

SURF
FLOOD
FIRE
& MUD

El Niño, PDO, Rain, and Wildfires

NATHAN COOL

Let's start at the end,
and work backwards

January 9, 2018

- 21 Dead
- 2 missing/buried
- 101 Closed for 2 weeks

We are encouraging people to find innovative ways to keep the material on your property both in the short term and the long term, to work with your architect to identify how to improve your property with the material on site.
– Rob Lewin, SB Emergency Mgmt Dir



December 7, 2017 – Thomas Fire Ventura and Santa Barbara Counties



February, 2017 – Oroville Spillway Fails

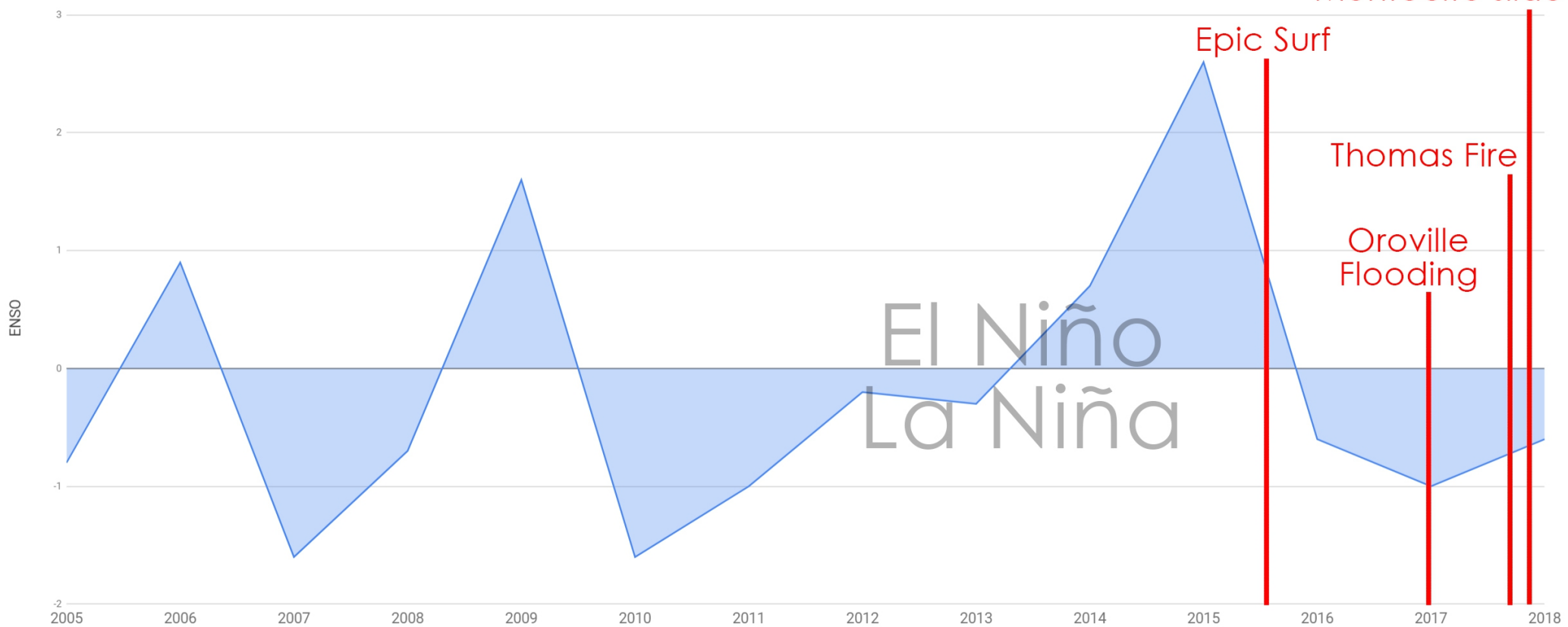


December 11, 2015 – Ventura Pier



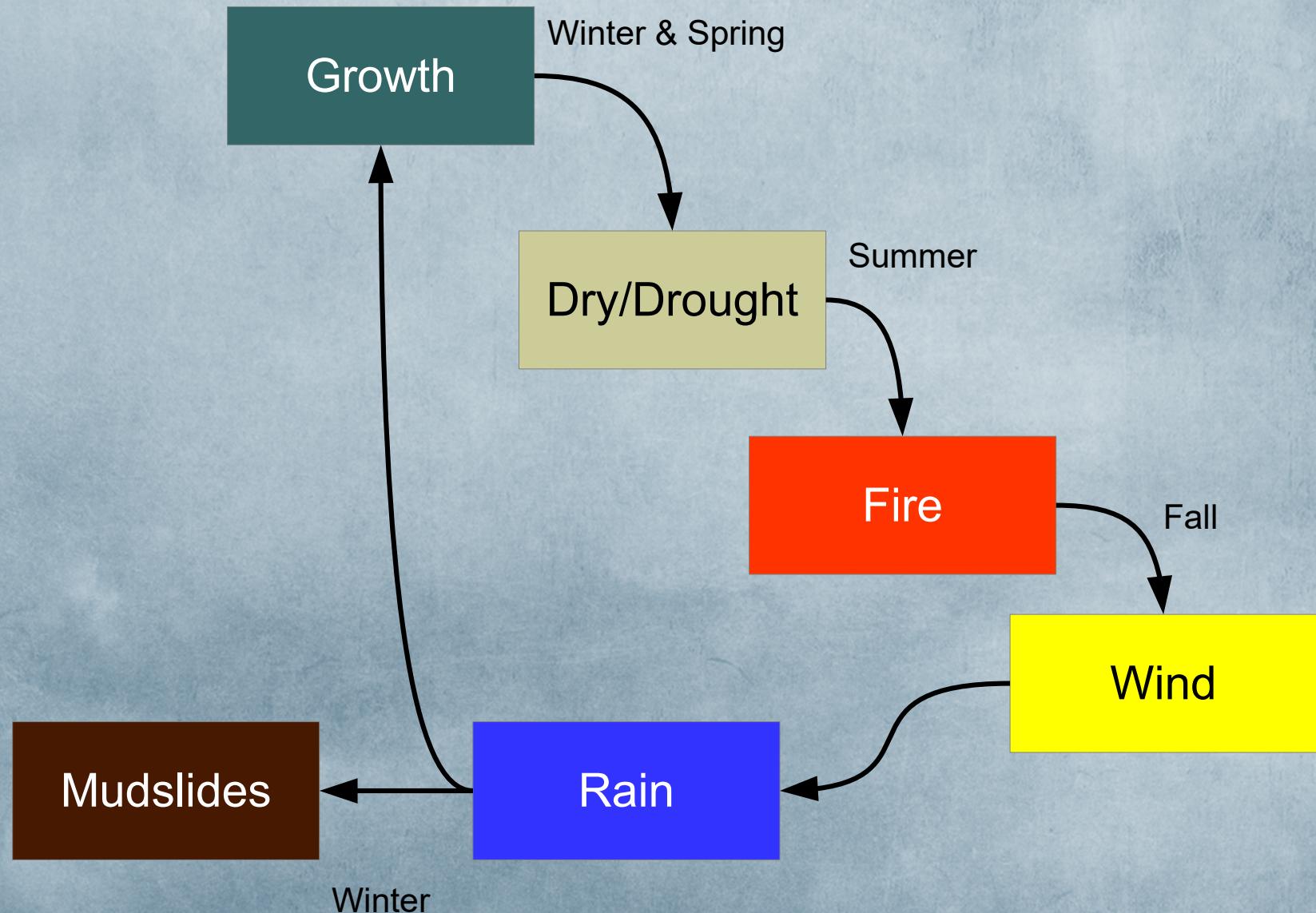
The Timeline and El Niño/La Niña

ENSO and Events

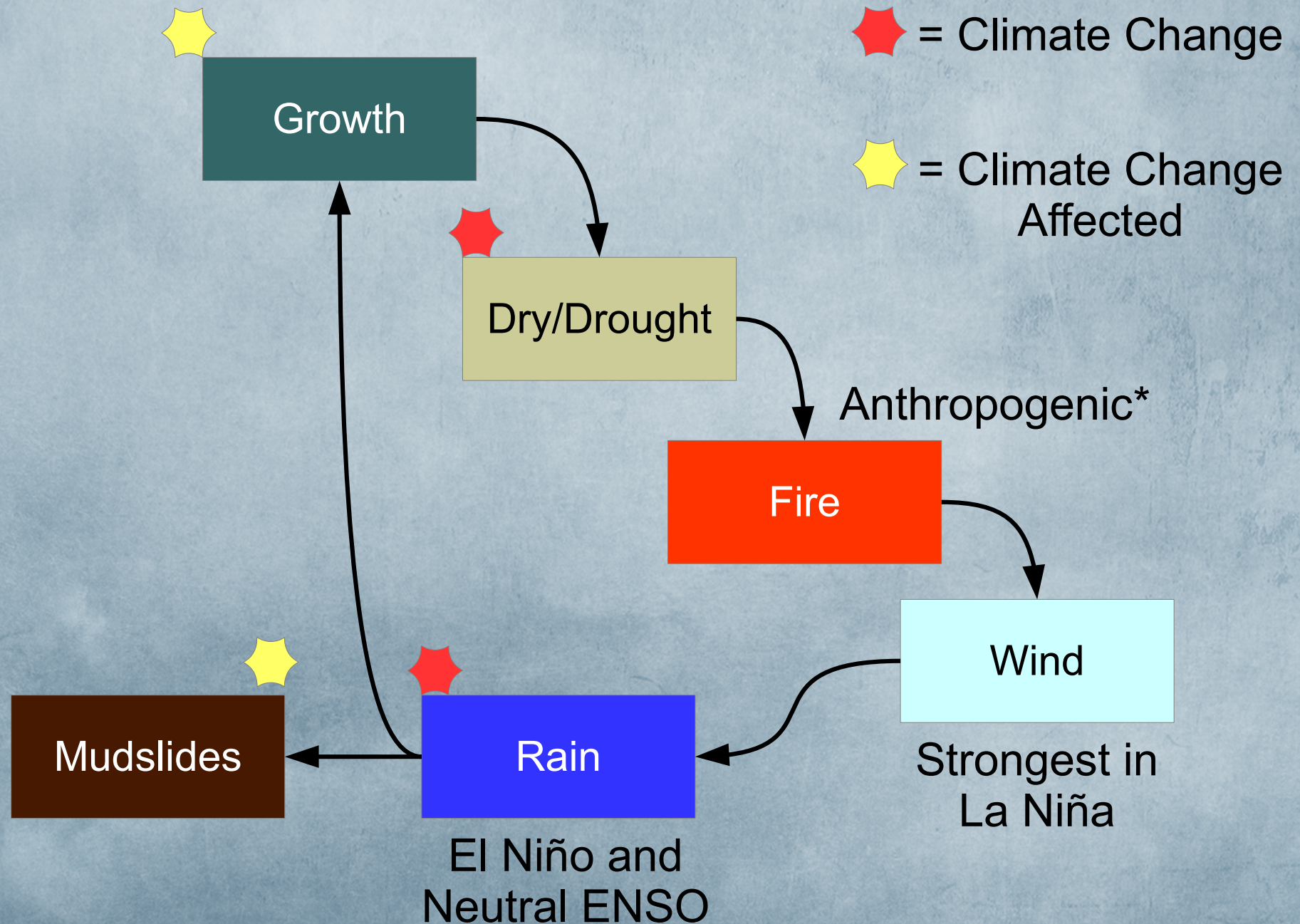


A Constant Cycle (1 of 2)

Pop Quiz, which are related to climate change?

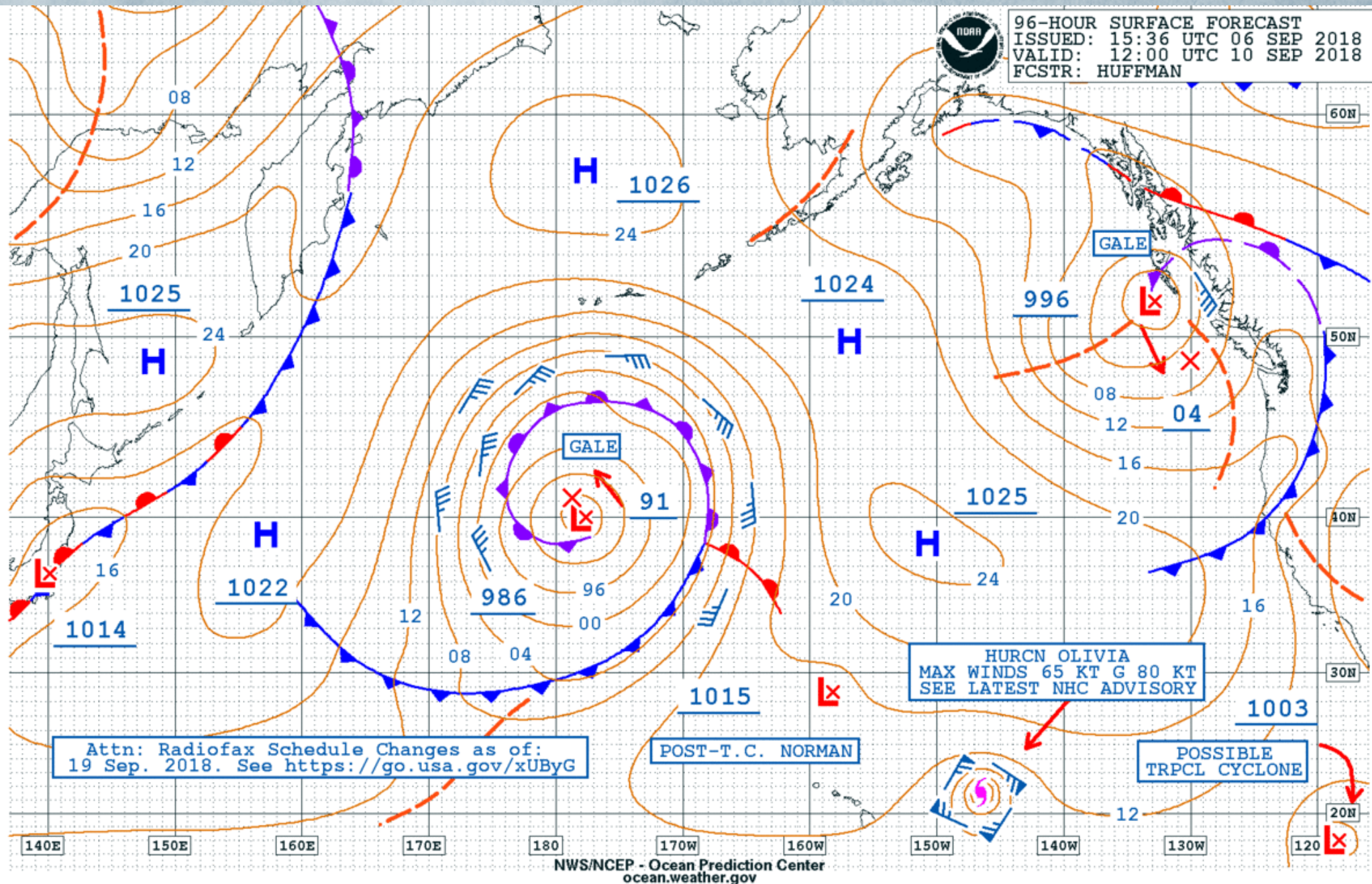


A Constant Cycle (2 of 2)



The Highs and Low of our World's Weather

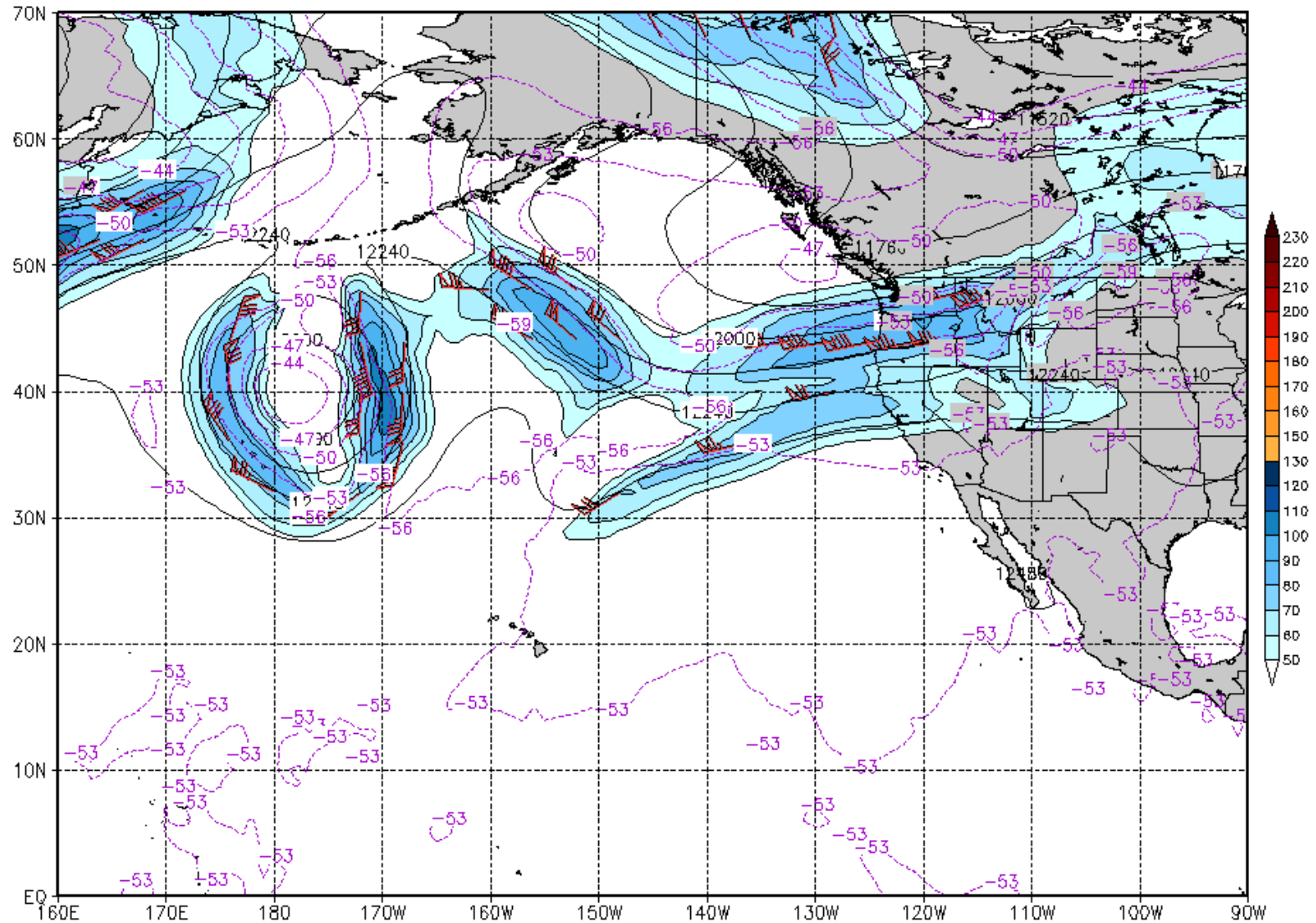
Pressure systems are tightly packed around the planet



