What about WY 2006?

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WHAT ABOUT THIS YEAR?

- How much water and where?

- Where is the cold air
  warm air
  moisture?

- Look to the West!

Ocean Characteristics

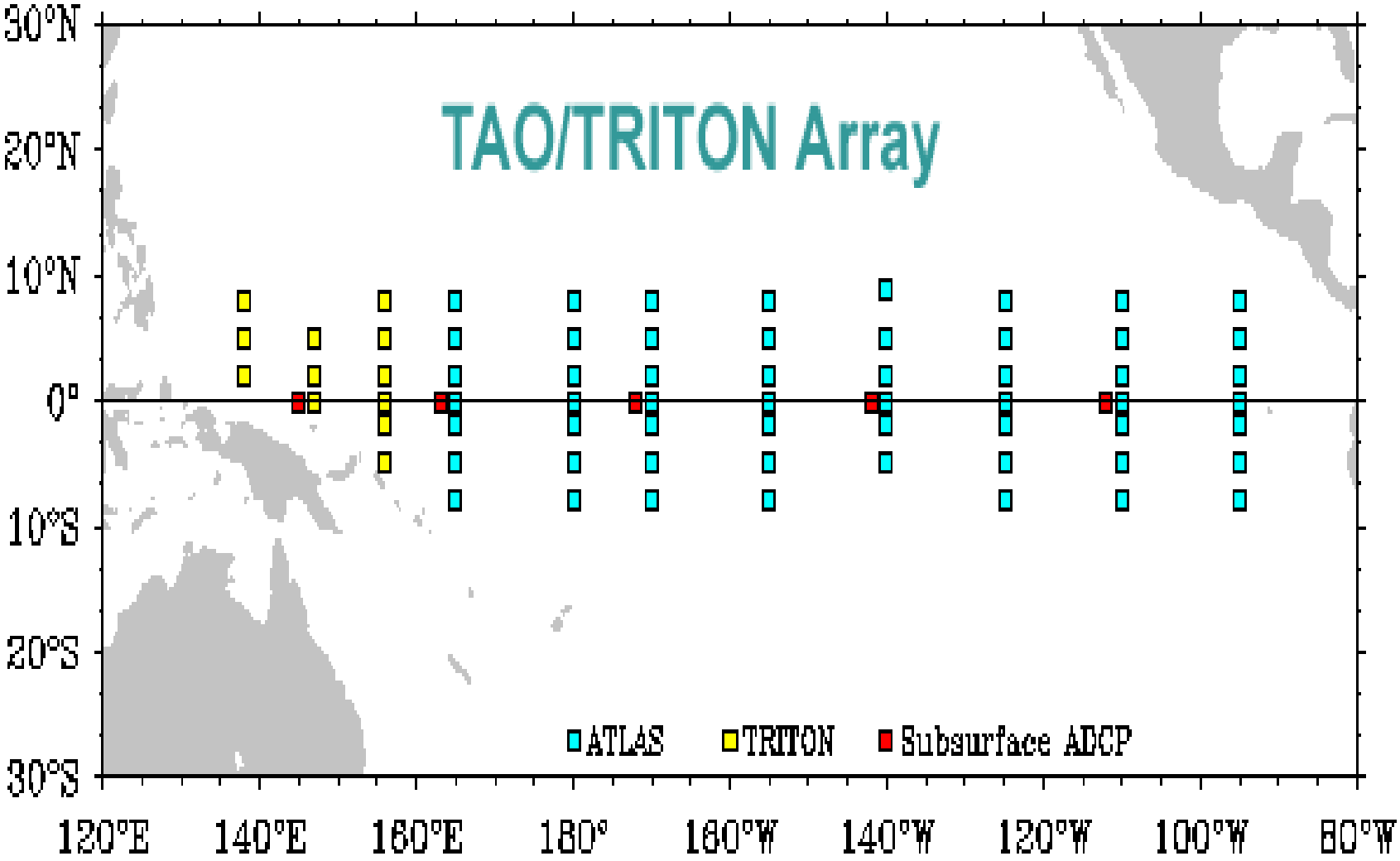
- El Nino and the Southern Oscillation (ENSO)
- Madden Julian Oscillation (MJO)
- Pacific Decadal Oscillation (PDO)

El Nino

What is it ?

