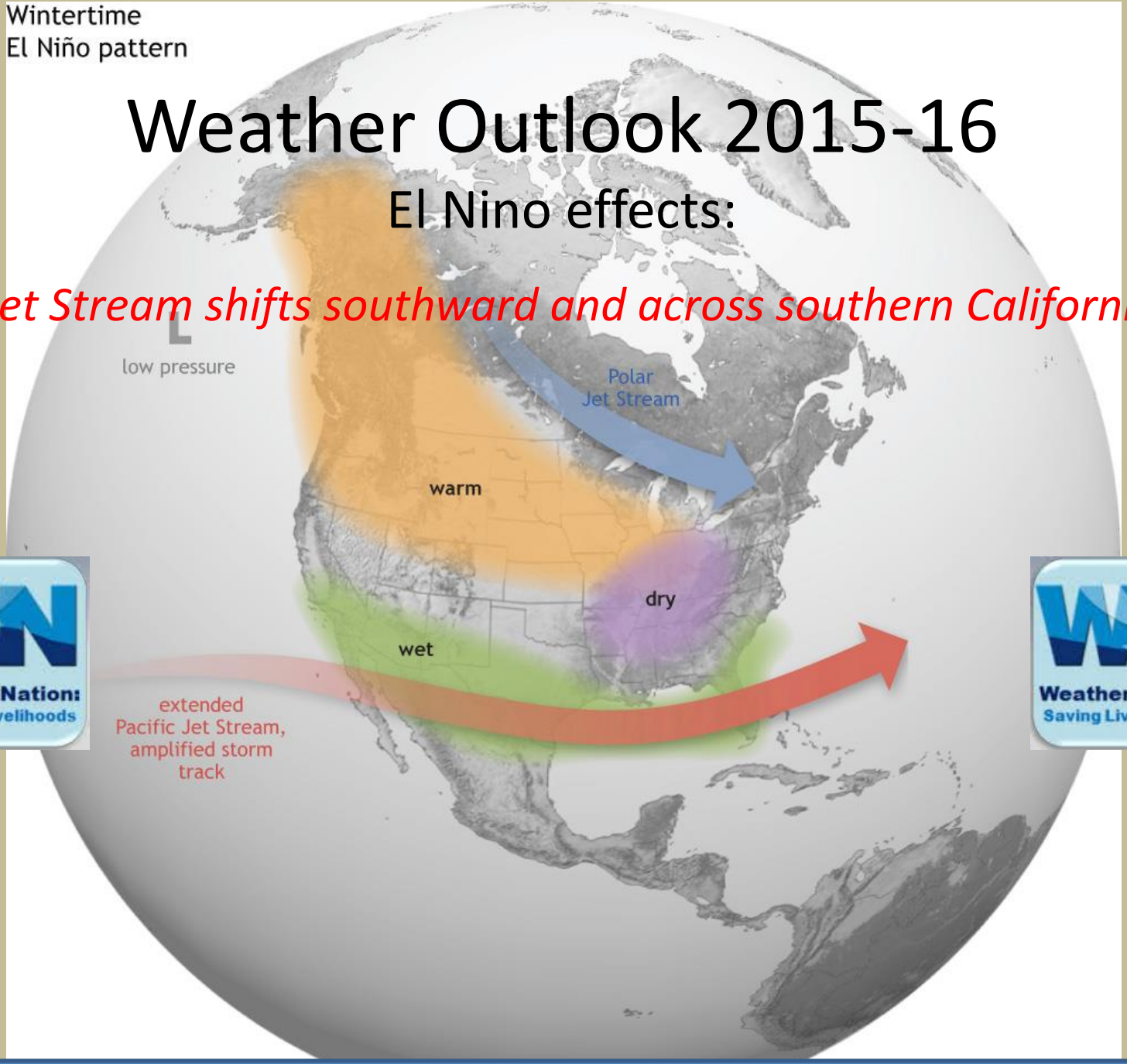
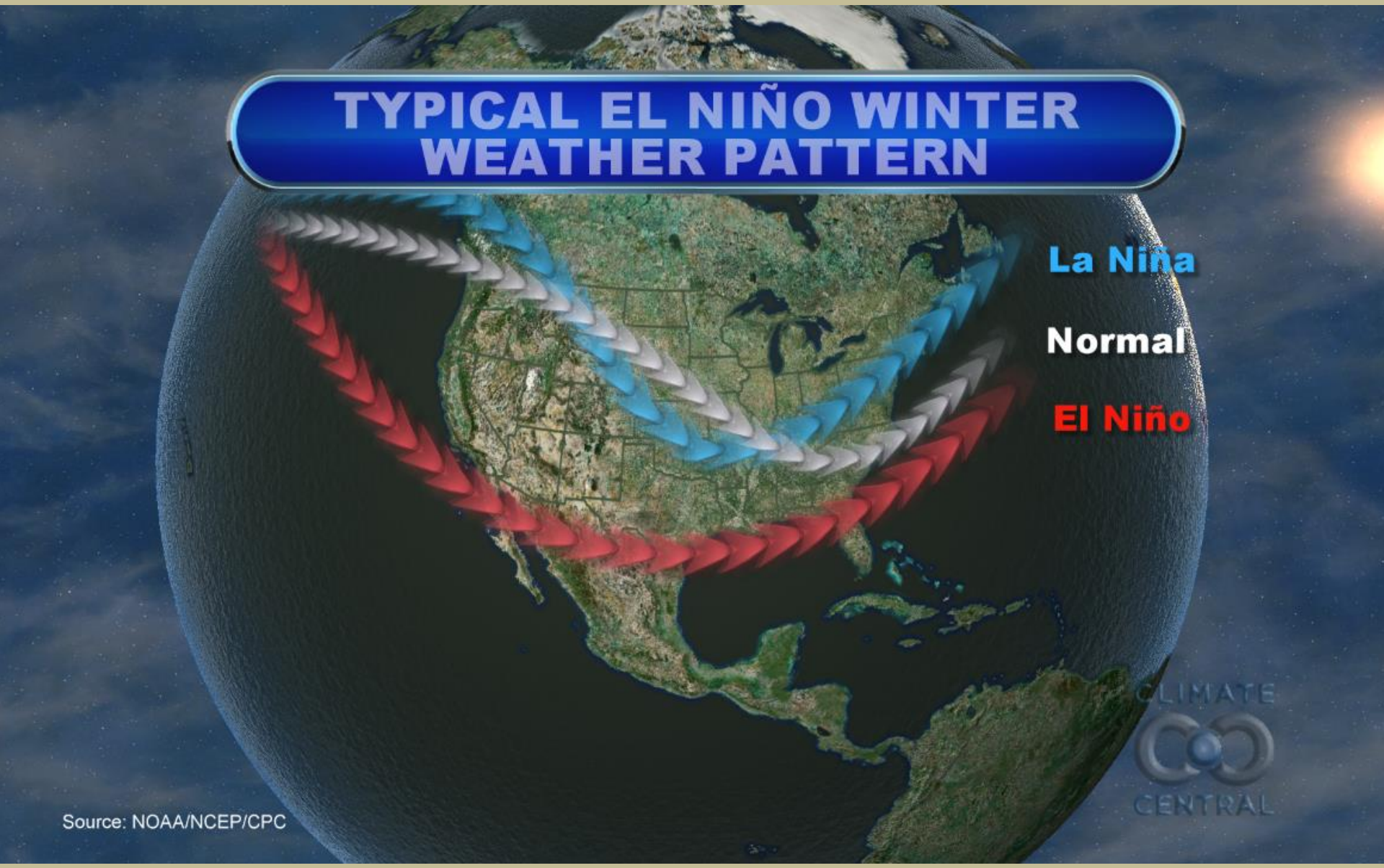
Weather Outlook 2015-16