The Highs and Low of our World's Weather

And the jetstream guides them and is influenced by them

UNCLASSIFIED



VT: Tue 06Z 11 SEP 18
NCEP_GFS (U): 200mb Heights [gpm] Isotachs [kts] Temp [°C]
Run: 2018090706Z Tau: 96

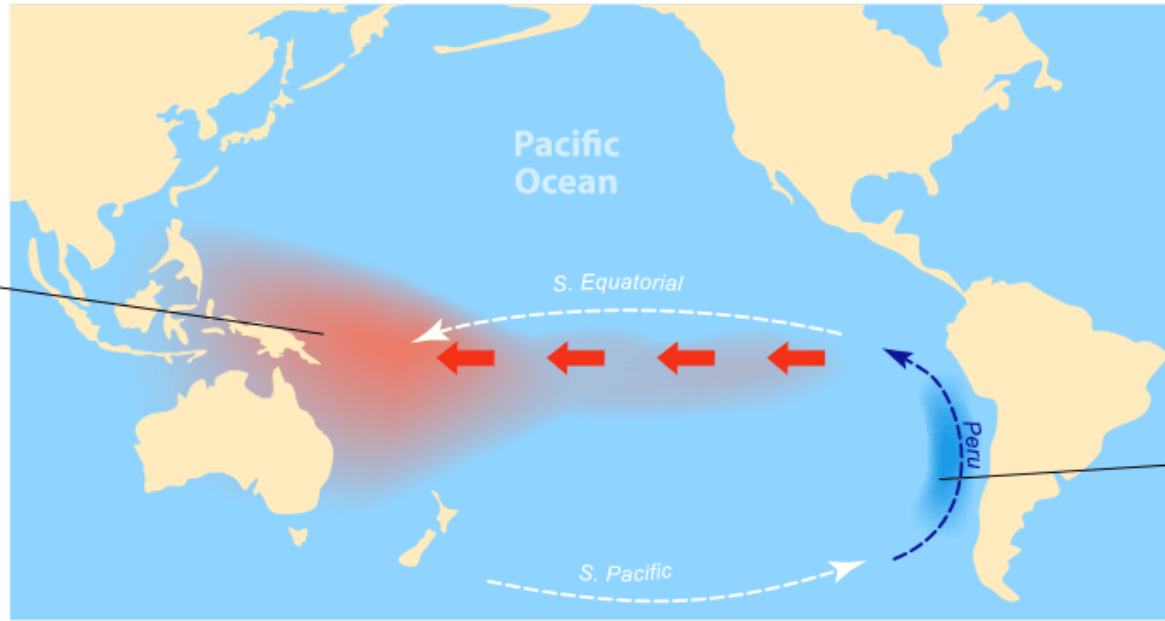
UNCLASSIFIED

Approved for public access. Distribution is unlimited.

ENSO in 30 seconds or less

NORMAL YEAR

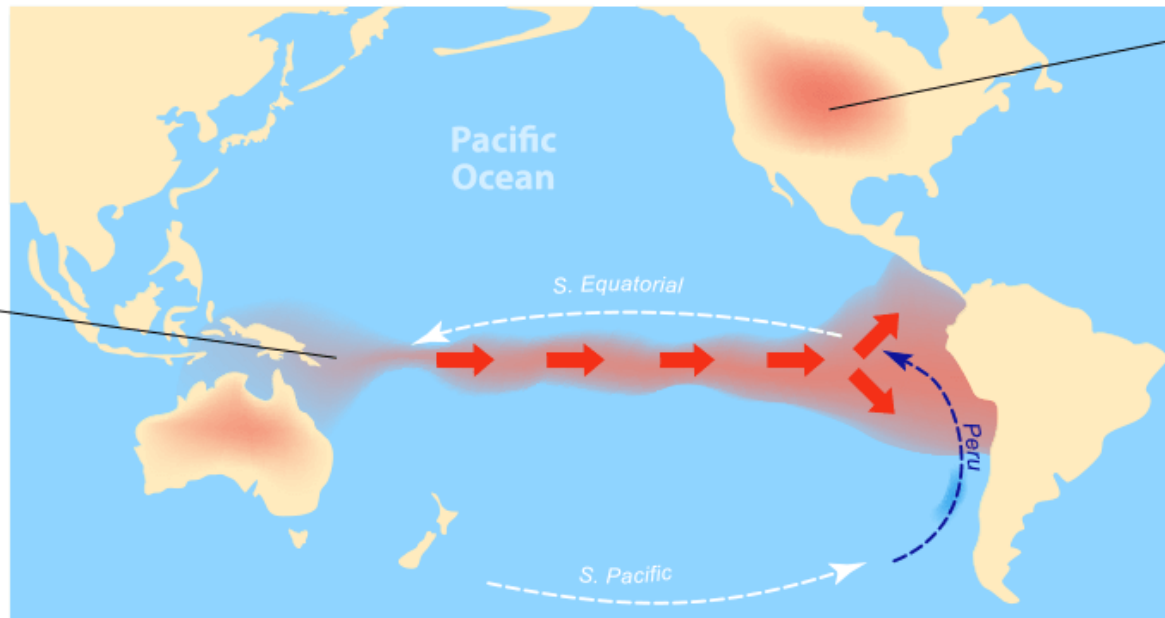
Equatorial winds gather warm water pool toward the west



Cold water along South American coast

EL NIÑO YEAR

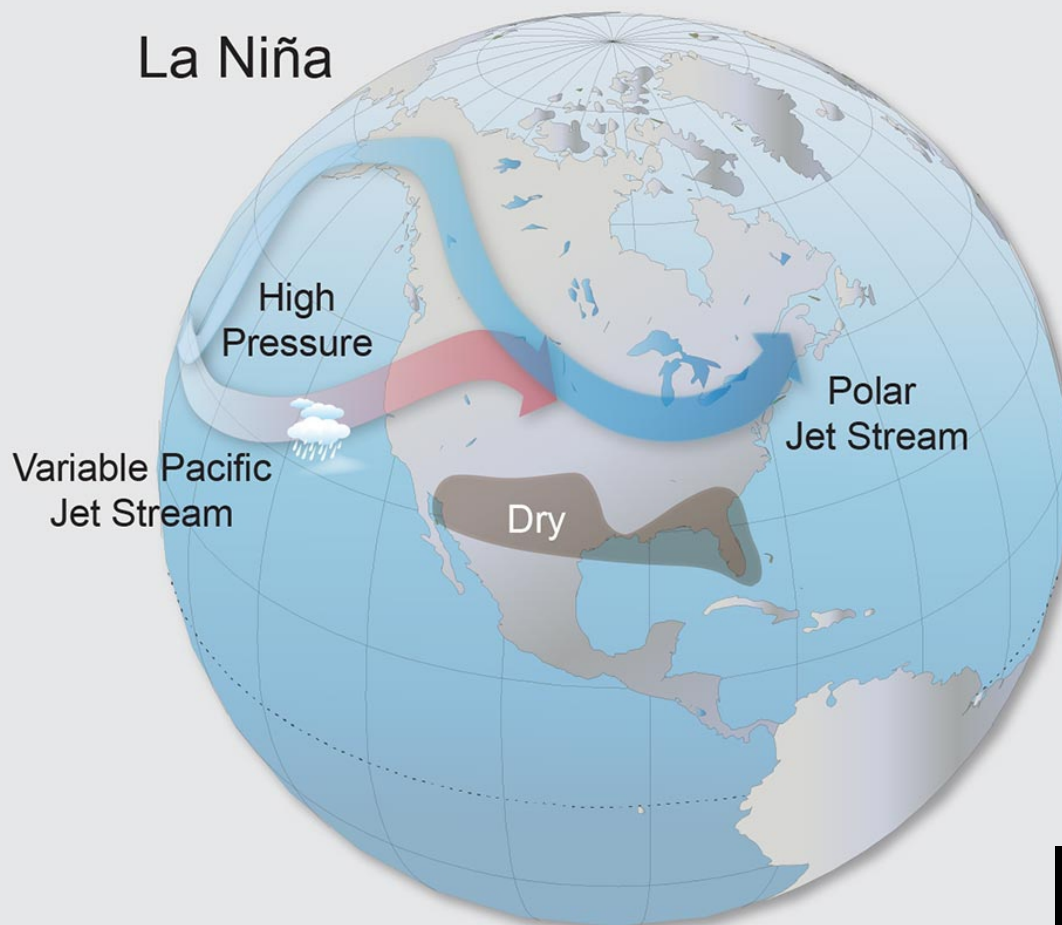
Easterly winds weaken. Warm water to move eastward