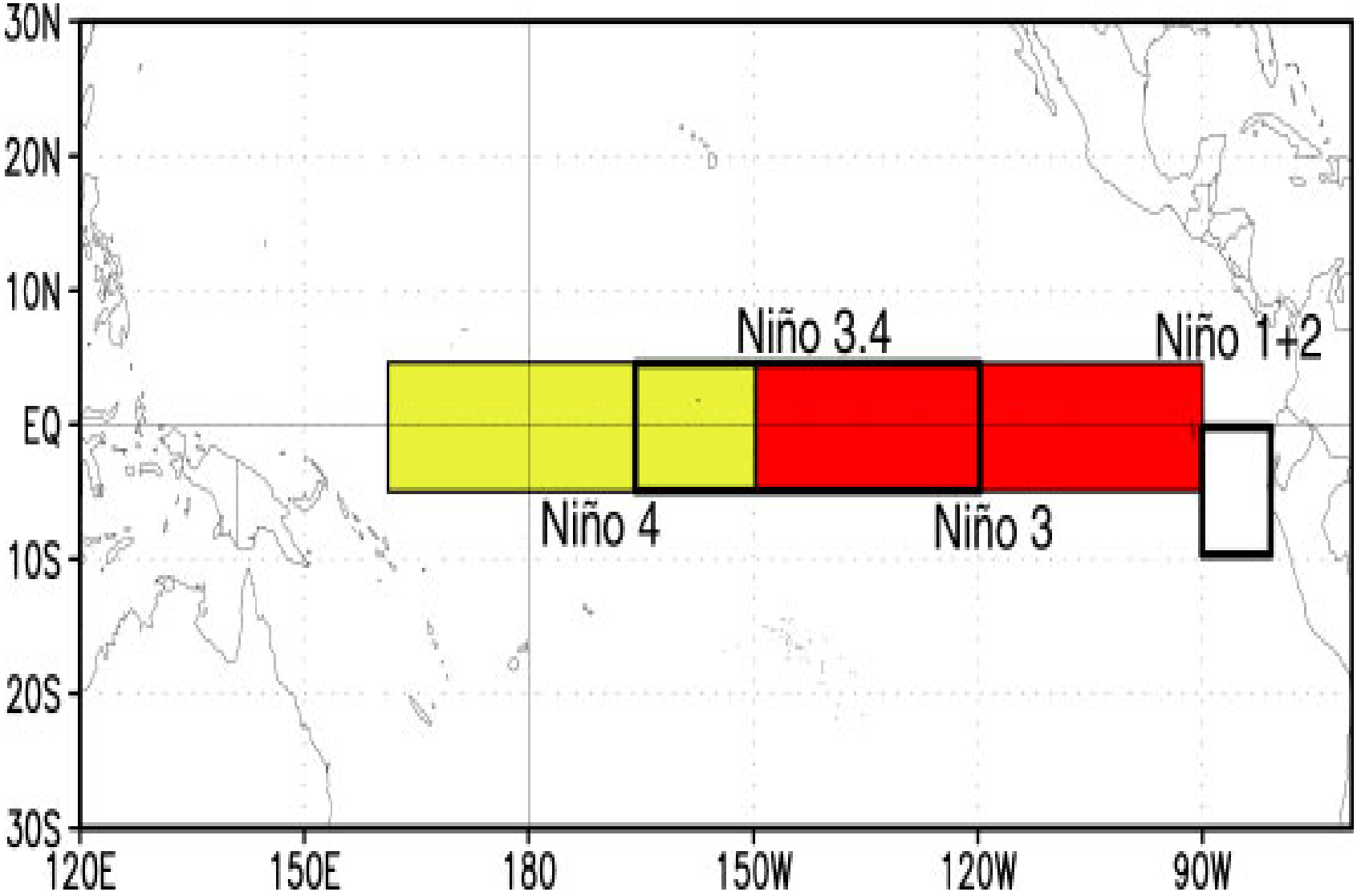
- Large scale warming of the tropical Pacific (5N to 5S)
- Occurs every 2 to 7 years
- El Nino threshold is + or - 0.5 C
- Duration: 1 to 3 years

