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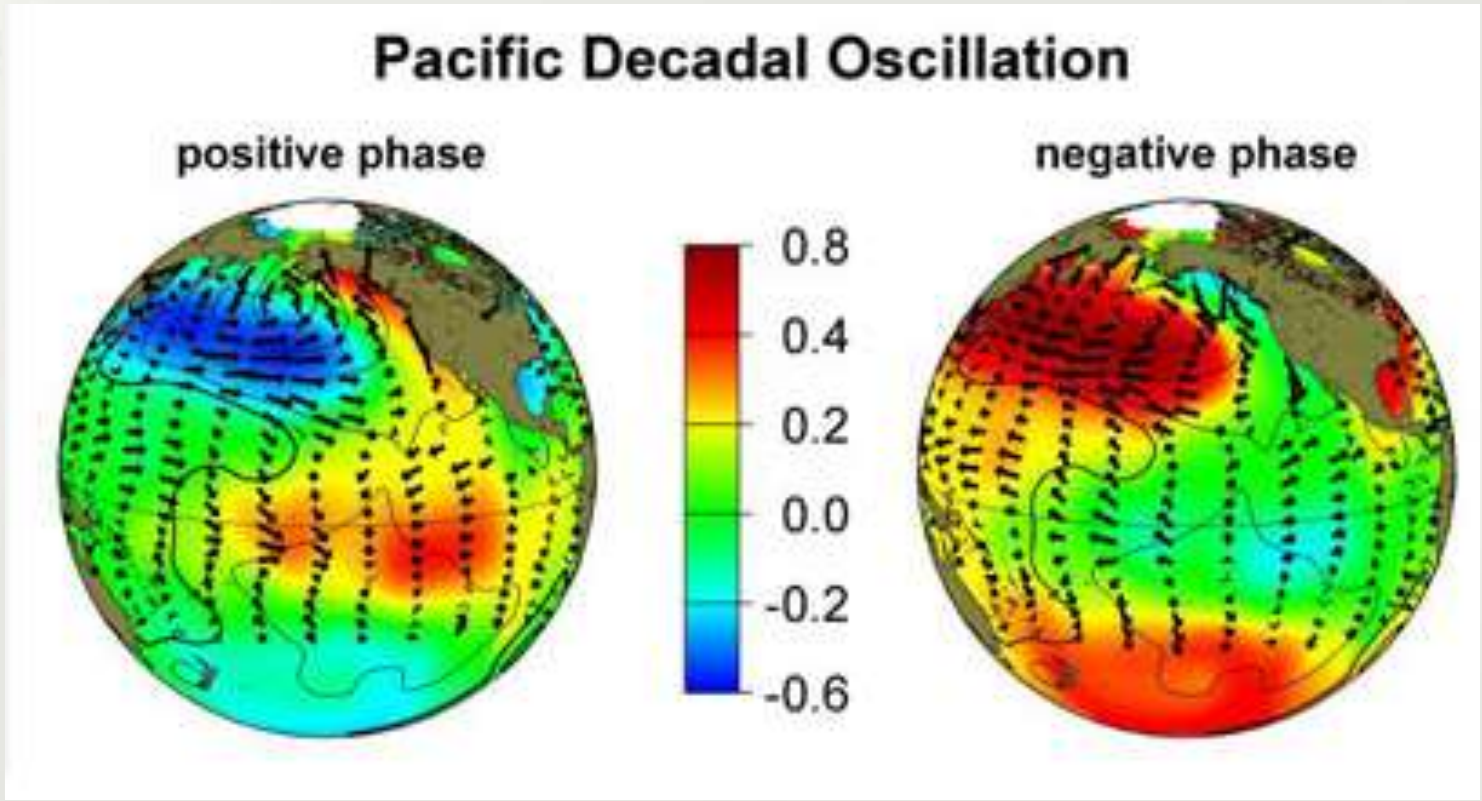
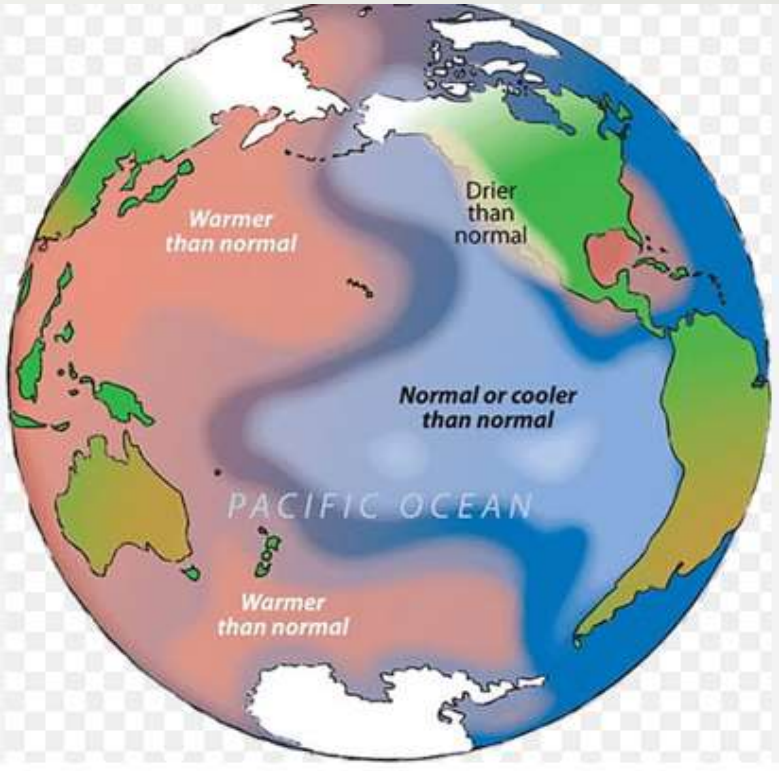
PACIFIC DECADAL OSCILLATION

(PDO)



Why in the news?