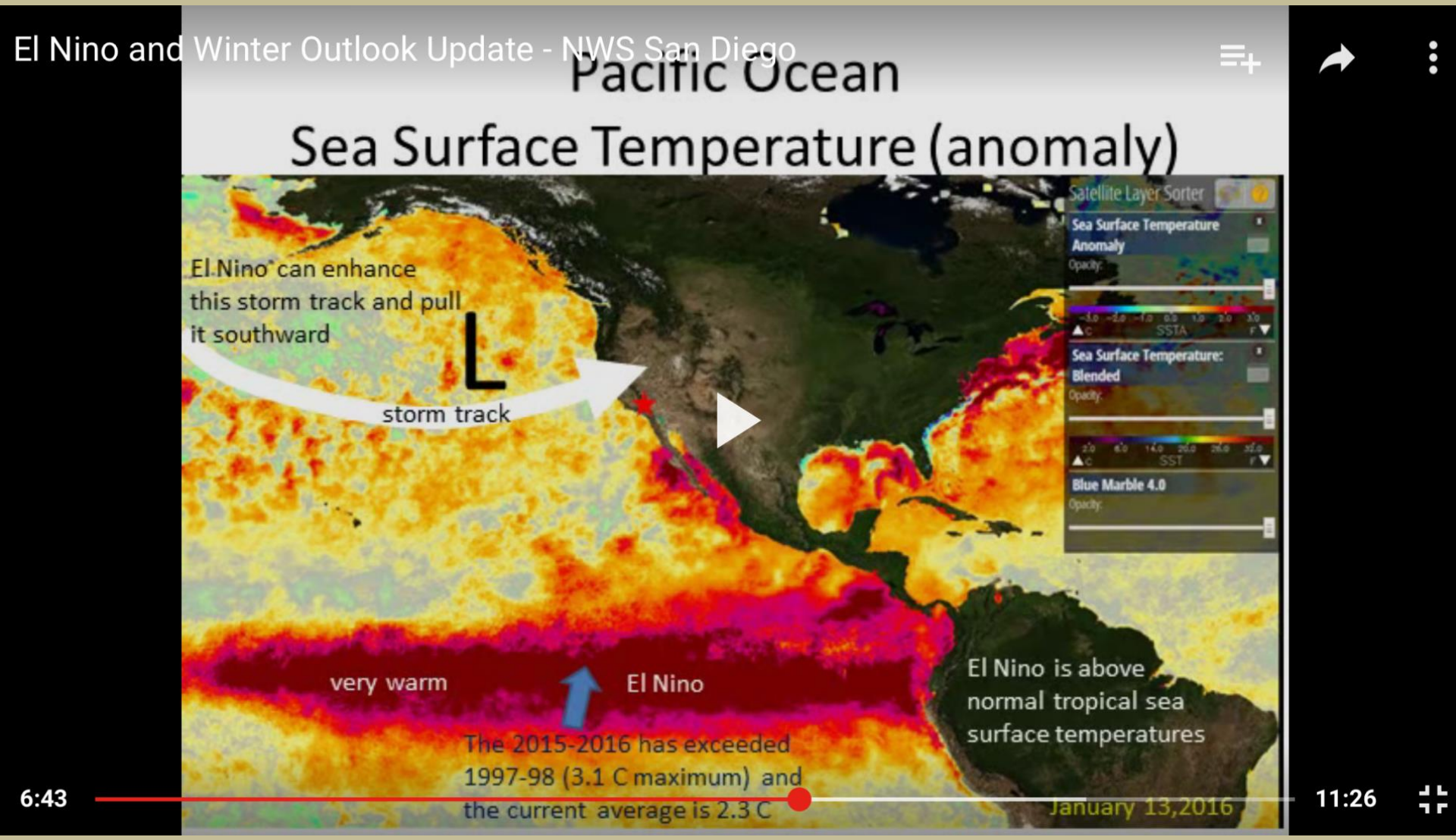
El Nino effects:

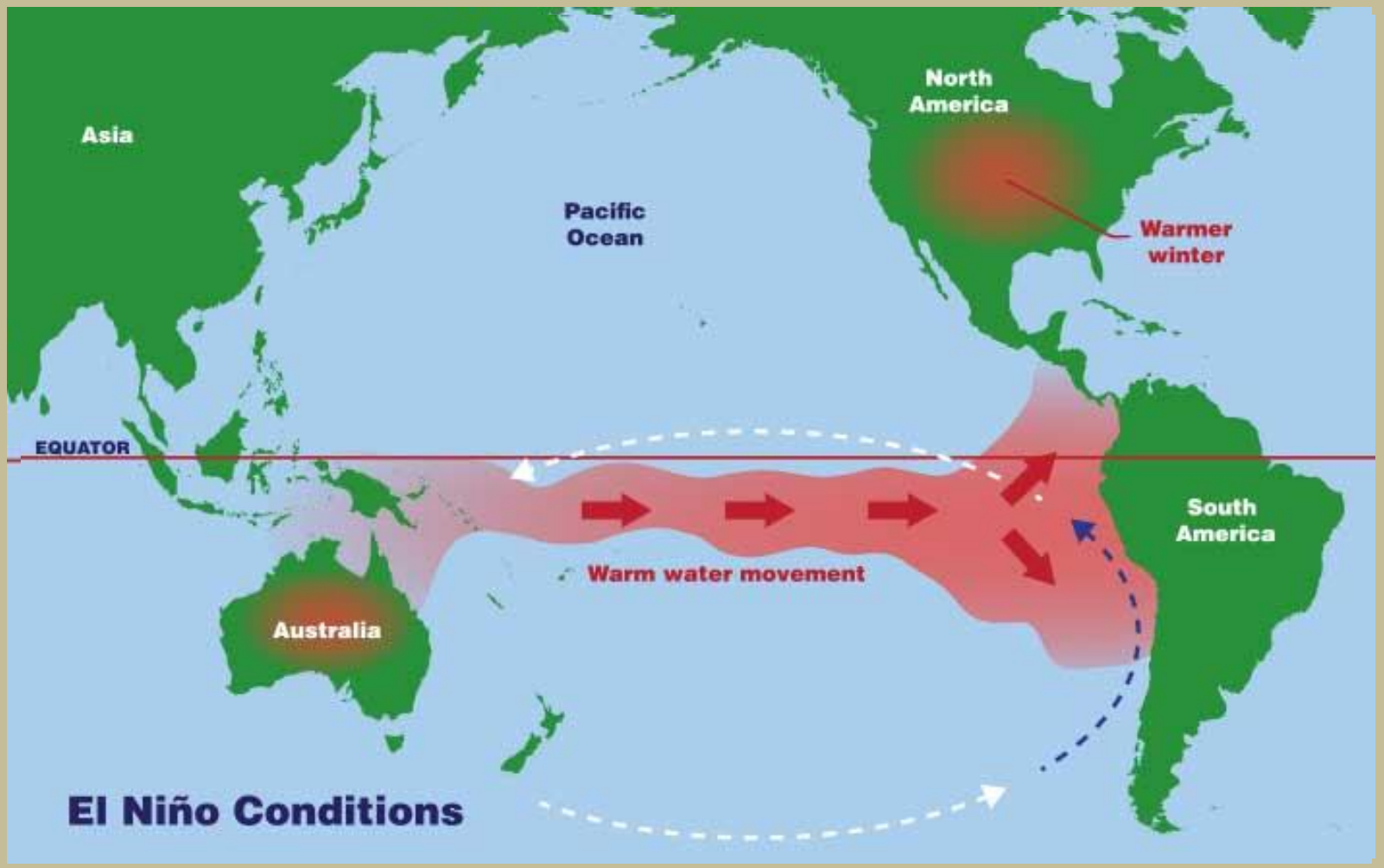
Jet Stream shifts southward and across southern California