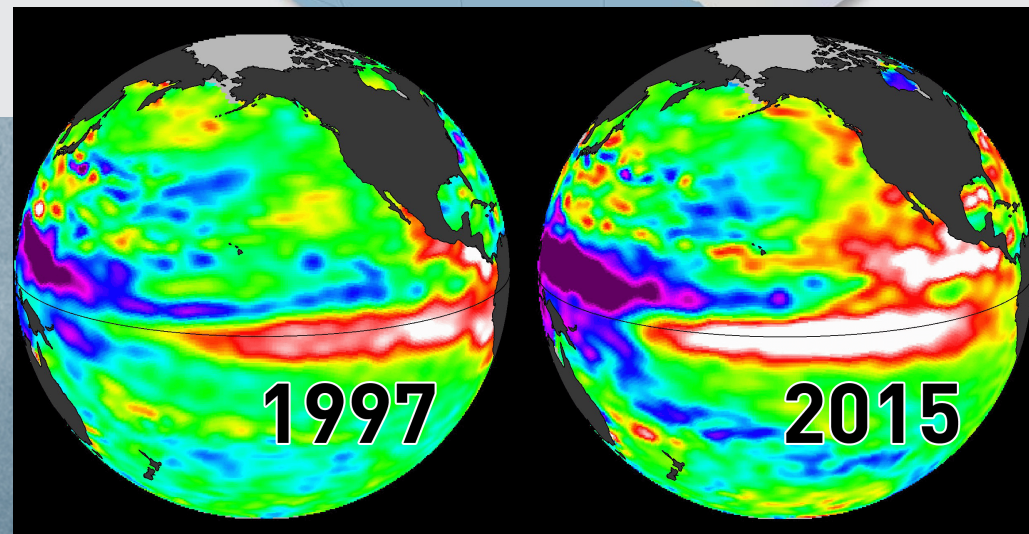
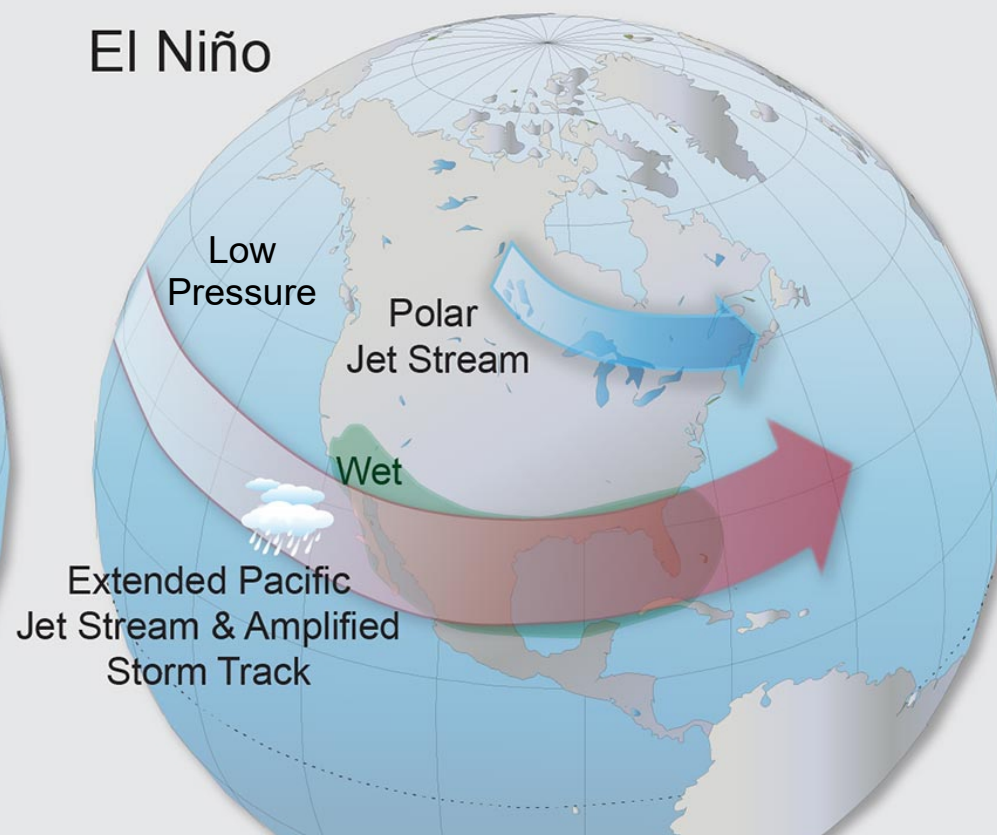
Warmer winter

Cycles Affecting the Jets – ENSO, El Niño, La Niña

La Niña



El Niño



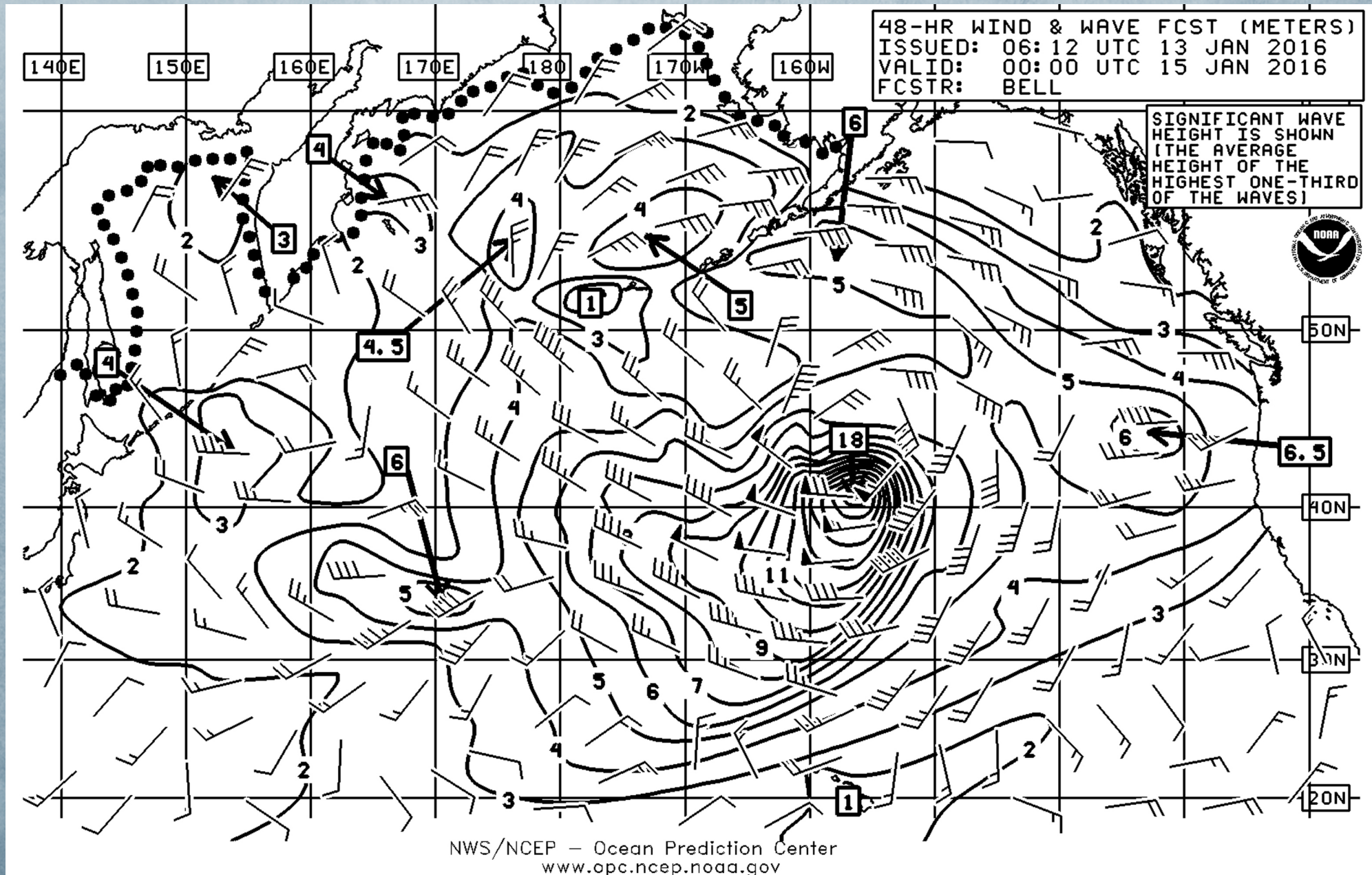
The Biggest Wave (paddled into, Aaron Gold, Jan 2016, Jaws)



The Biggest Wave (paddled into)

Low latitude storm, 18m seas (60'). Normal winter seas 30-35'.