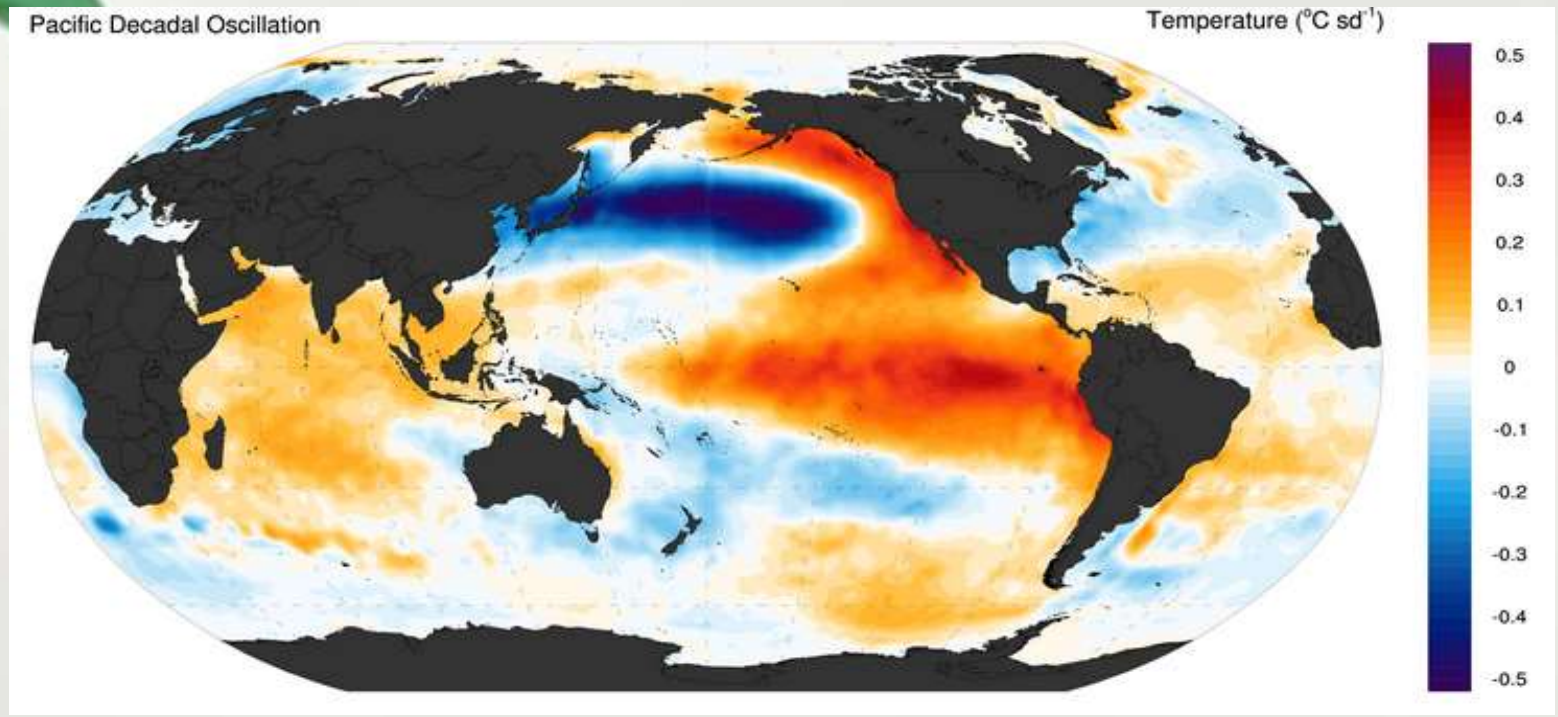
According to a study, a combination of global warming and the Pacific Decadal Oscillation (PDO) could make cyclones more frequent in the coming years.



Pacific Decadal Oscillation

The Pacific Decadal Oscillation (PDO) is a long-term ocean temperature fluctuation of the Pacific Ocean.

The PDO is a long-lived El Niño-like pattern of Pacific climate variability.