Buoy Locations for Tropical ocean/atmosphere



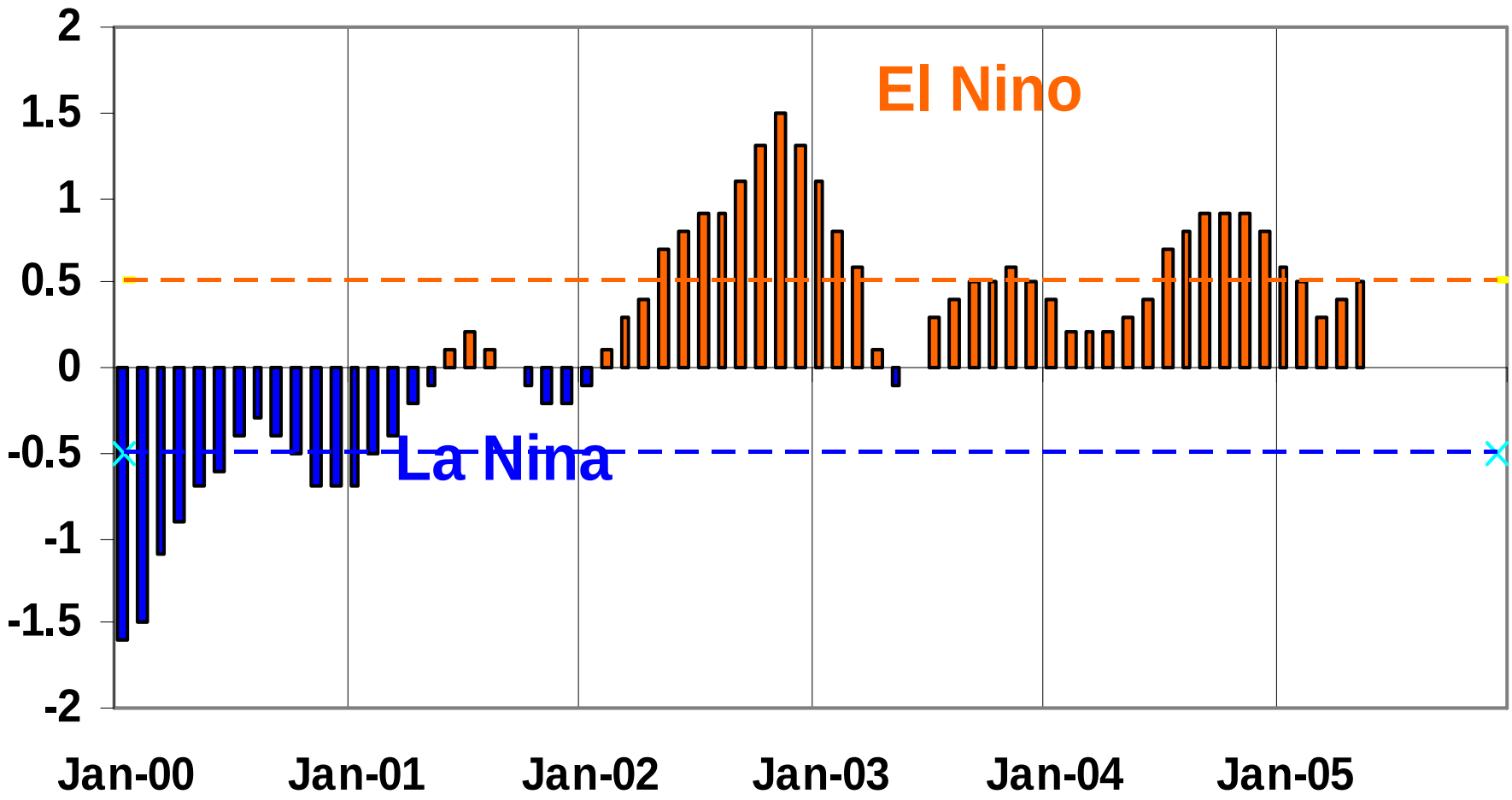
TOA Buoy

El Nino monitoring regions



SST Anomaly in El Nino 3.4

Units = degrees C



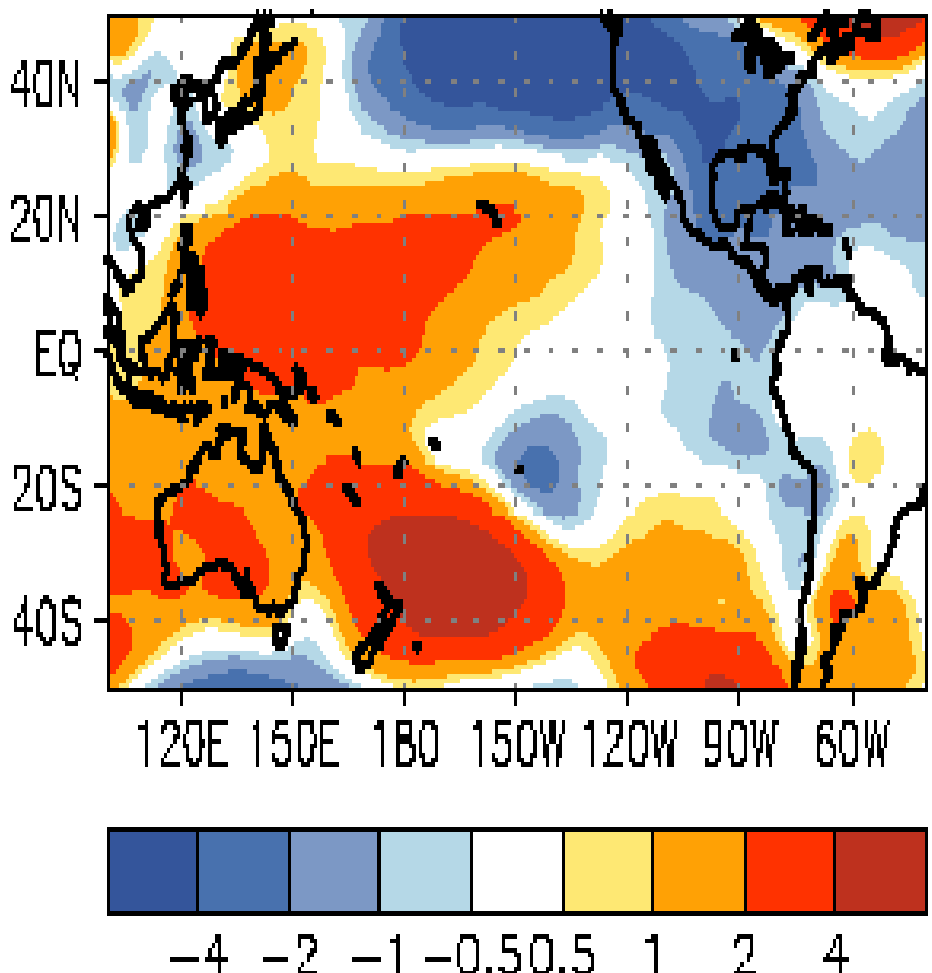