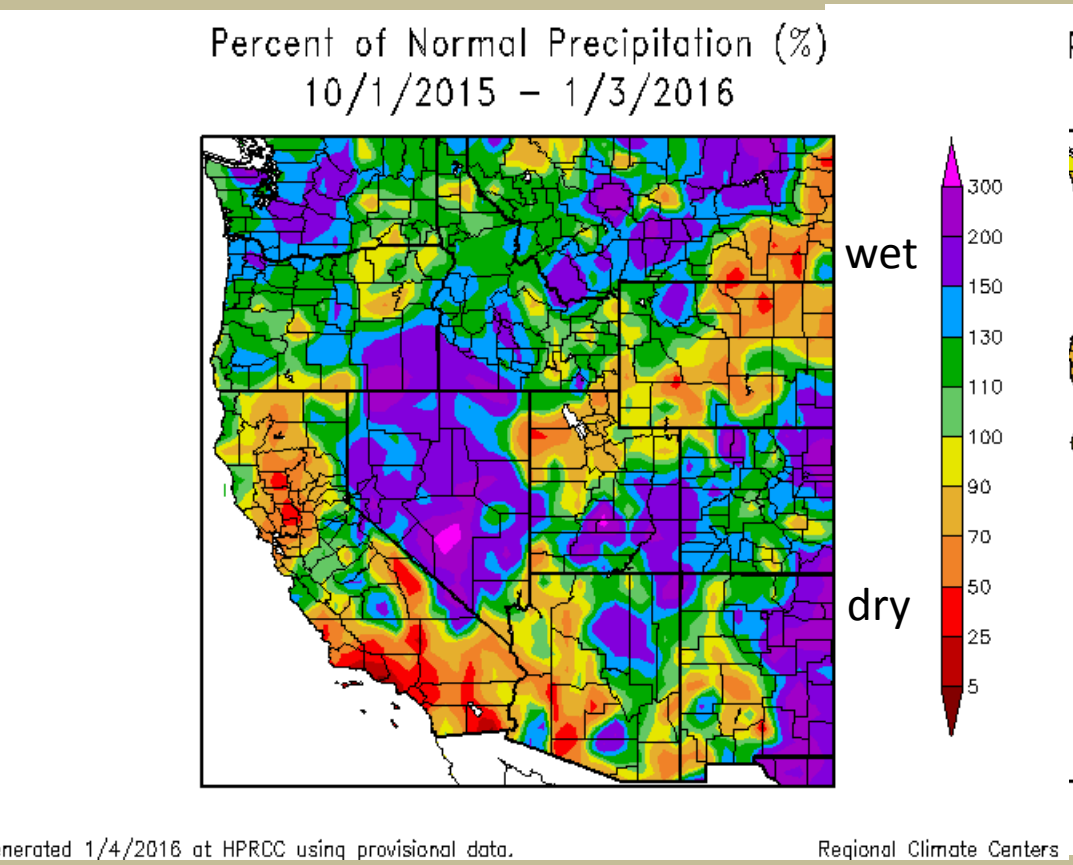
How the jet stream changes

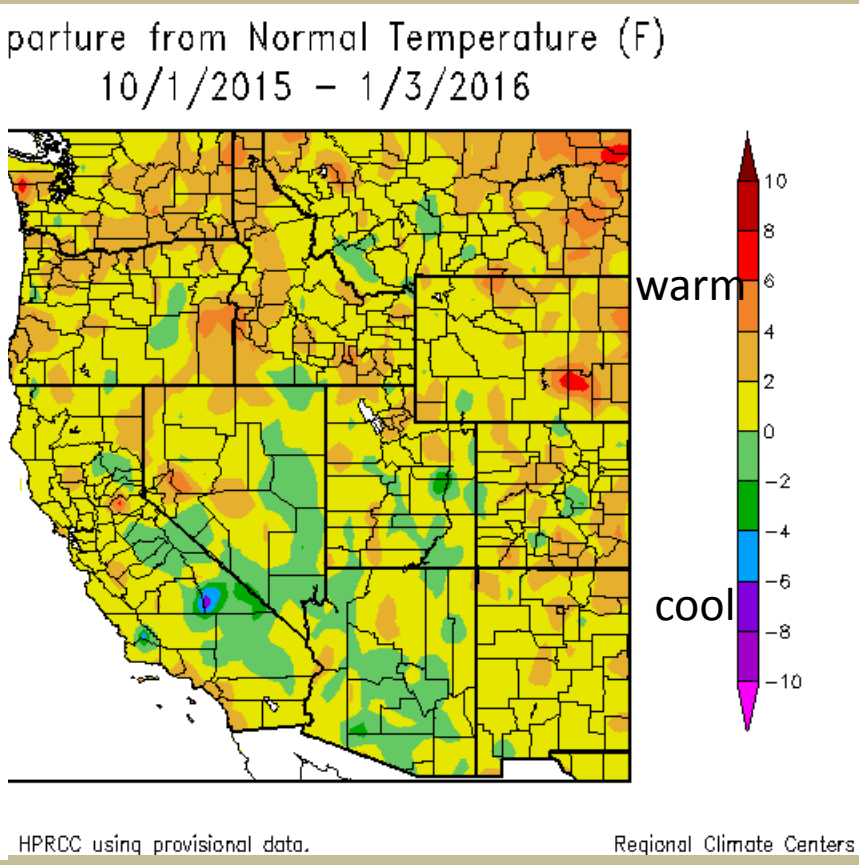



El Nino and Winter Outlook Update - NWS San Diego
Pacific Ocean
Sea Surface Temperature (anomaly)
El Nino can enhance this storm track and pull it southward
L
storm track
very warm
El Nino
The 2015-2016 has exceeded 1997-98 (3.1 C maximum) and the current average is 2.3 C
El Nino is above normal tropical sea surface temperatures
January 13,2016
Satellite Layer Sorter
Sea Surface Temperature Anomaly
Sea Surface Temperature: Blended
Blue Marble 4.0
6:43
11:26