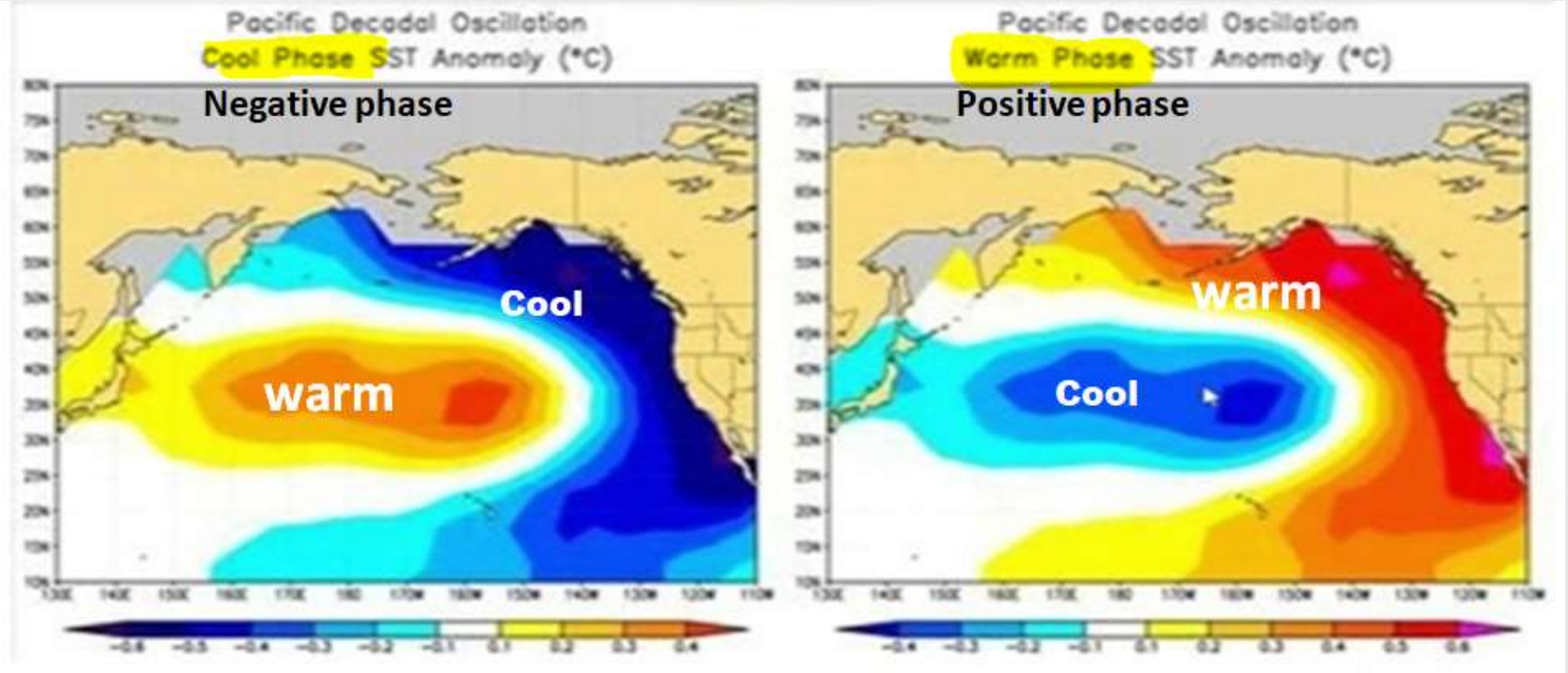
Phases of Pacific Decadal Oscillation

- **It has two phases:**

Cool or Negative Phase: Characterized by a cool wedge of lower than normal sea-surface temperatures in the eastern equatorial Pacific.

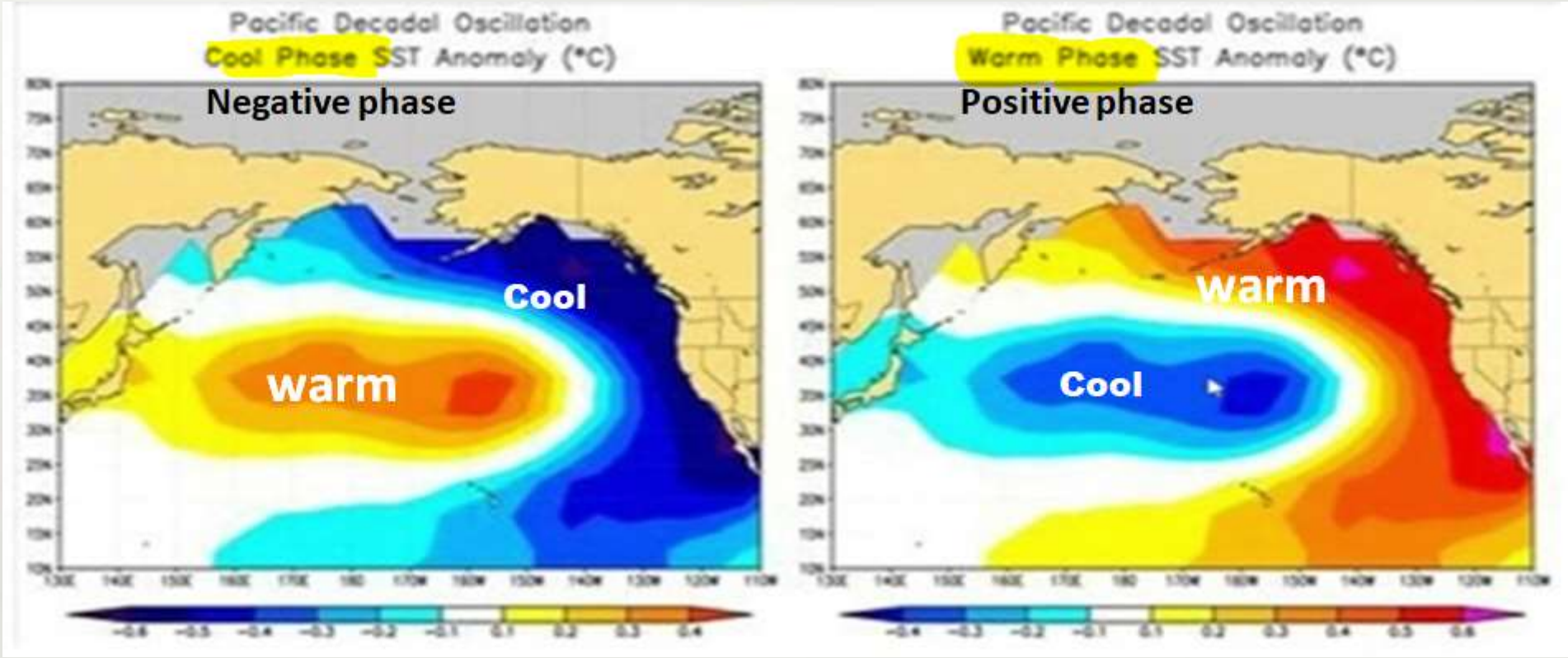
And a warm horseshoe pattern of higher than normal sea-surface heights connecting the north, west and southern Pacific

Warm or positive phase: It is reverse of cool phase.