ΔSST's $\longrightarrow$ ΔPressure

- Southern Oscillation Index (SOI)=

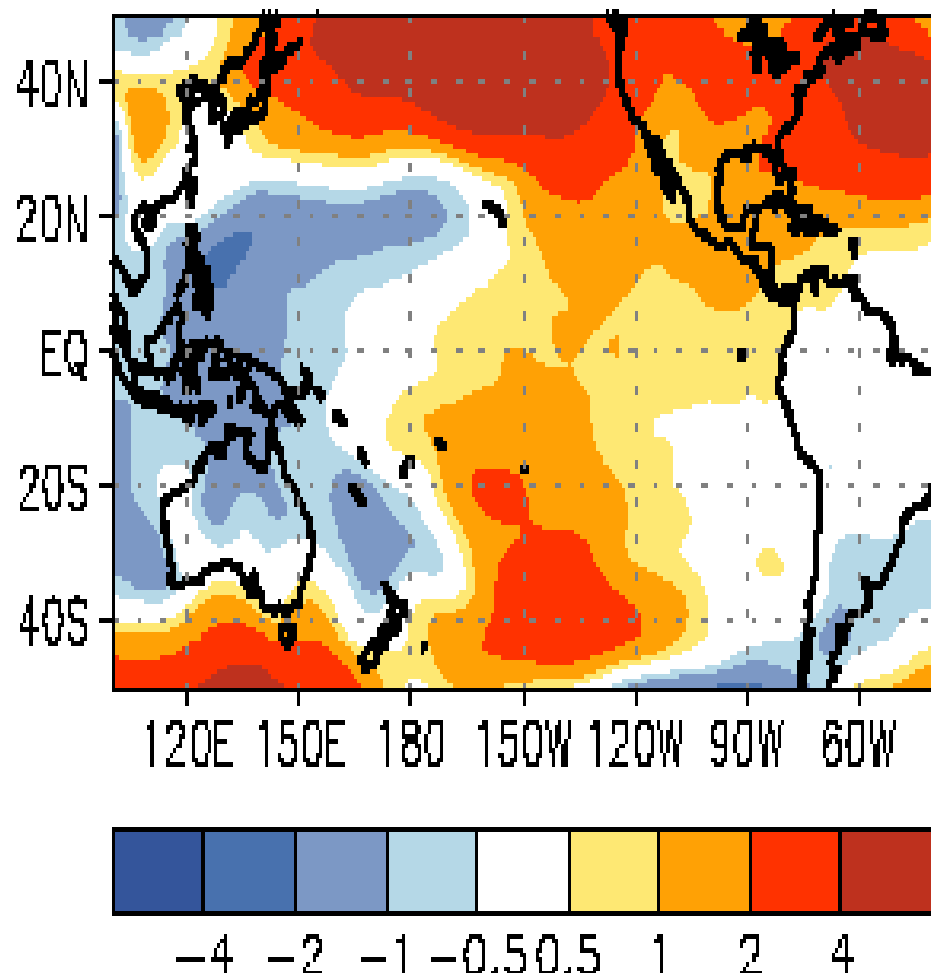
$$P_{Tahiti} - P_{Darwin}$$

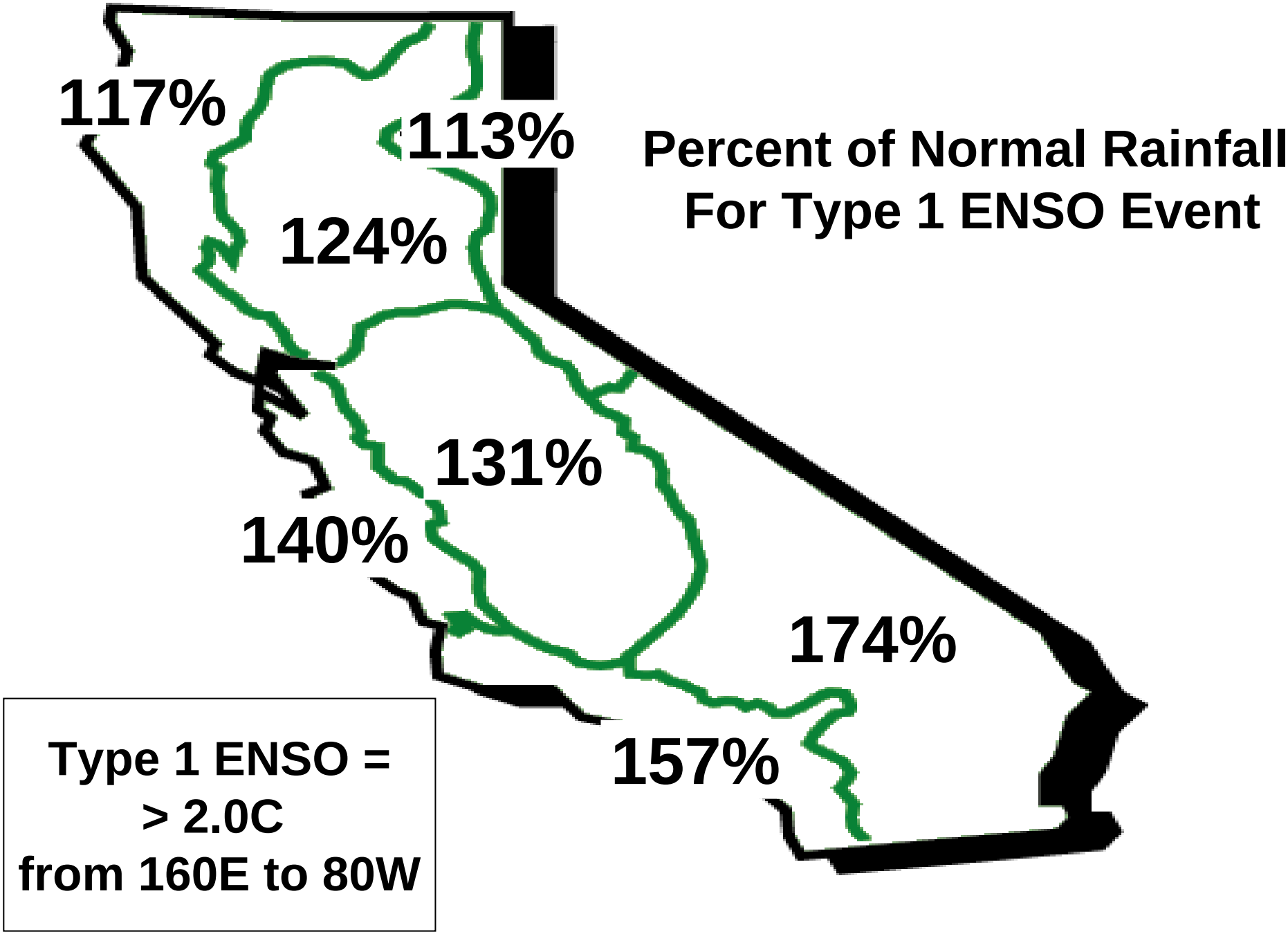
Pressure Departure from Normal (mb)

EL NIÑO
Jan-Mar 1998



LA NIÑA
Jan-Mar 1989




Percent of Normal Rainfall
For Type 1 ENSO Event
117%
113%
124%
131%
140%
174%
157%
Type 1 ENSO =
> 2.0C
from 160E to 80W

Madden Julian Oscillation (MJO)