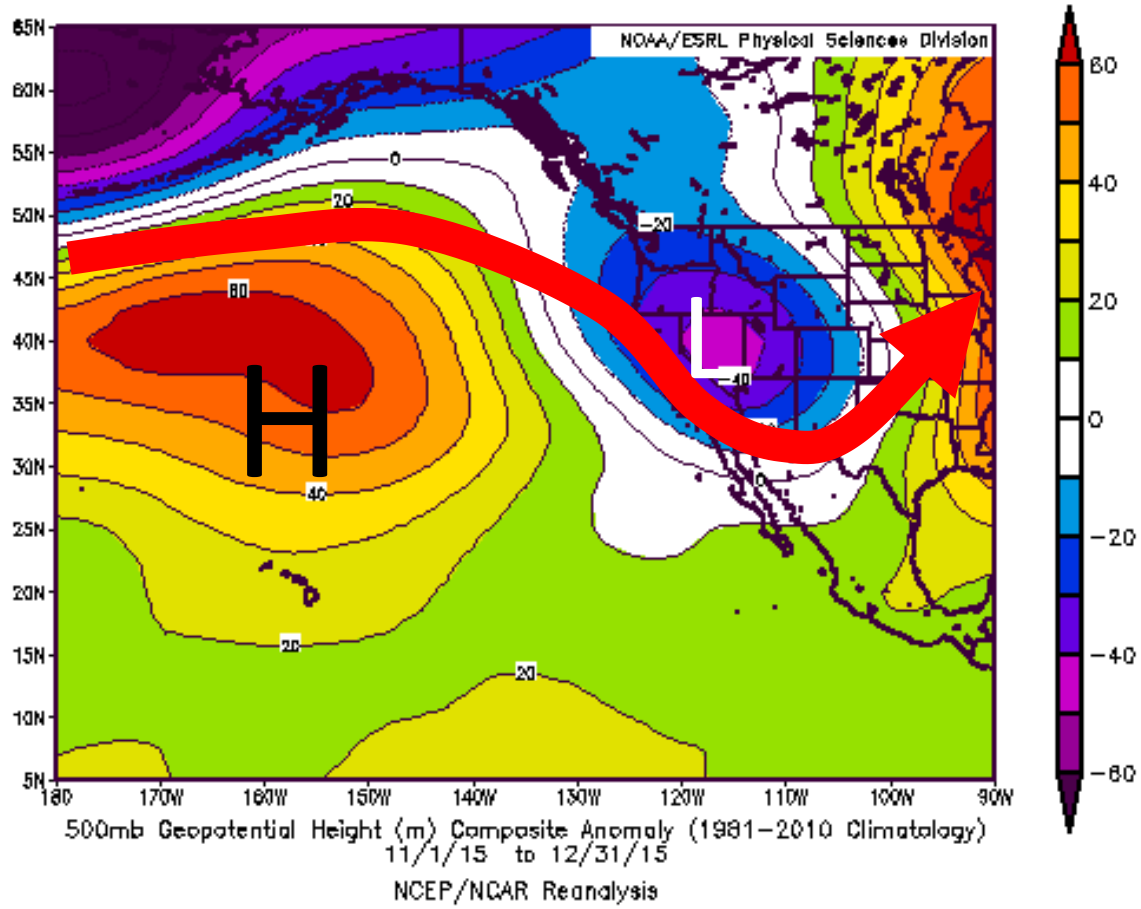

Asia
North America
Pacific Ocean
Warmer winter
EQUATOR
South America
Warm water movement
Australia
El Niño Conditions