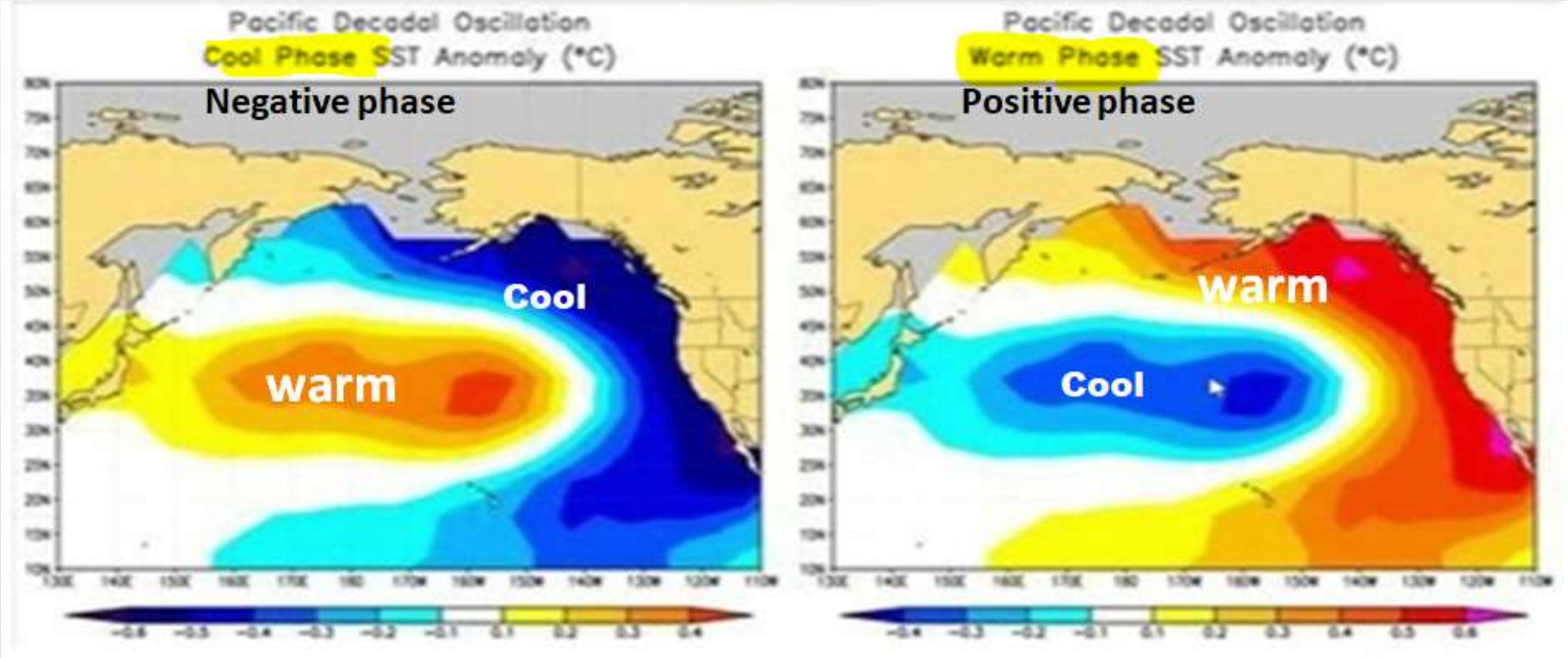
PDO fluctuates approximately every 20 to 30 years.

- A ‘cool’ phase occurred from 1947 to 1976 (29 years), and a ‘warm’ phase from 1977 to 1999 (22 years).
- However, in the recent time, the ‘warm’ and ‘cold’ phases have been much shorter.