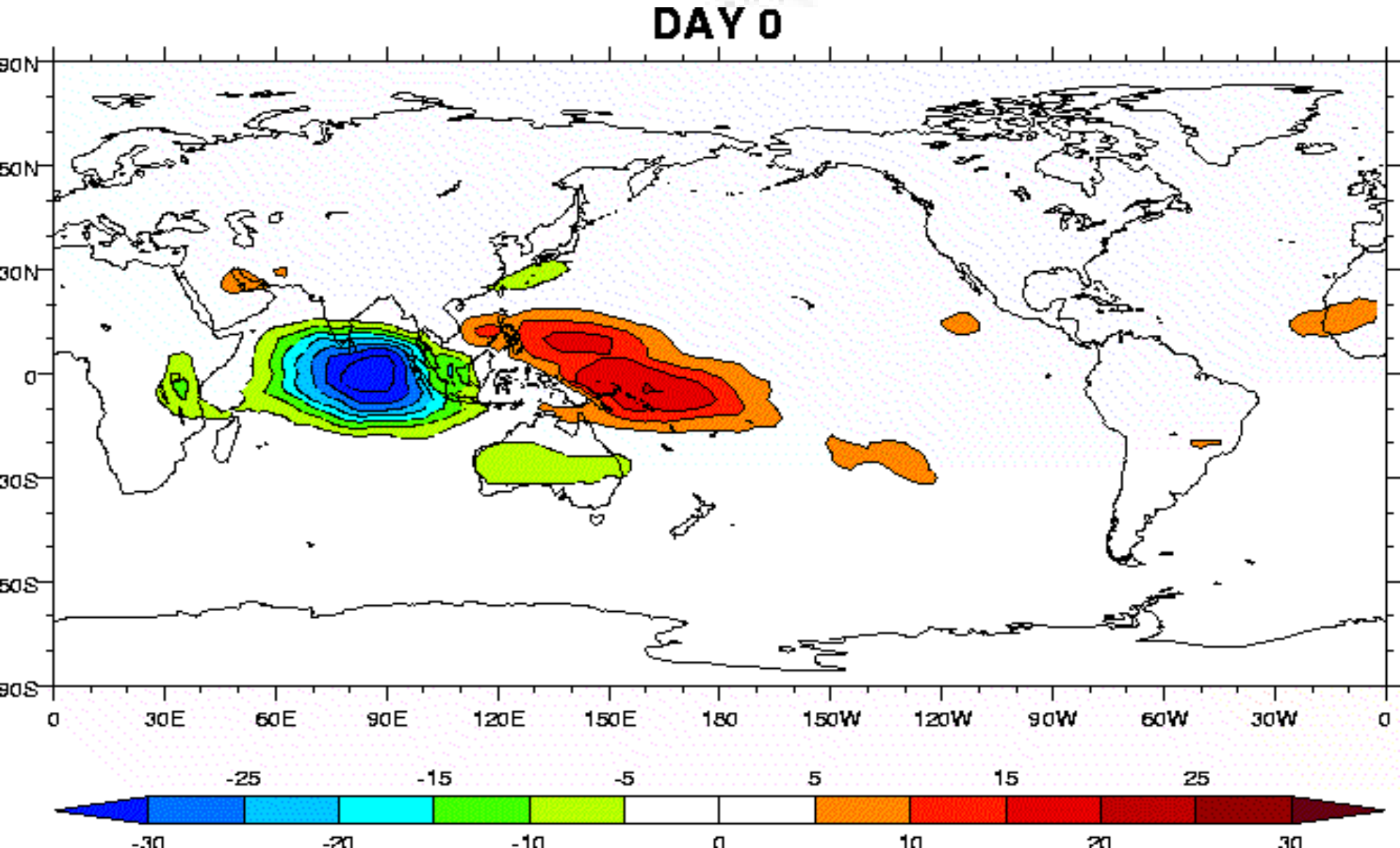
MJO = Large area of convection moving eastward from the Indian Ocean.

- SOURCE OF MOISTURE

How is convection measured?

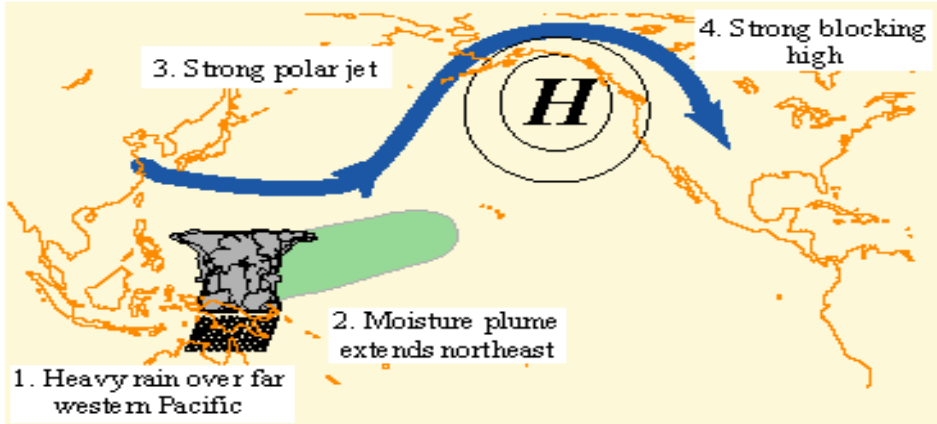
- High, cool cloud tops emit little amounts of Outgoing Longwave Radiation (OLR).
- Small amounts of OLR indicate convection
- Satellites measure OLR
- Measurements are compared to norms

Enhanced and Suppressed Convection

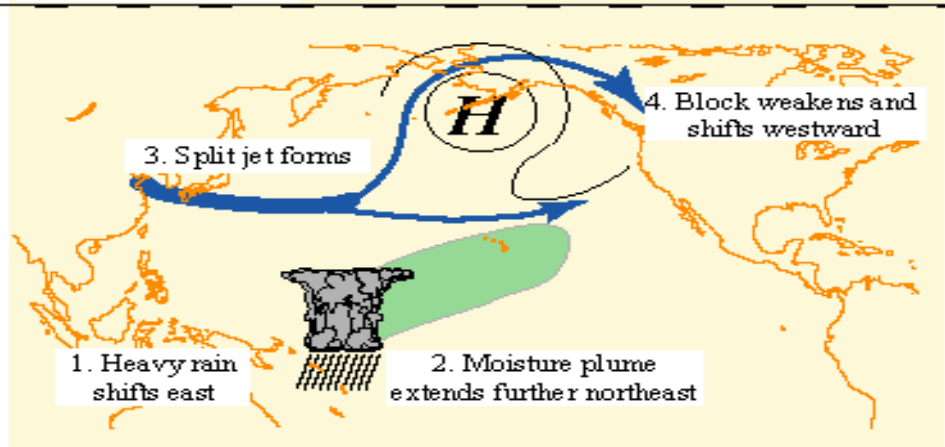


Typical Wintertime Weather Anomalies Preceeding Heavy West Coast Precipitation Events

