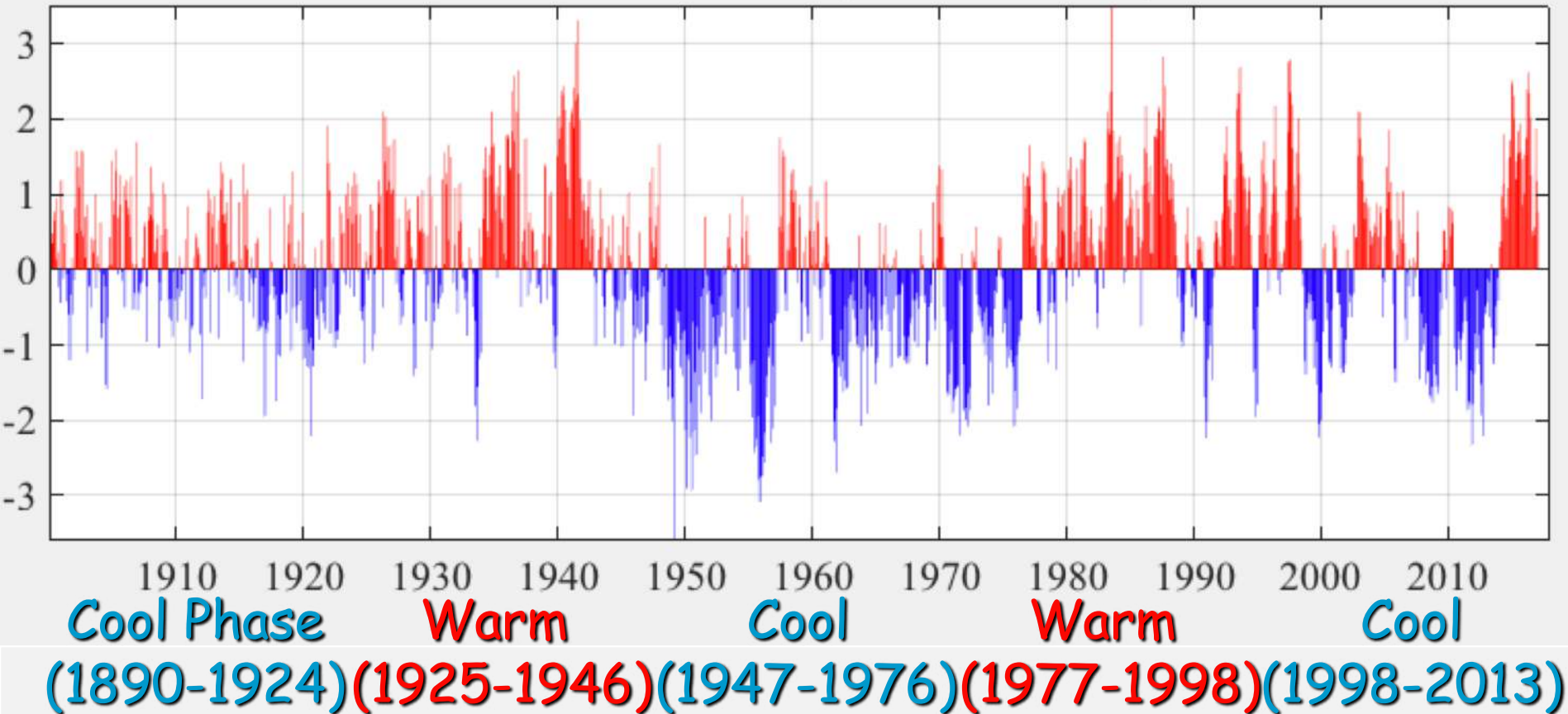
(Impacts/Status)

- More frequent and stronger El Niño events occur during periods dominated by the “Warm Phase.”
- More frequent and stronger La Niña events occur during periods dominated by the “Cool Phase.”
- In 2014, we apparently “flipped” from the “Cool” to the “Warm” phase.

Pacific Decadal Oscillation (PDO)


(Each Phase Typically Lasts for 15-30 Years)

PDO index values: January 1900 - January 2017



What About Climate Change?

- An assumption is made that no climate change has occurred from the time of the analog years to the present.
- We know that the climate constantly changes, this this assumption adds error to the forecast...
- To minimize this error, more-recent analogs (1950 -) are generally selected.



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Your Feedback is Welcome

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