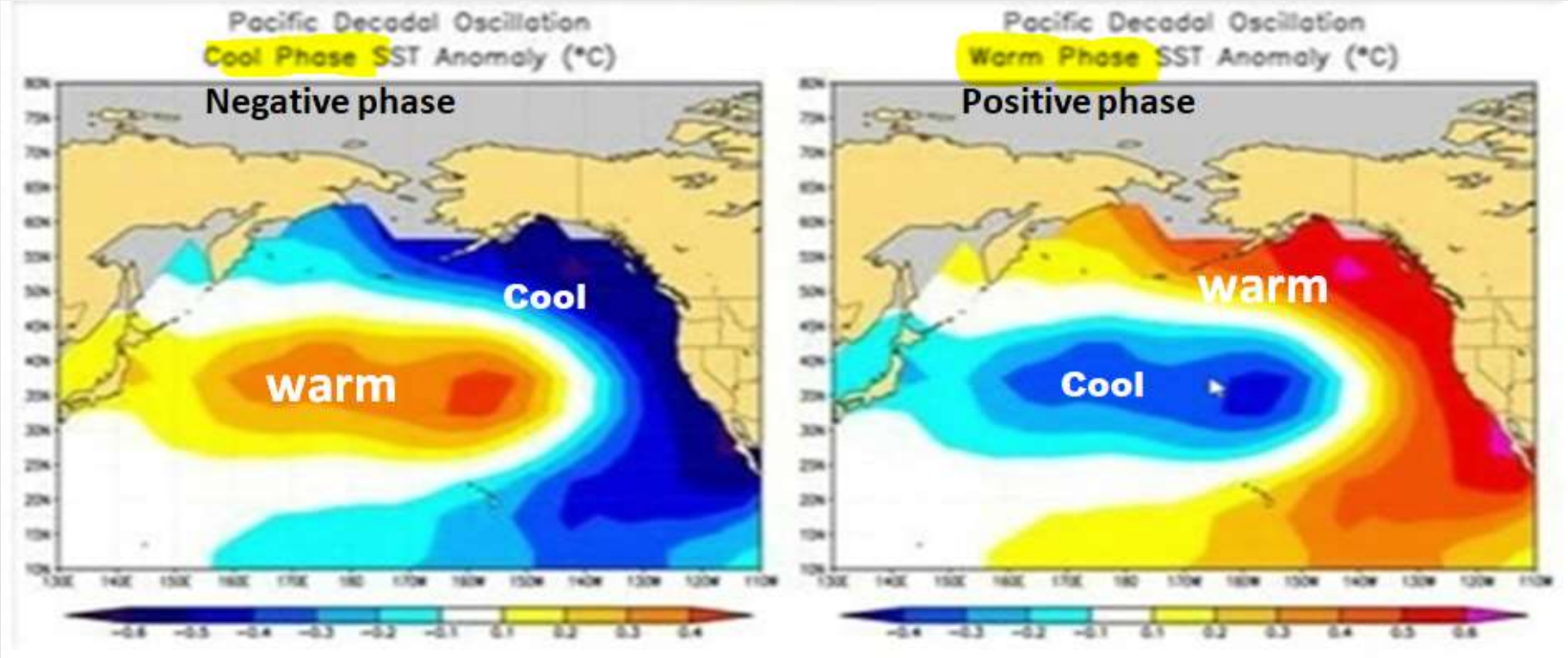
PDO's Influence on Cyclone Formation

- PDO's Cooler (negative) phase enhances equatorial cyclone formation, driven by warm Central Equatorial Pacific waters.
- Cyclones can intensify due to increased moisture and warm waters.



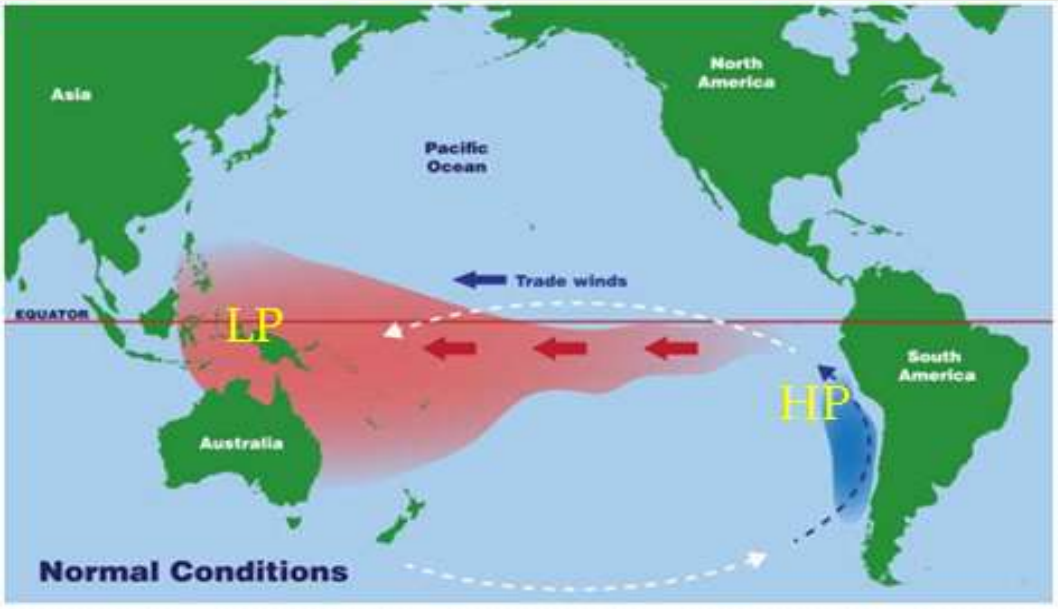
- In 2019, the PDO entered a cooler or negative phase. If it remains so, it could mean more tropical cyclones in the post-monsoon months that originate near the equator.

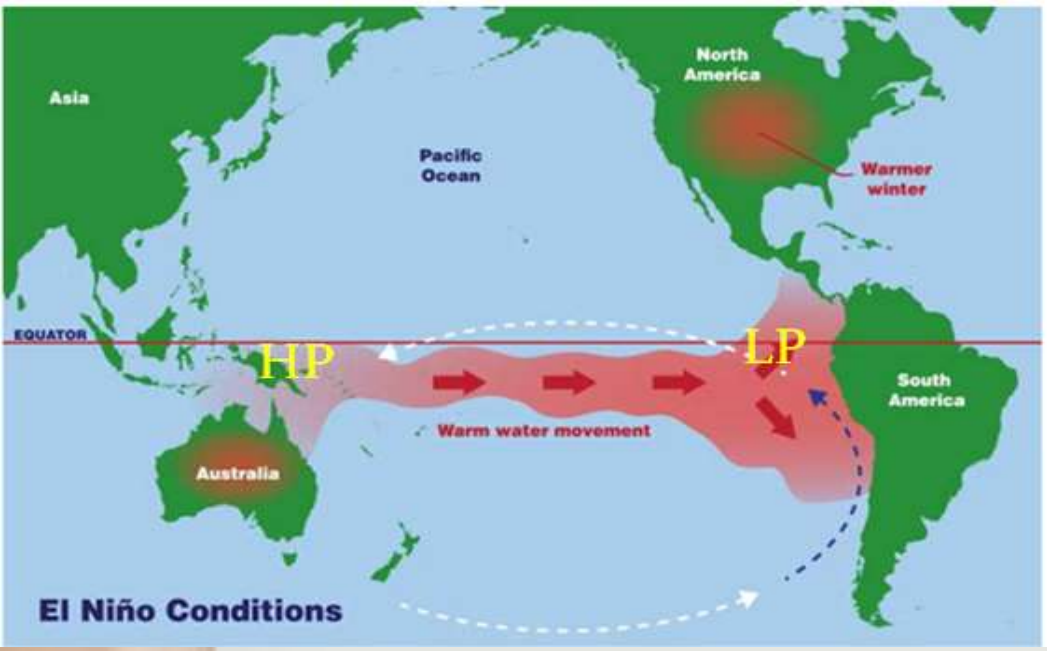
o in 1981-2010, PDO was in a 'warmer' or positive phase, The number of equatorial-origin cyclones was 43% fewer in 1981-2010, compared with 1951-1980,



Relation between Pacific Decadal Oscillation-PDO and El Nino Southern Oscillation (ENSO)

- If both phenomena are in the same phase, their associated impacts can be amplified.