Effect of El Niño



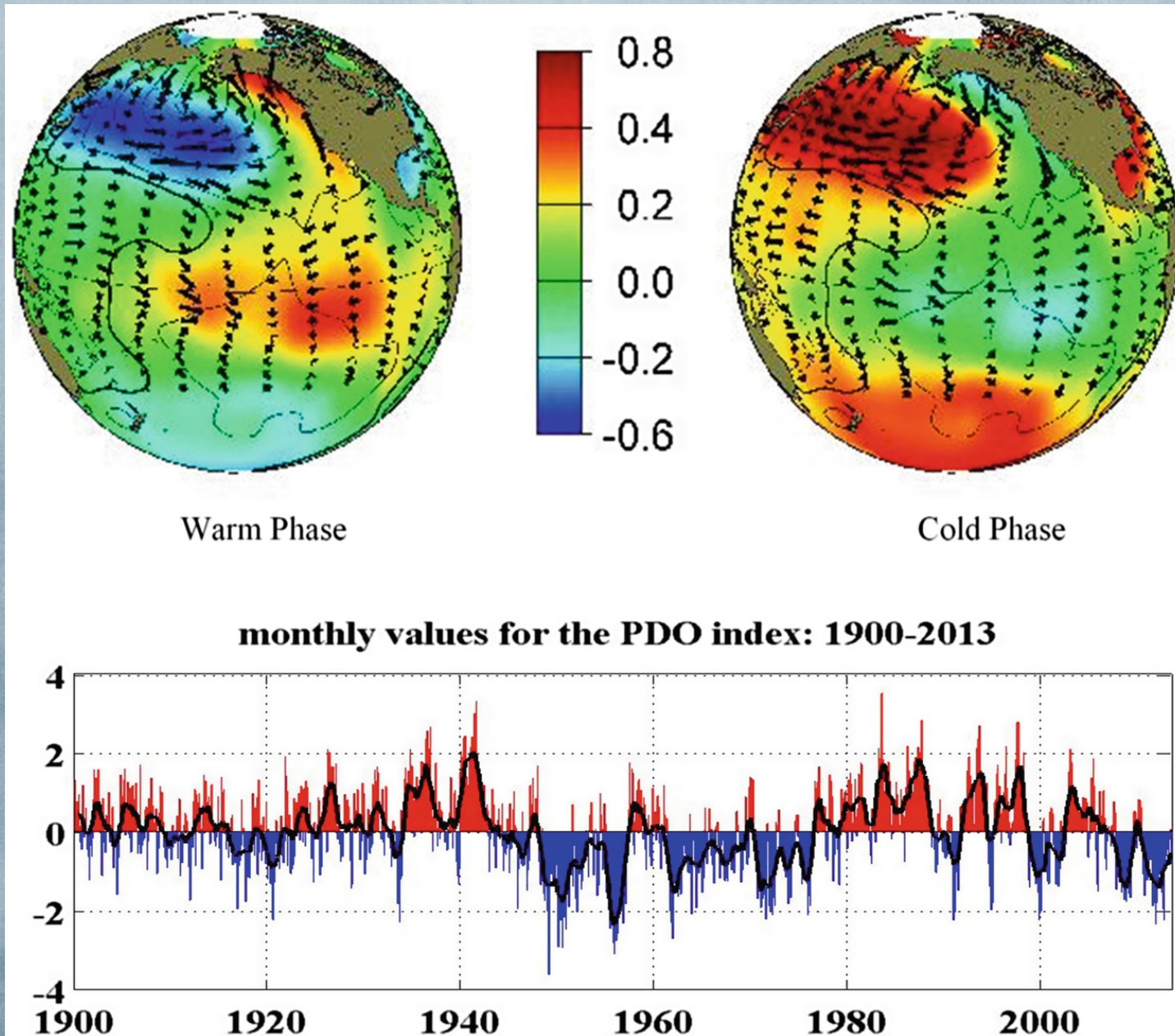
El Niño Effects, West Coast of the U.S.

- Lower latitude jetstream in North Pacific
- Western Pacific storms ride it unabated
- Bigger surf for west coast
- More rain in SoCal
- Subsequent growth from rain