Winter 2015-16 so far



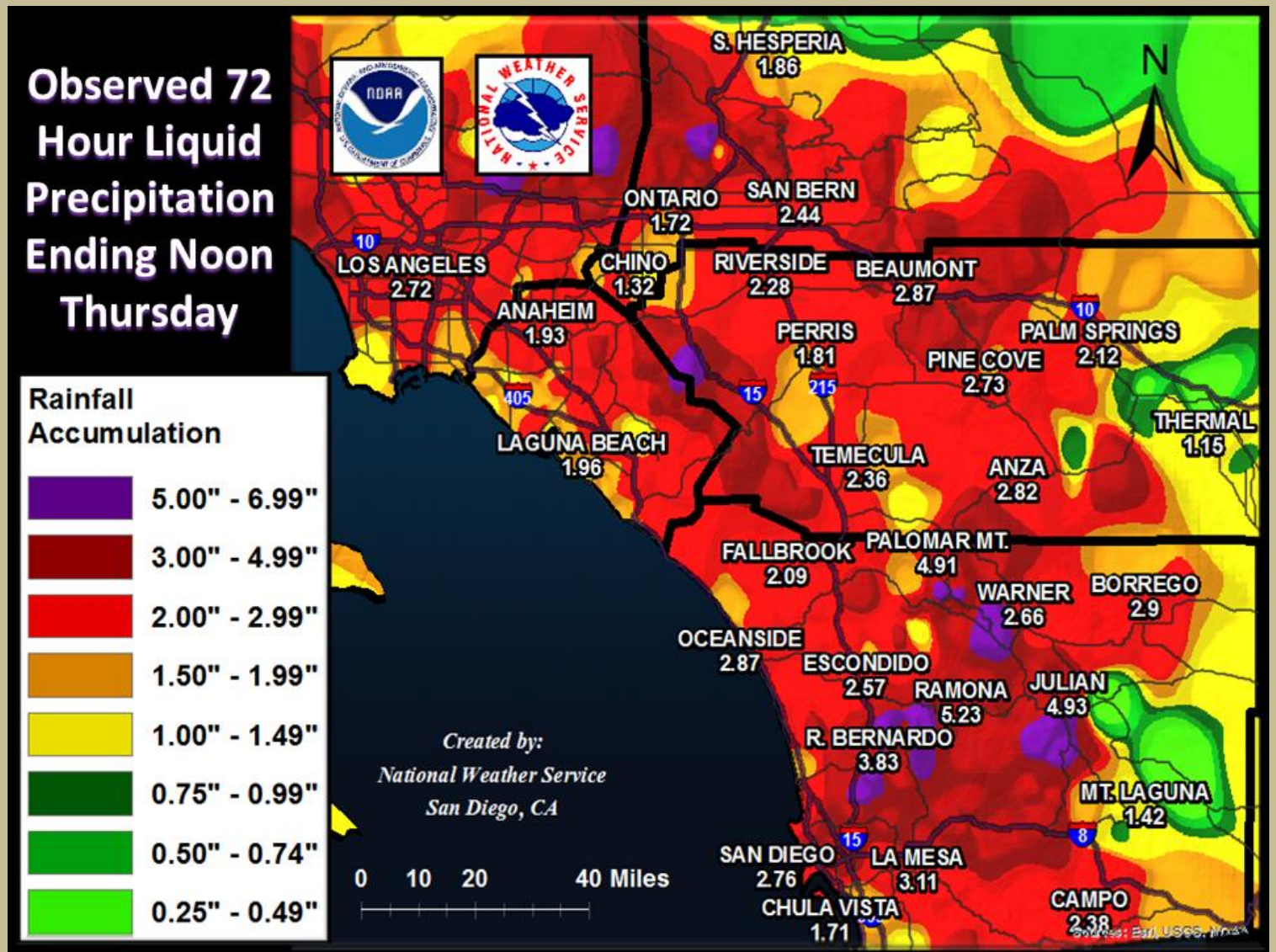


Weather Pattern
November and December 2015

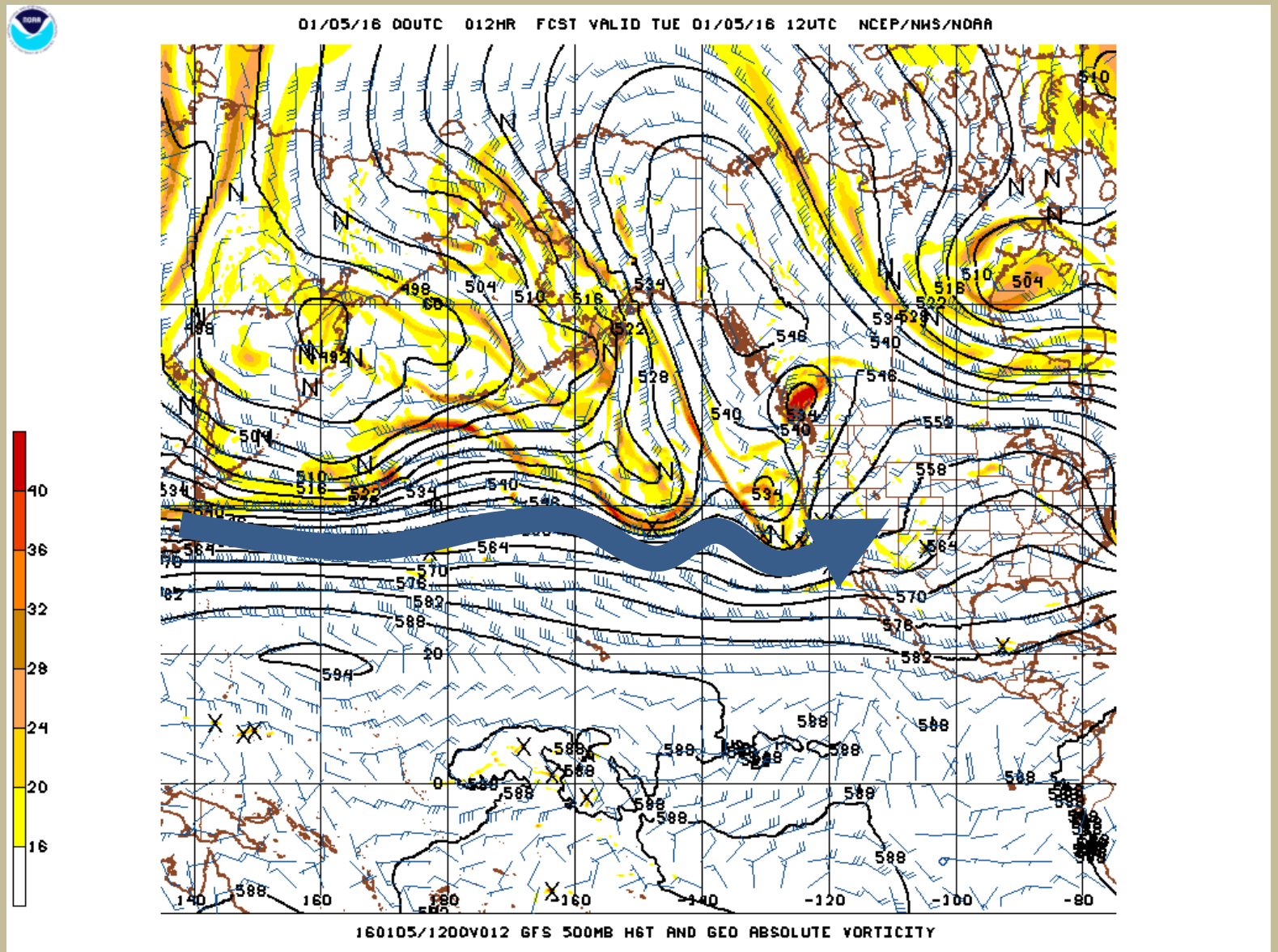


Series of Pacific storms January 4-8, 2016

bring high impact – first Socal "El Nino pattern"