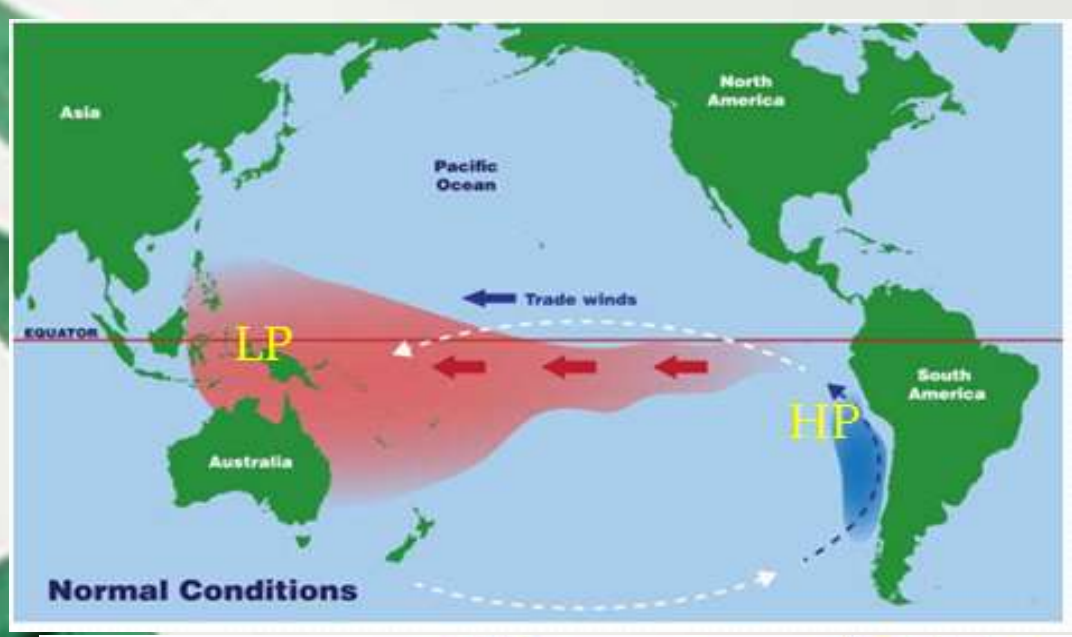


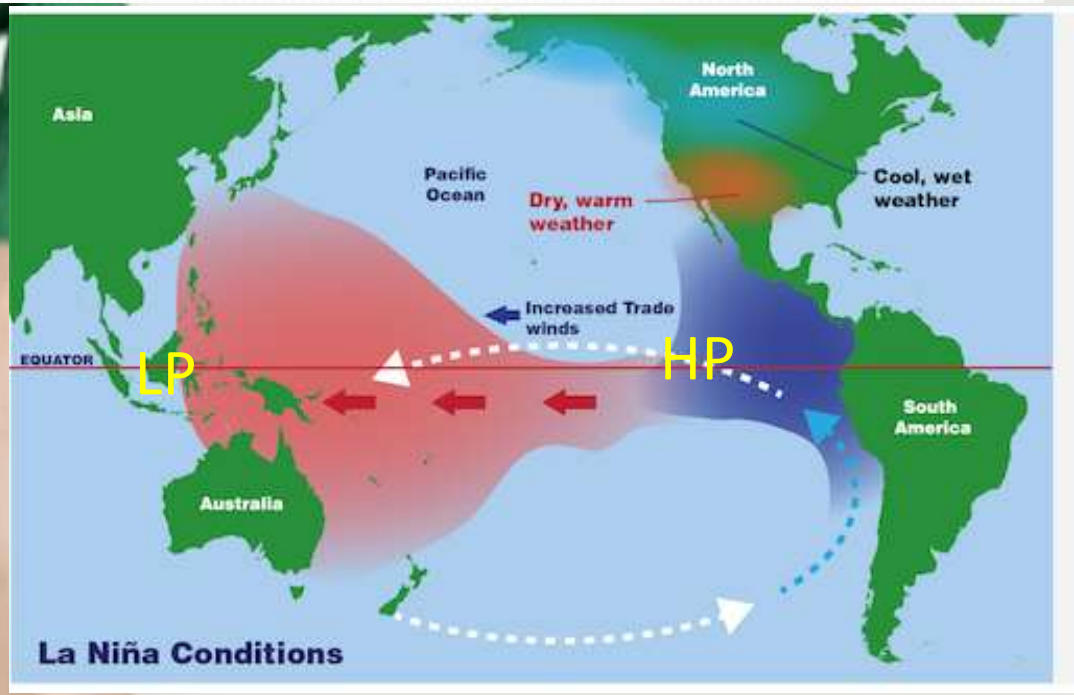


El Nino

- El Niño is a climate pattern that describes the unusual warming of surface waters in the eastern Pacific Ocean
- The normal low pressure system is replaced by a high pressure system in the western Pacific (the southern oscillation).
- This allows accumulate warm ocean water along the coastlines of Peru and Ecuador.
- Climatically, the development of an El Niño brings drought to the western Pacific, rains to the equatorial coast of South America, and convective storms and hurricanes to the central Pacific.