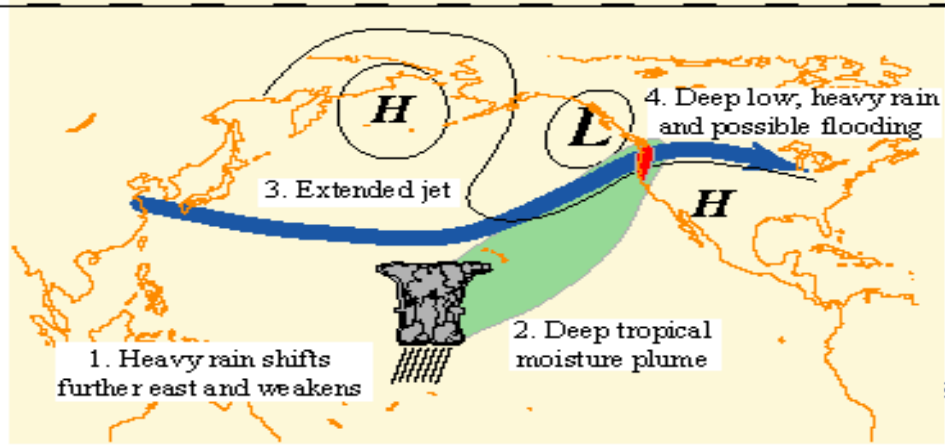
7-10 Days Before Event



3-5 Days Before Event



Precipitation Event



Climate Prediction Center/NCEP/NWS

Pacific Decadal Oscillation

- **What?** A long-term fluctuation of SST's in the North Pacific

Long term = 20 to 30 YRS

- **Where?** North of 20N in the central and eastern north Pacific

Similar to El Nino

- Warm and cool phases of SST
- Warm phase PDO effects on California rain are similar to the warm phase of El Nino
- SST's affect pressure and wind patterns

PDO notes:

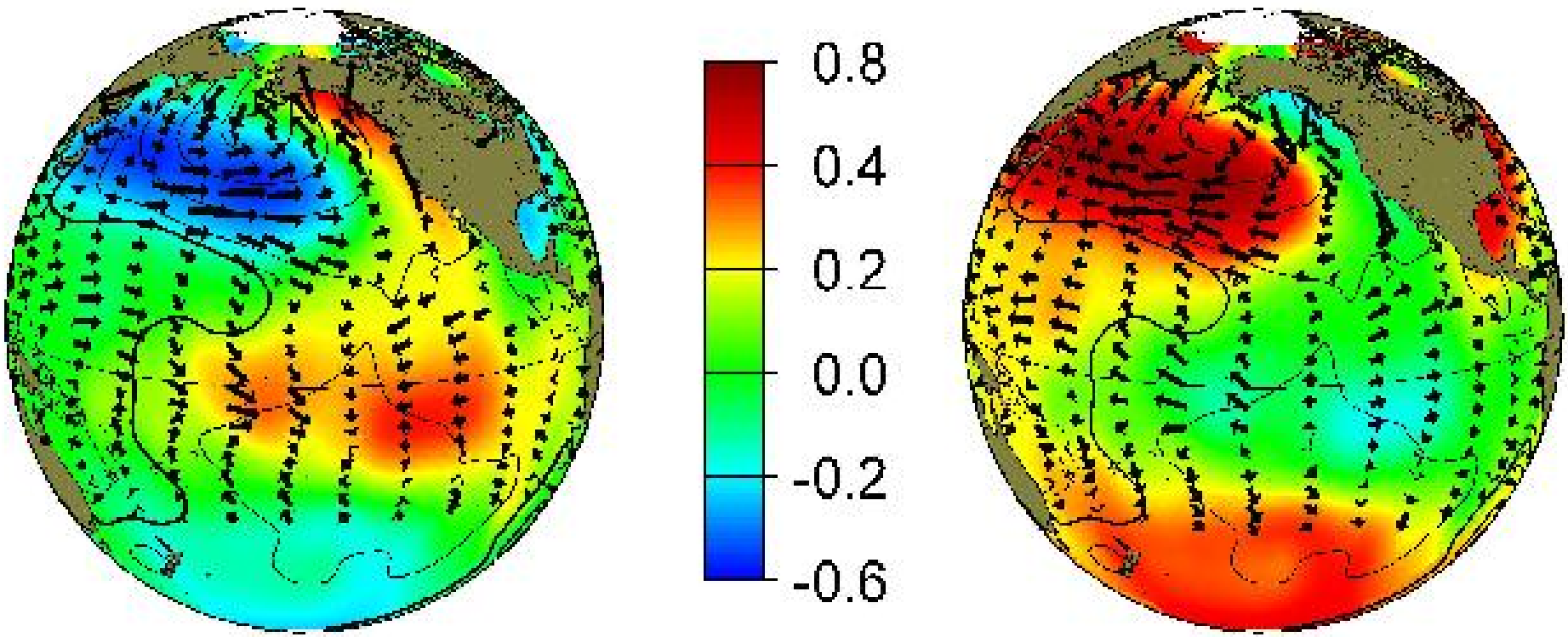
- Life cycle = 20 to 30 years
  (El Nino cycle = 1 to 3 years)