A Bigger Cycle – Decadal Cycles, PDO

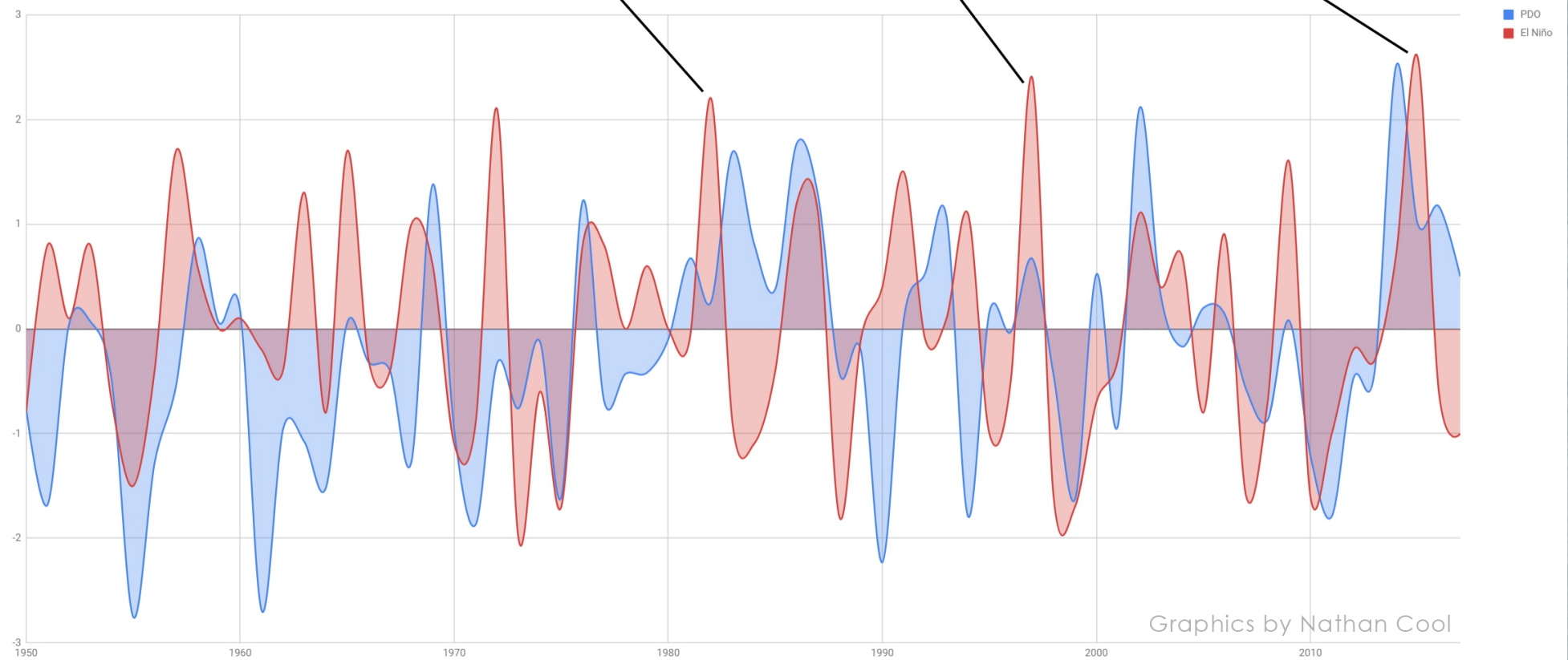
ENSO's cousin

Positive PDO = More Frequent and/or stronger El Niños



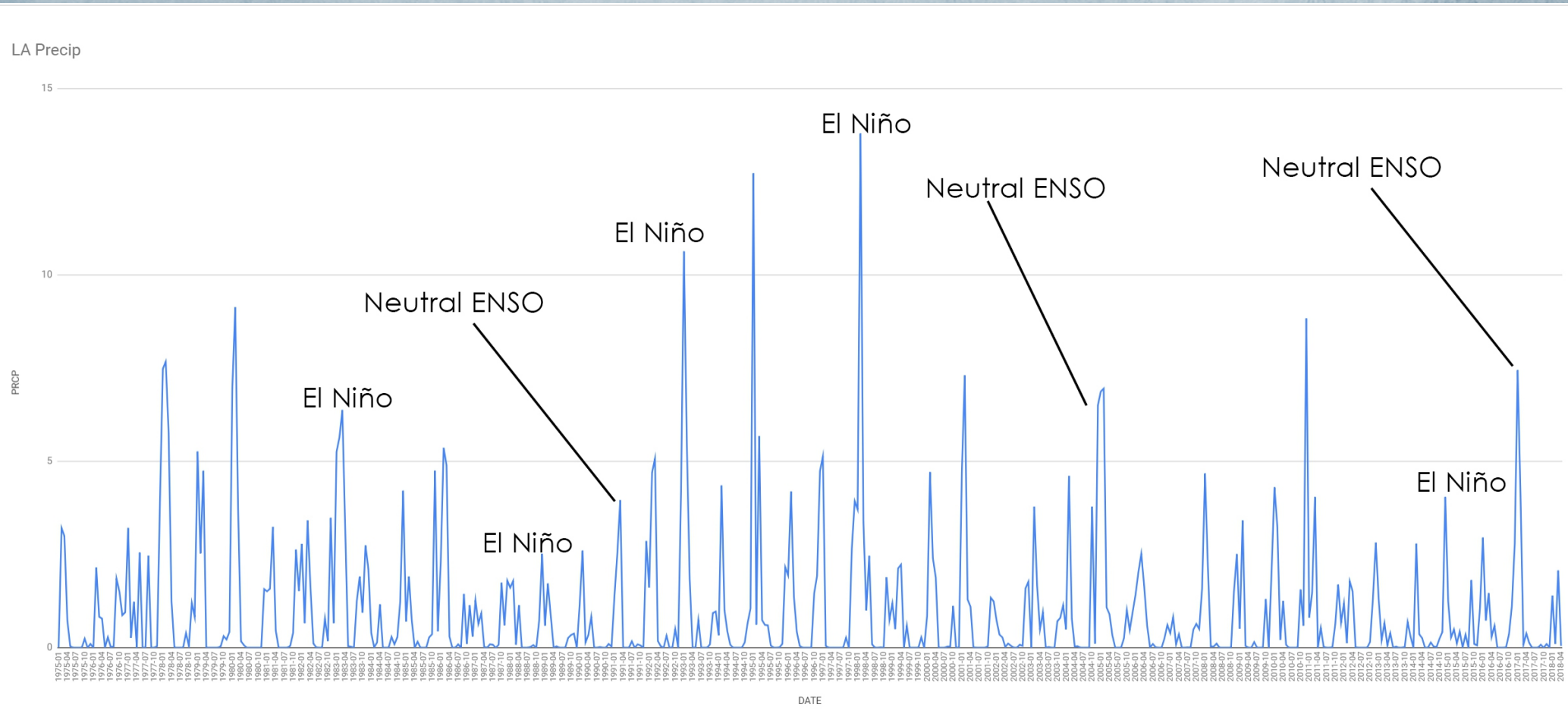
ENSO to PDO Correlation

PDO and El Niño



ENSO and Rainfall in SoCal

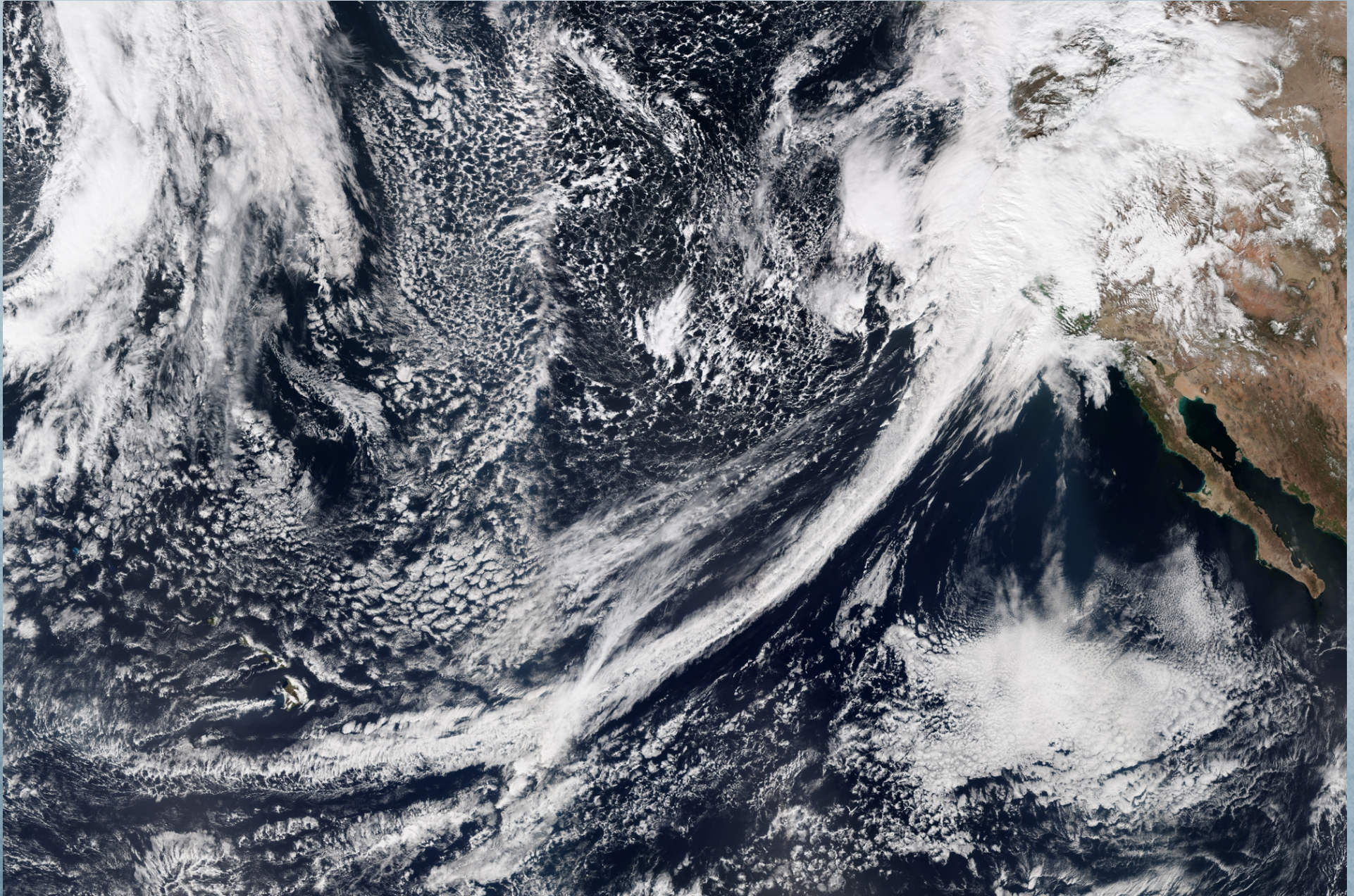
El Niño “often” increases rainfall from the lower latitude jetstream.