La Nina



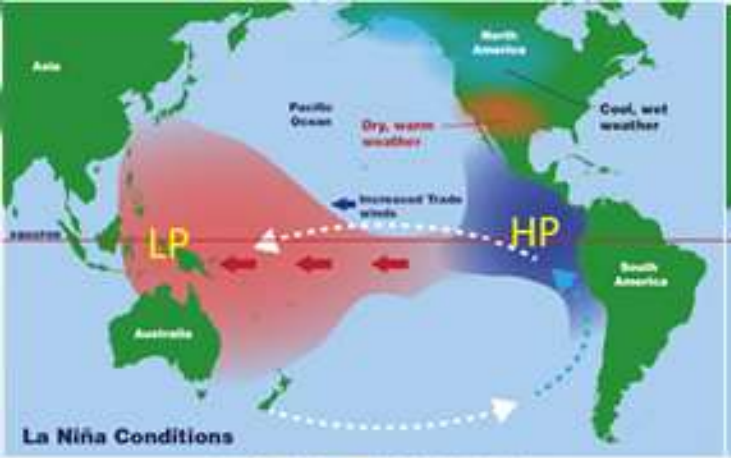


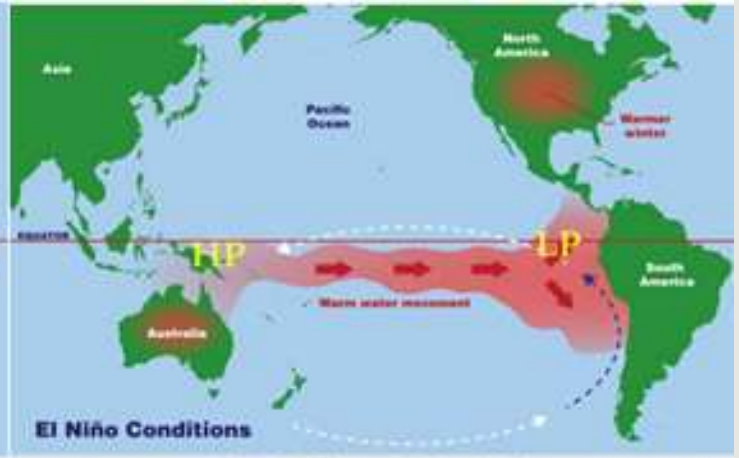
During a La Niña period, the sea surface temperature across the eastern equatorial part of the central Pacific Ocean will be lower than normal by 3–5 °C

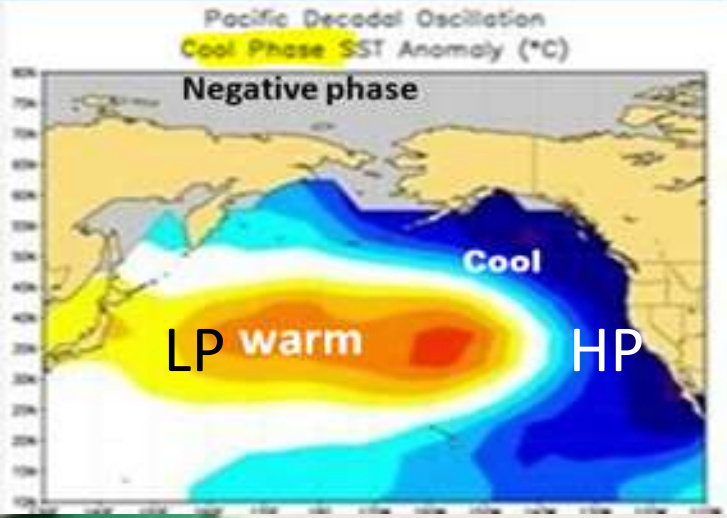
The trade winds are more powerful when La Nina is present, which causes Asia to get warmer water.

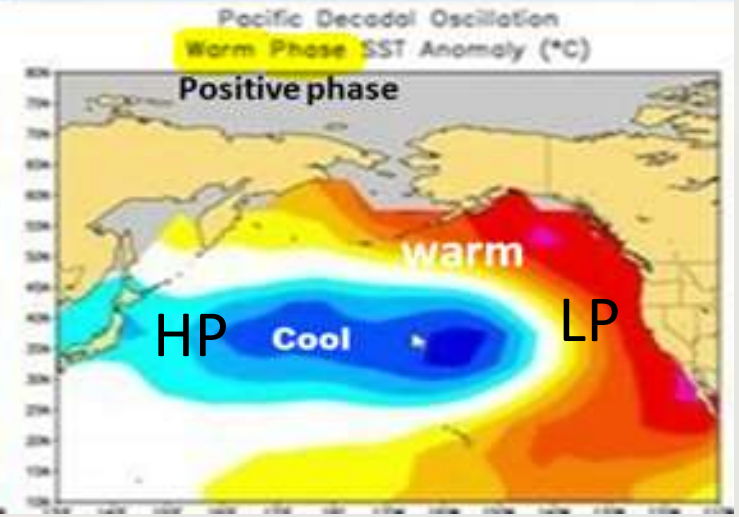
Increased upwelling off the west coast of the United States causes cold water rich in nutrients to rise to the surface.