- Measured by satellite that detects sea level elevation (therefore temps and pressure are inferred)

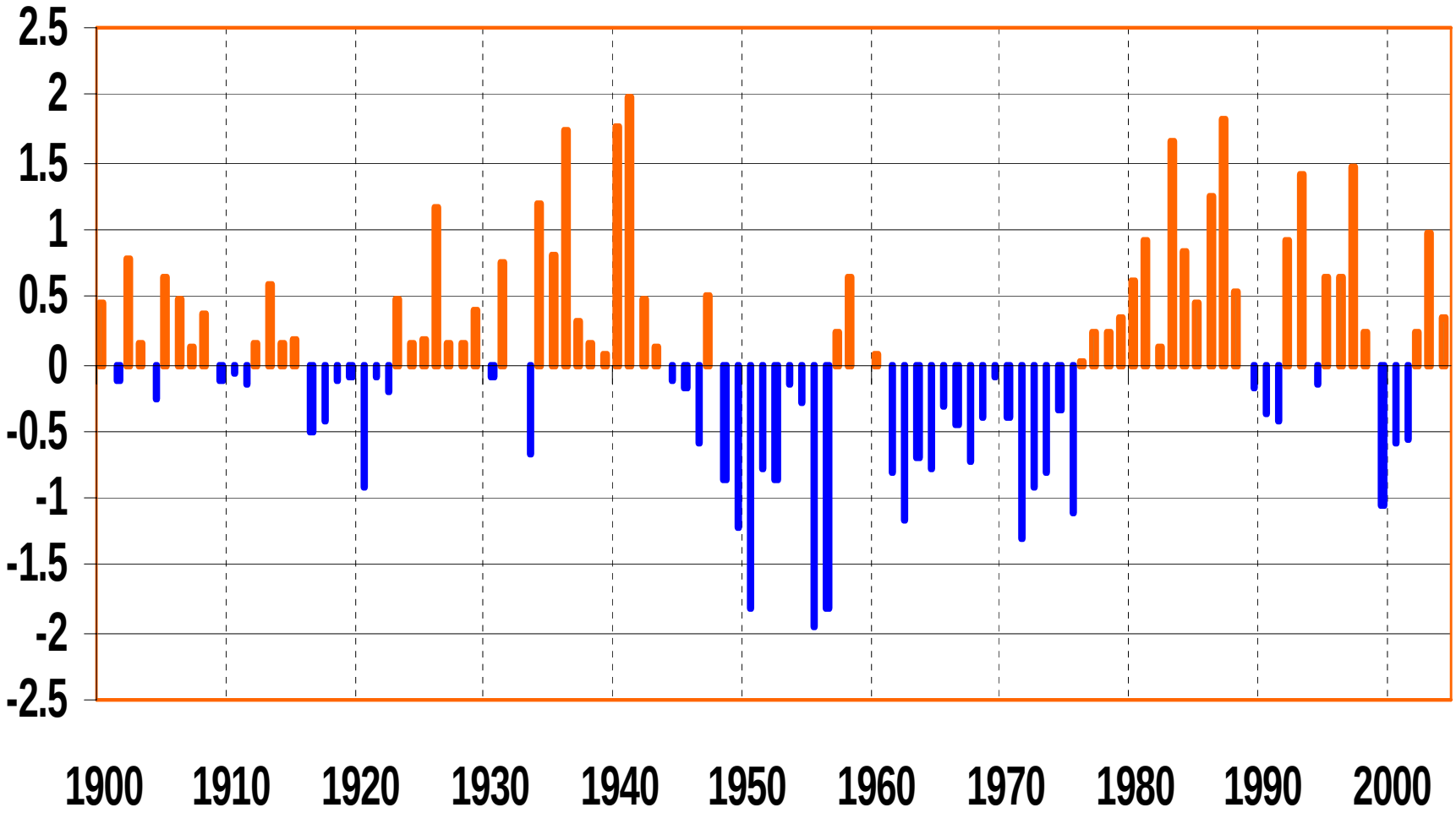
PDO

Warm phase

Cool Phase



PDO Index - N Pac poleward of 20N



Where are we now?

- El Nino… Neutral conditions expected next 3-6 months
- MJO… normal amounts of activity exist
- PDO… Near Neutral. Maybe cool phase developing

- **COMMENTS OR QUESTIONS?**