The Neutral ENSO – When wet gets wetter

Atmospheric River formation more likely

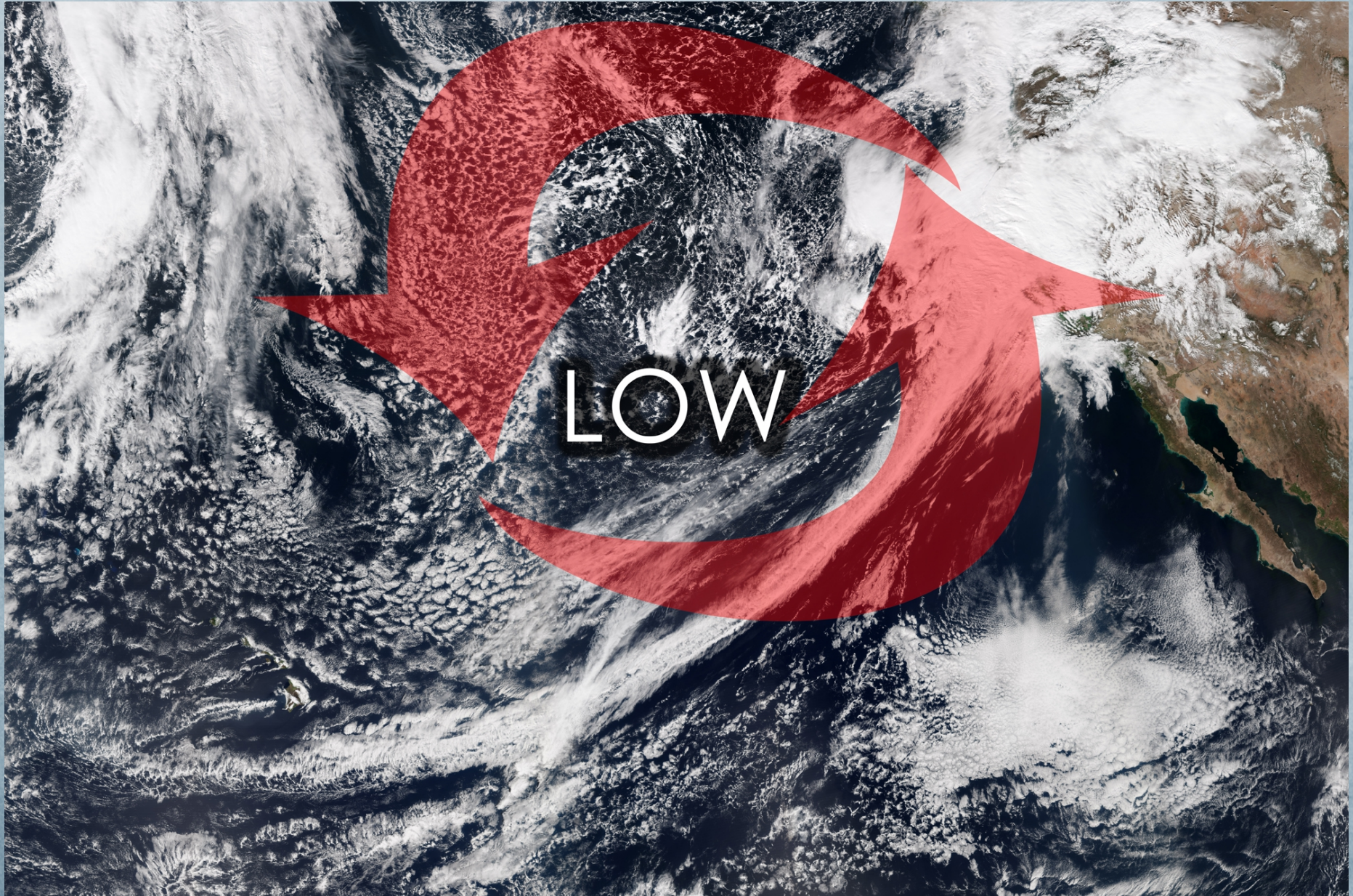
NASA Image, February 20, 2017



The Neutral ENSO – When wet gets wetter

Atmospheric River formation more likely

NASA Image, February 20, 2017

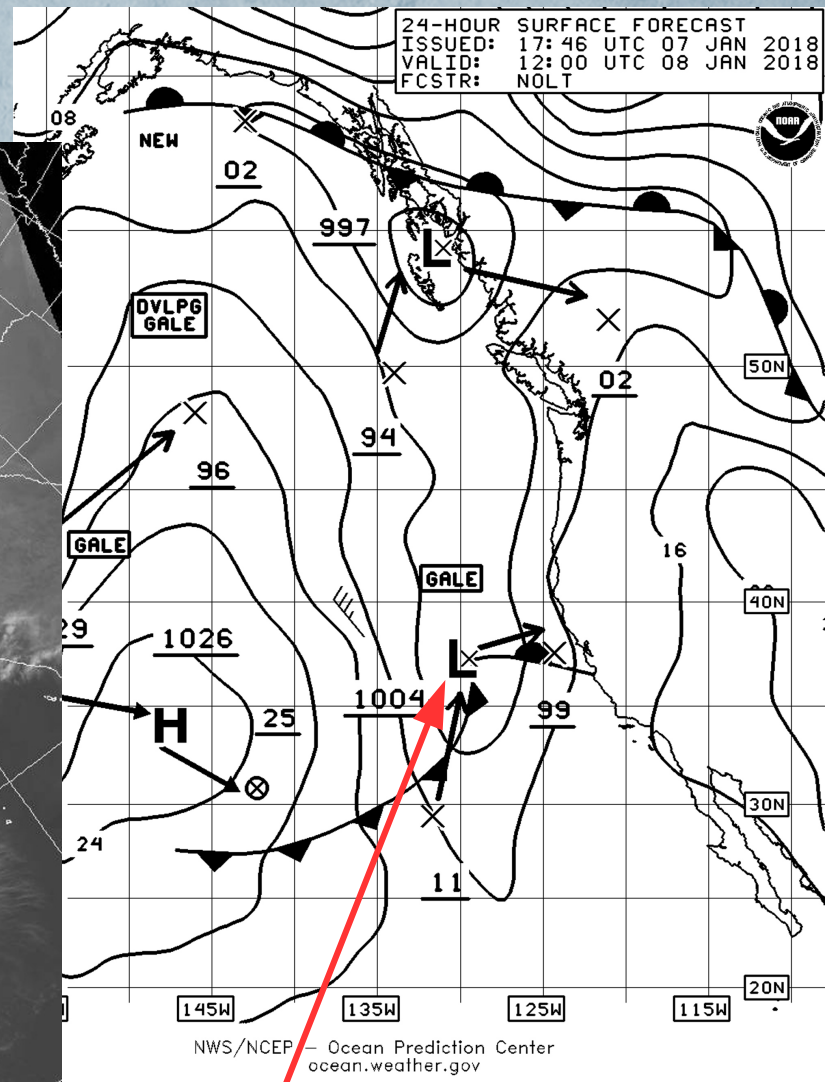
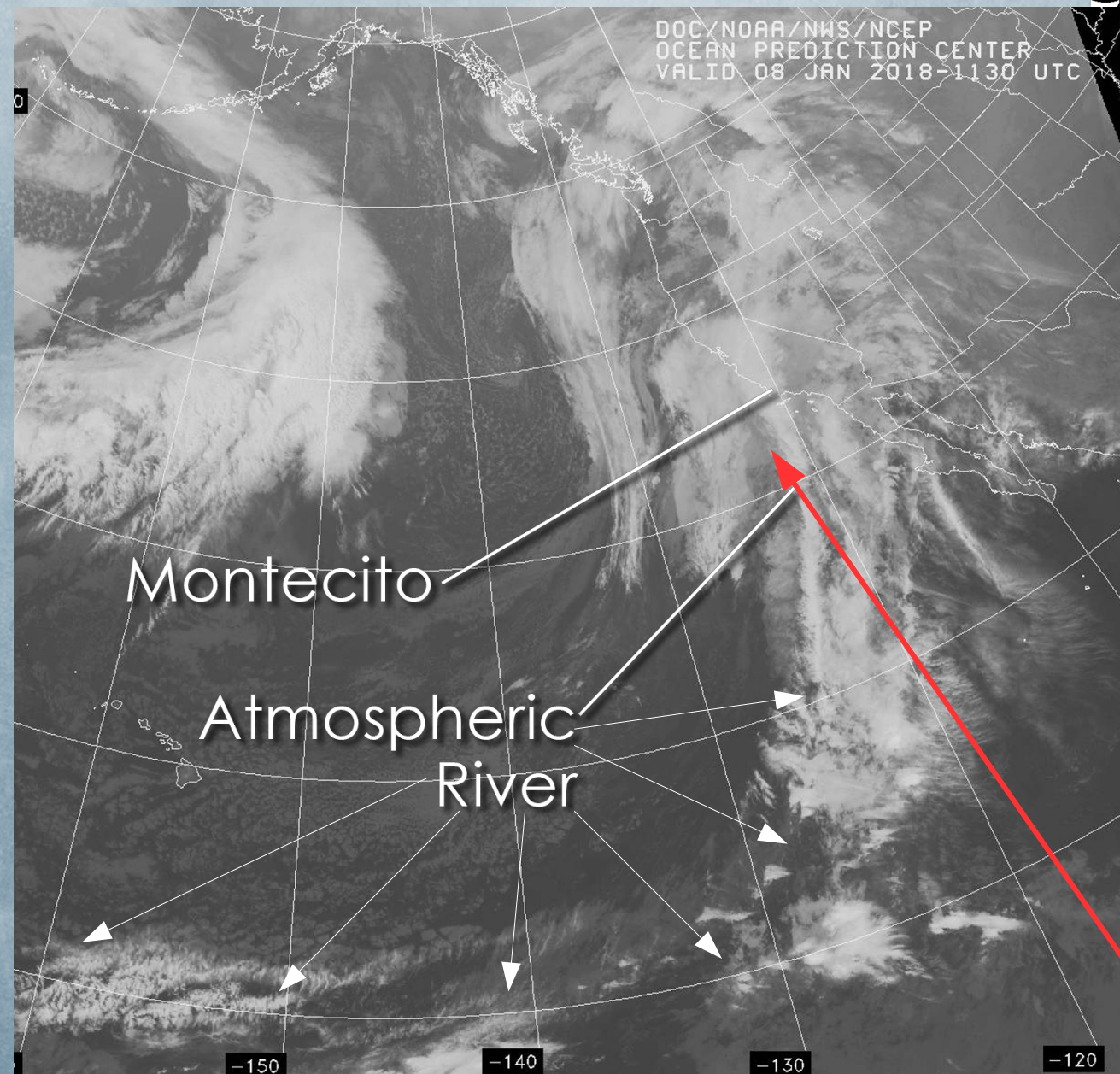


The Neutral ENSO – When wet gets wetter

The “Great Flood” in NorCal 1862 caused during neutral ENSO with ARs
Rained for 40 days, 25” of precip in NorCal