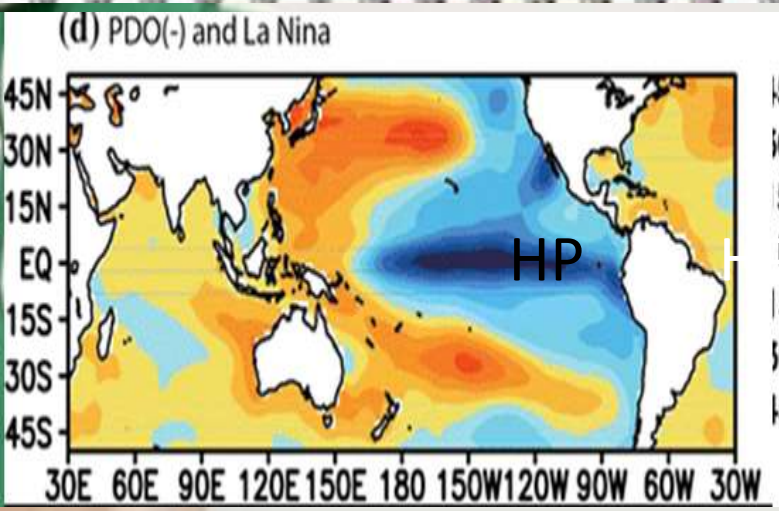
An appearance of La Niña often persists for longer than five months.

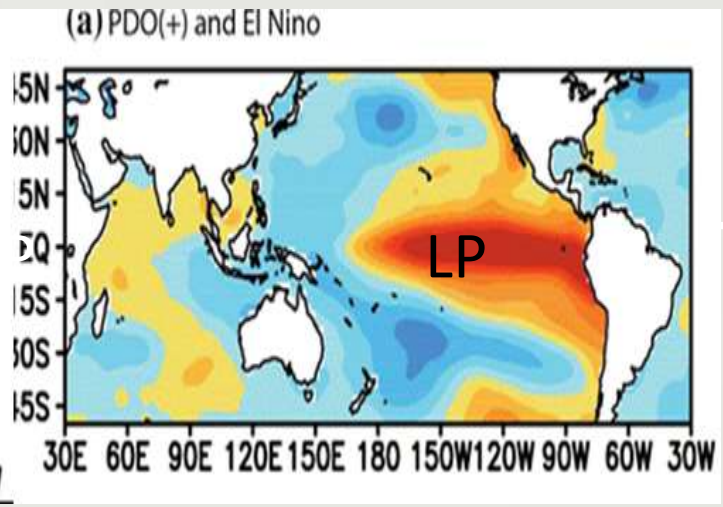












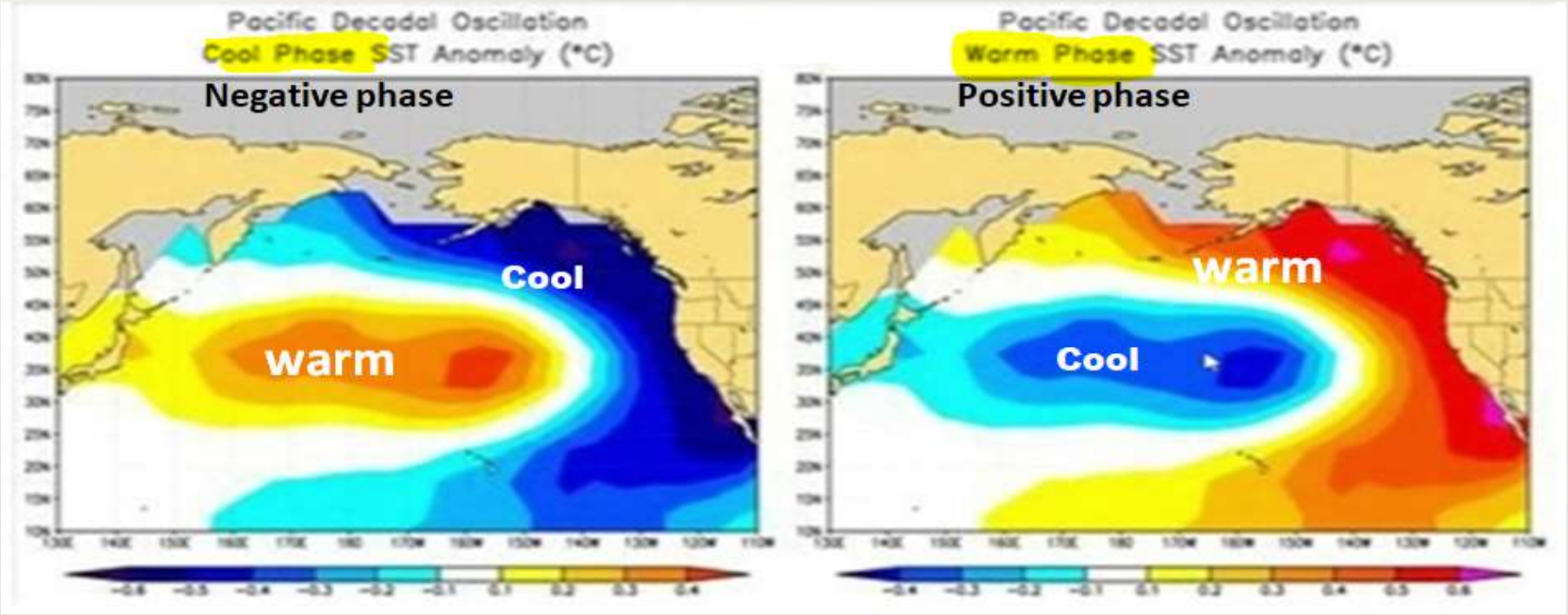
- **Impact on Indian Monsoon:**

El Niño with a positive PDO is generally not good for the Indian monsoon.

o **La Nina phase is linked with a negative PDO, it intensifies monsoon in India**

Conclusion

- PDO is a complex phenomenon.
- It impacts region ranging from USA to India.
- Due to climate change and other related events such as ENSO its cycle has changed in the recent time.
- Still research is required on to understand its different dimensions.



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