The Weather Pattern



Vista tree and home damage

Sabre Springs Poway Road damage

Tuesday

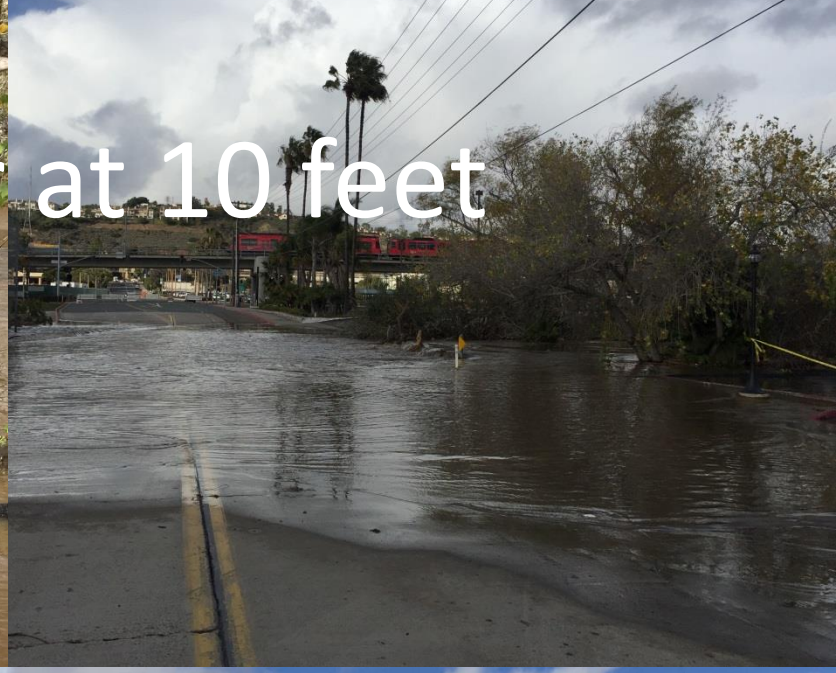
LOTS OF RAIN IN SMALL AMOUNT OF TIME LEADS TO FLOODING
10:01

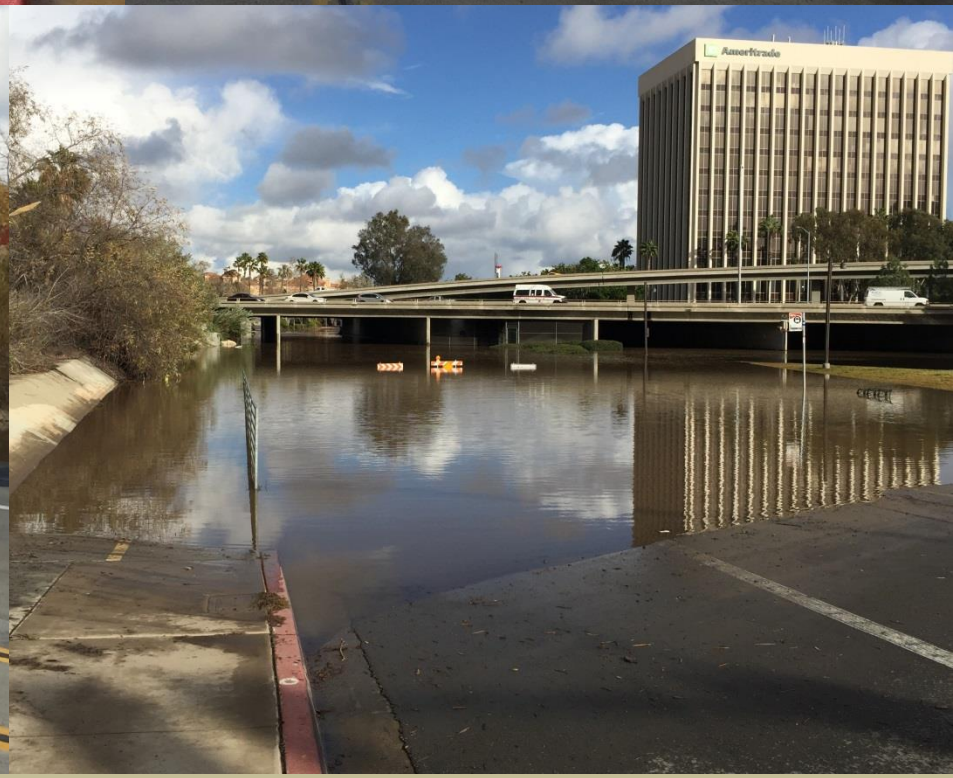
LOTS OF RAIN IN SMALL AMOUNT OF TIME LEADS TO FLOODING

LOTS OF RAIN IN SMALL AMOUNT OF TIME LEADS TO FLOODING
DOZENS OF RESCUES ACROSS COUNTY THIS AFTERNOON/EVENING
10:02

DEVELOPING STORY
WEST COAST SUPER SOAKER
FLOODING TRIGGERS DANGEROUS MUDSLIDES IN CA
125 NORTH BOUND AT 125 NB CONNECTOR - 5 MPH
125 NORTH BOUND
7:06 | 54°

San Diego River at 10 feet





Water Levels

The City of San Diego's Water Levels are updated weekly, January 4, 2016.

Due to web software updates, the next update will not be until the end of Janauary 2016.

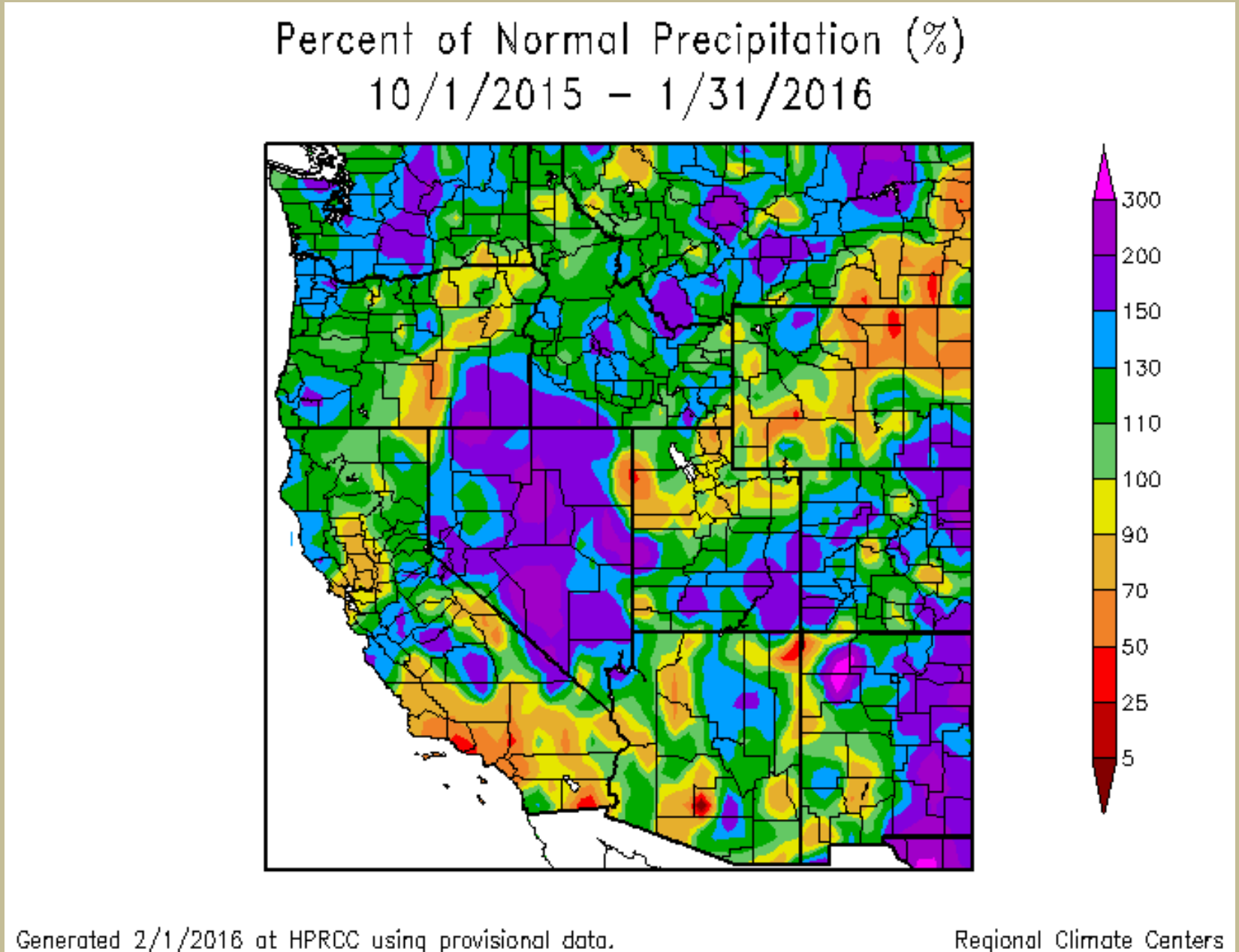
Reservoir	Depth When Full	Current Depth	Storage Capacity	Current Storage	Percent Full
Barrett	160.88 ft	73.96 ft	34,805.5	1,818.1	5.2
El Capitan	197.00 ft	122.00 ft	112,806.9	30,110.3	26.7
Hodges	115.00 ft	91.20 ft	30,632.6	11,108.8	36.3
Miramar	114.00 ft	106.30 ft	6,682.4	5,506.9	82.4
Morena	157.00 ft	78.50 ft	50,694.0	1,301.8	2.6
Murray	95.00 ft	91.90 ft	4,684.2	4,183.4	89.3
Lower Otay	127.10 ft	126.90 ft	49,848.9	36,970.5	74.2
San Vicente	306.00 ft	241.76 ft	249,358.0	152,843.7	61.3
Sutherland	145.00 ft	61.16 ft	29,508.1	2,183.4	7.4

San Diego County Water Authority	Olivenhain	24,789	21,991	1,065.2	88.7%	1,206
San Diego, City of	Barrett	34,806	2,021	1,521.9	5.8%	(2,076)
San Diego, City of	El Capitan	112,807	30,970	676.2	27.5%	(1,498)
San Diego, City of	Hodges	30,633	12,367	293.4	40.4%	388
San Diego, City of	Lower Otay	49,849	37,333	474.5	74.9%	3,414
San Diego, City of	Miramar	6,682	5,521	706.4	82.6%	56
San Diego, City of	Morena	50,694	1,329	2,961.2	2.6%	(301)
San Diego, City of	Murray	4,684	4,075	532.7	87.0%	(62)
San Diego, City of	San Vicente	249,358	160,566	707.5	64.4%	73,085
San Diego, City of	Sutherland	29,508	2,328	1,974.3	7.9%	(204)
San Dieguito W.D.	San Dieguito	883	372	243.0	42.1%	0
Sweetwater Authority	Loveland	25,400	7,525	1,297.0	29.6%	(226)
Sweetwater Authority	Sweetwater	28,079	3,429	196.6	12.2%	(135)