Montecito's Atmospheric River Event



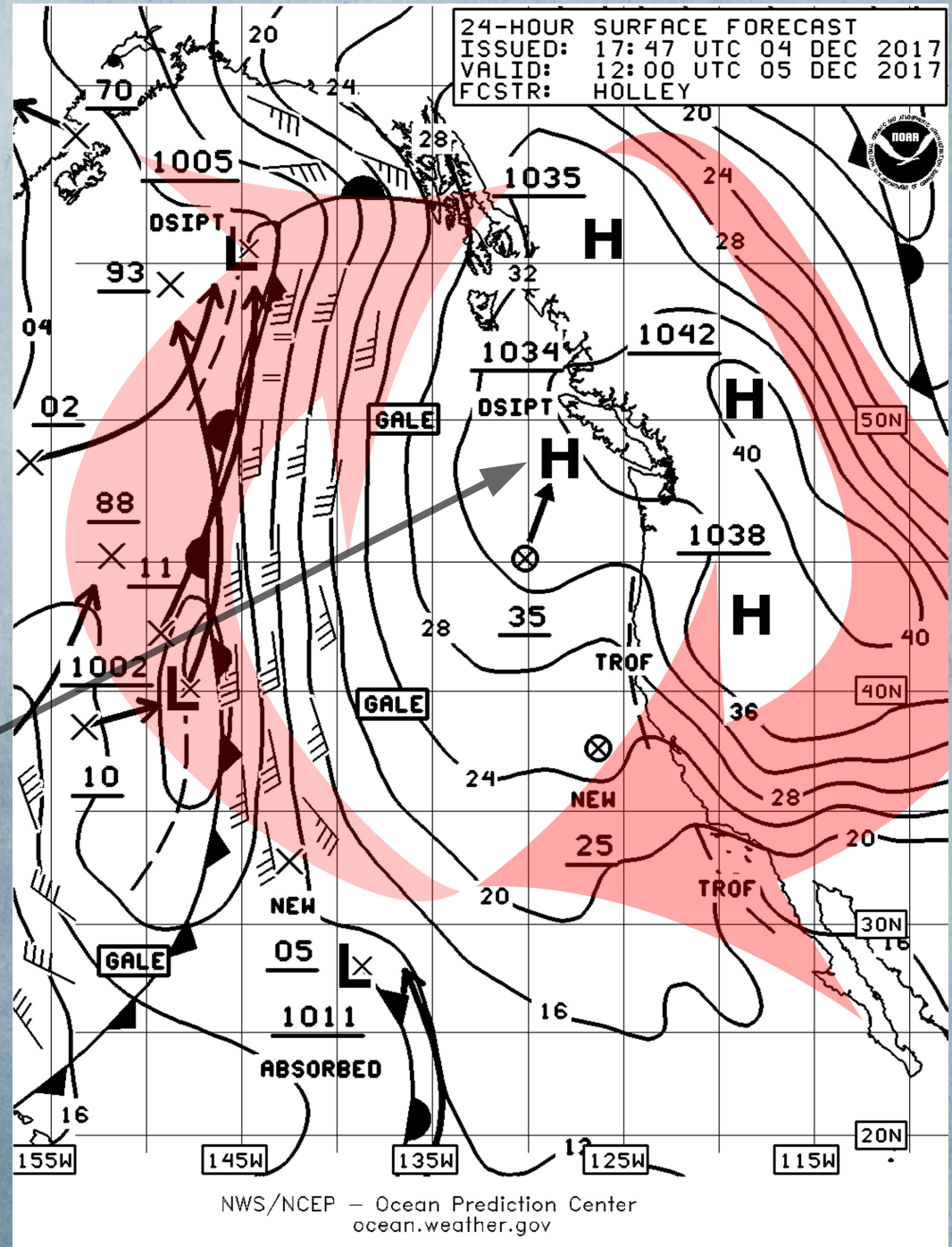
Low Pressure System

After El Niño, La Niña can increase winds

Rain and growth become prime for fire and winds

- Thomas Fire conditions

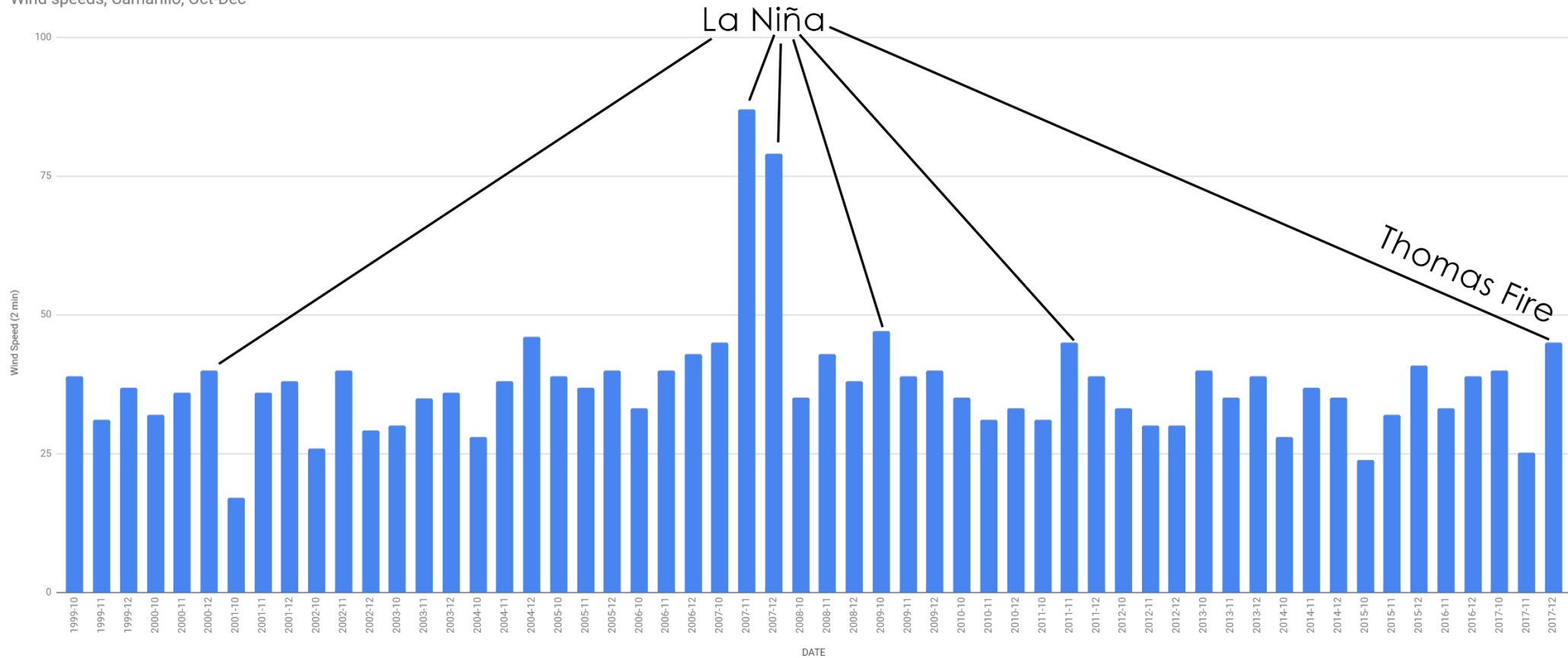
Great Basin High



After El Niño, La Niña can increase winds

Rain and growth becomes prime for fire and winds

Wind speeds, Camarillo, Oct-Dec



Pop Quiz

How many wildfires have burned in California from January 2018 through August 2018?

- A. About 100
- B. About 300
- C. About 600
- D. About 1,000
- E. About 3,000
- F. About 6,000

Pop Quiz

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2018 California Wildfires (so far, through August)

- 6,035 fires
- 1,462,436 acres burned
- \$2.6 billion in damages
- Tree deaths (from climate change) adding fuel
- Growth from recent rains (El Niño and neutral winters)

Wind, natural. But Wildfires?
Sparked mostly from human activity.

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Photographer: Mark Ralston/Getty Images

Markets

Southern California Edison Sued Over Los Angeles-Area Wildfires

By [Robert Burnson](#) and [Mark Chediak](#)

January 9, 2018, 3:56 PM PST

- ▶ Utility may be legally responsible if its lines sparked blazes
- ▶ Shares have suffered since December outbreak of conflagrations

LIVE ON BLOOMBERG

Watch Live TV >

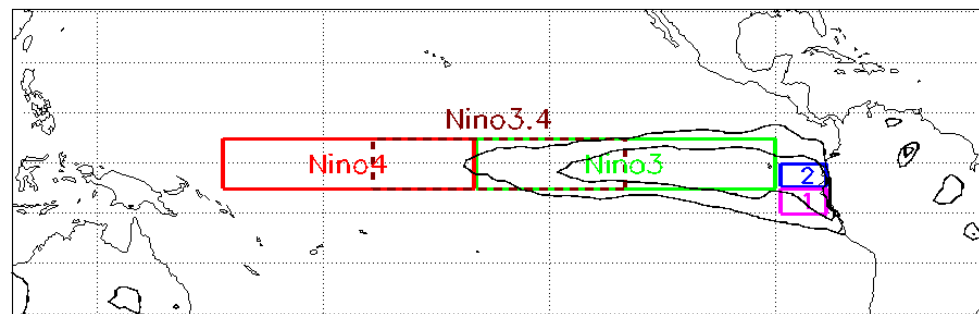
Listen to Live Radio >



What lies ahead?

El Niño Returns

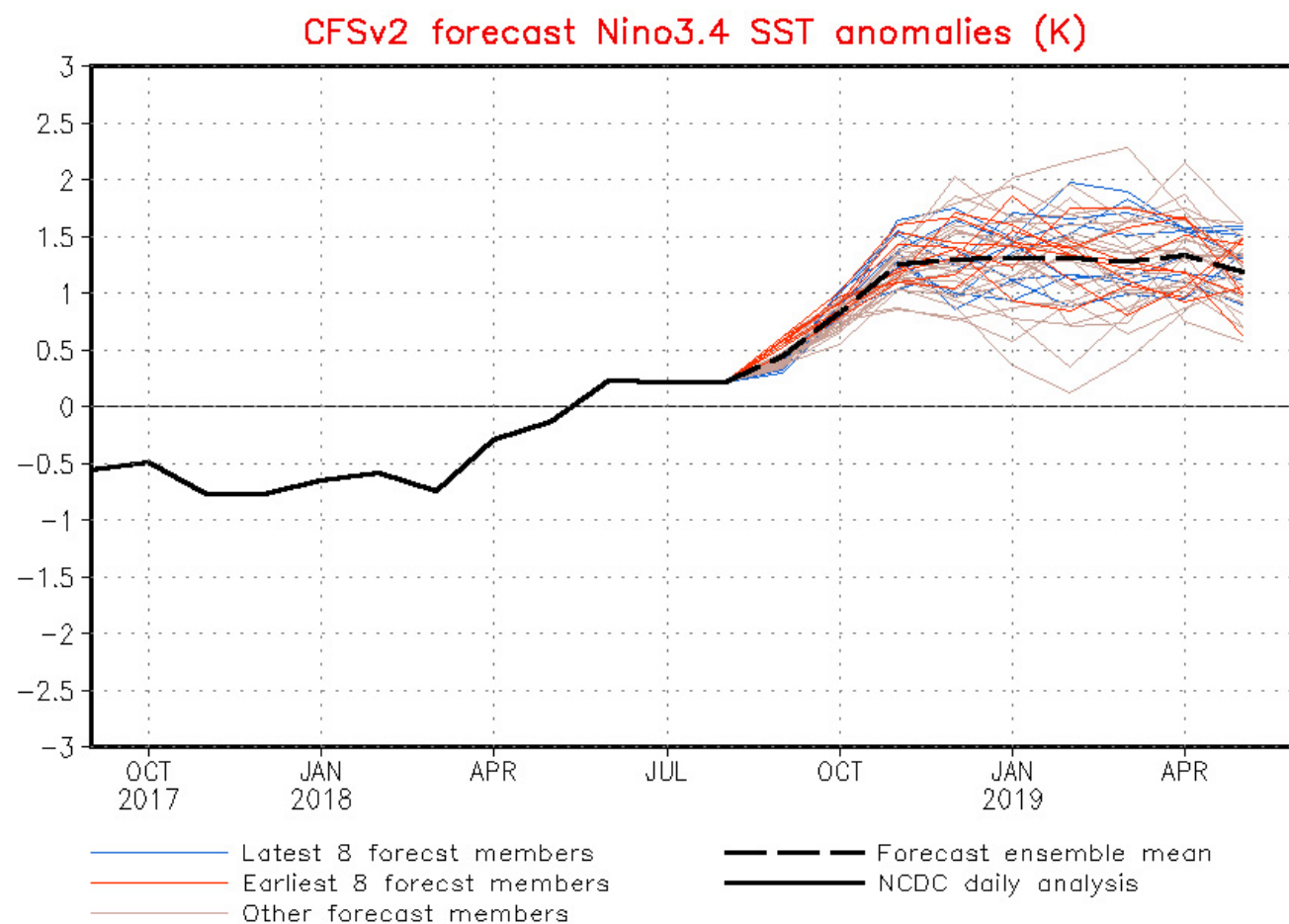
PDO remains neutral to positive



NWS/NCEP/CPC

Last update: Sun Sep 9 2018
Initial conditions: 30Aug2018–8Sep2018

- 2018-19 = 1.4°C
- 2015-16 = 2.6°C
- 1997-98 = 2.4°C



What lies ahead?

El Niño Returns

PDO remains neutral to positive

- Lower-latitude storms likely.
- Bigger surf likely for west coast.
- Higher than normal rain chance.
- Mudslide potential increases.
 - More burned areas to slide

Thank You!

SURF FLOOD FIRE & MUD

*How the strongest El Niño ever
led to years of extremes,
and what this means going forward.*

NATHAN COOL