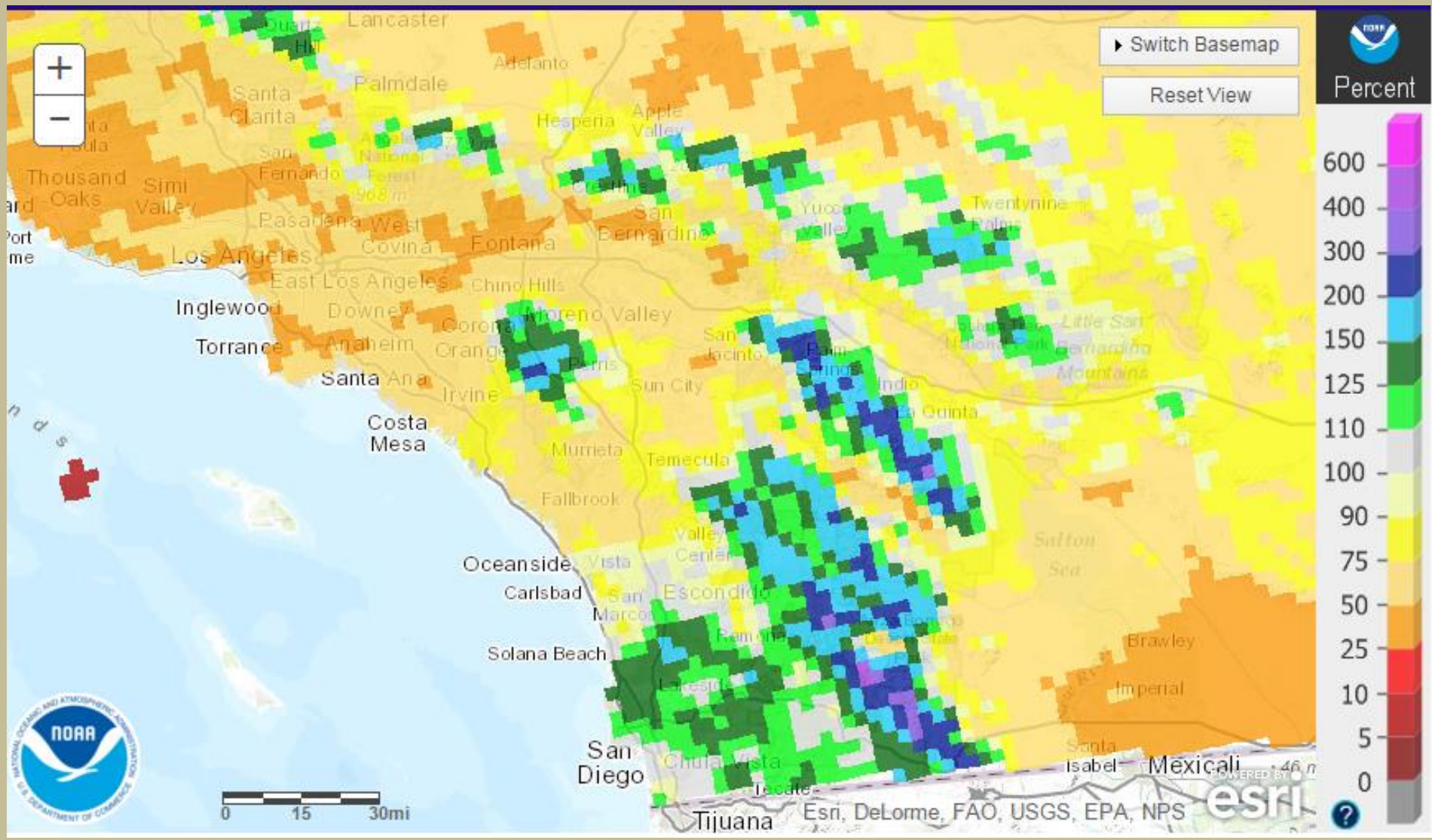
January 13

Long way to fill local reservoirs and state

Percent of Normal Precip (water year)



Local View (since October 1)
Percent of Normal Precipitation



Precipitation in 1982-83 and 1997-98
2 strong El Nino winters

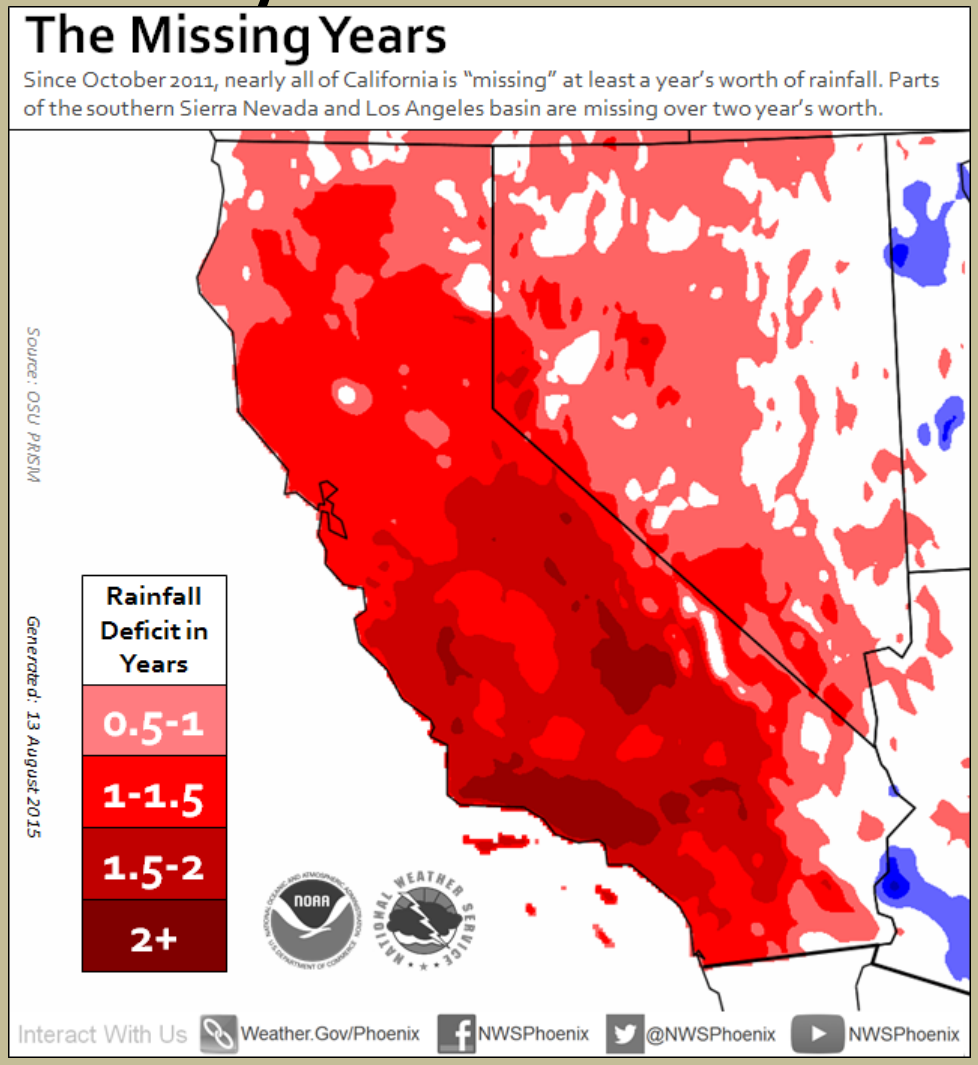
Month	San Diego 82/83, 97/98	Santa Ana 82/83, 97/98	Riverside 82/83, 97/98
November	2.10, 1.17	3.76, 1.70	2.57, 1.14
December	1.43, 1.35	1.01, 5.35	0.52, 3.12
January	2.10, 2.68	4.06, 2.19	2.58, 2.66
Rainfall To Date	5.63, 5.20 2015-16 – 6.06	8.83, 9.24 2015-16 – 3.29	5.67, 6.92 2015-16 – 3.55
February	3.88, 7.65	3.88, 13.99	3.25, 10.08
March	6.57, 2.21	8.32, 2.95	6.01, 1.94
April	1.74, 1.11	2.74, 0.94	2.44, 0.82
May	0.01, 0.64	0.26, 2.48	0.17, 1.53

Rainfall is INCHES

Mountain and Desert Precipitation

Location	2015 to 2016 to date	Normal October to date
Idyllwild	15.25	12.33
Big Bear	10.79	9.89
Palomar Mountain	12.74	14.64
Palm Springs	2.31	2.85

Missing Years of Precipitation
1 to 2 years worth needed

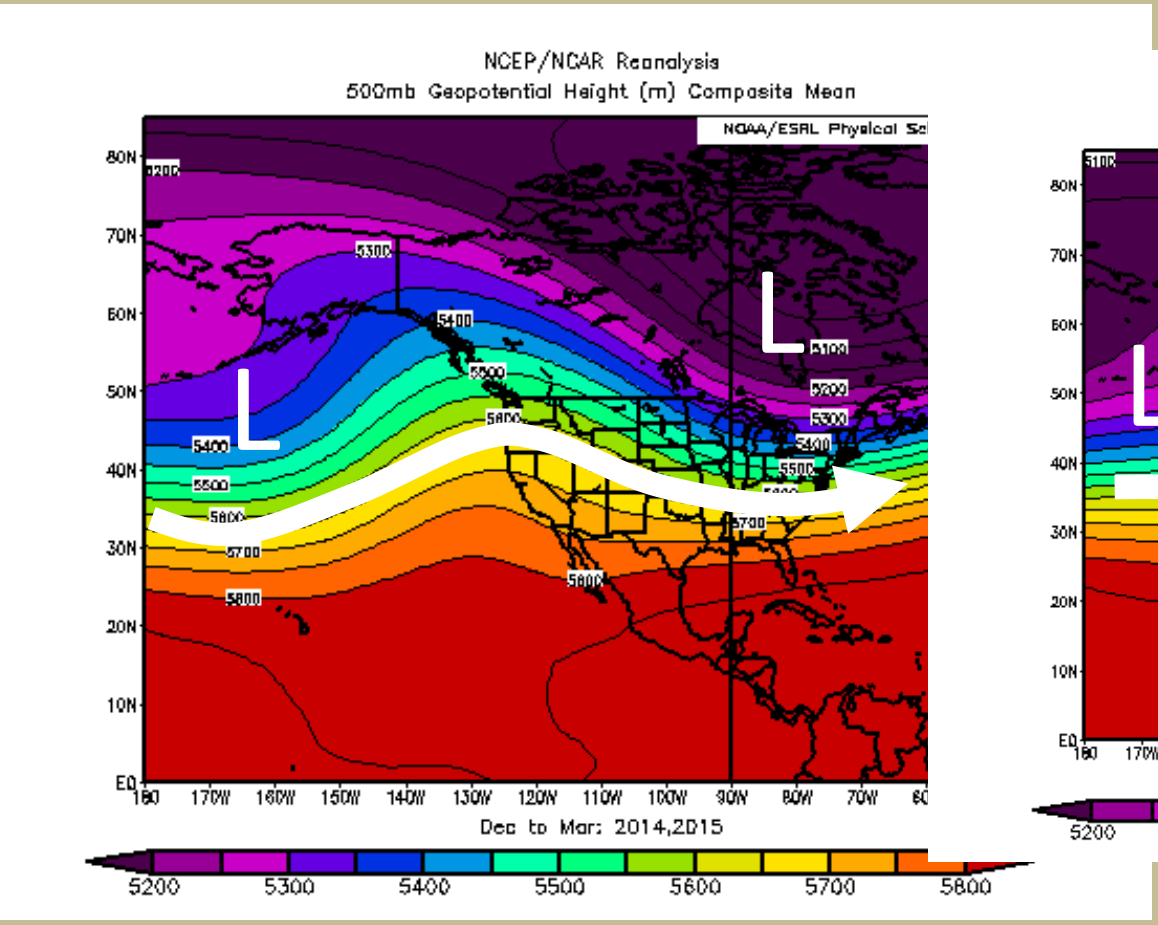


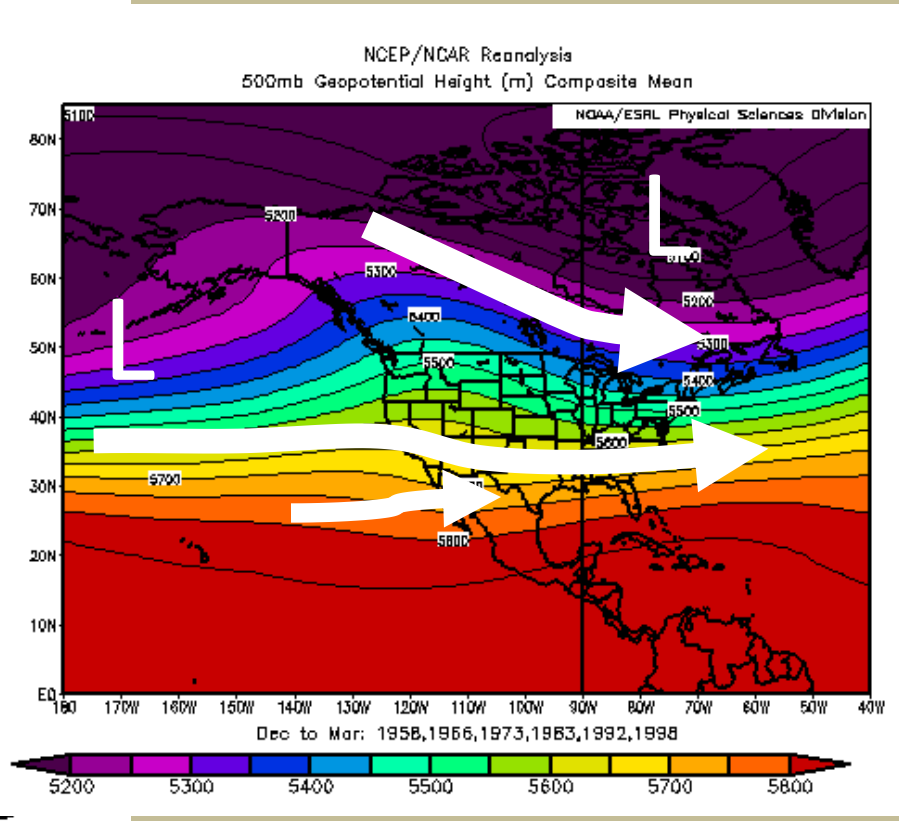
Credit Paul Iniguez

Heavy Rain and Flooding
Turn Around Don't Drown

Photo by Alex Tardy

Comparing Jet Stream

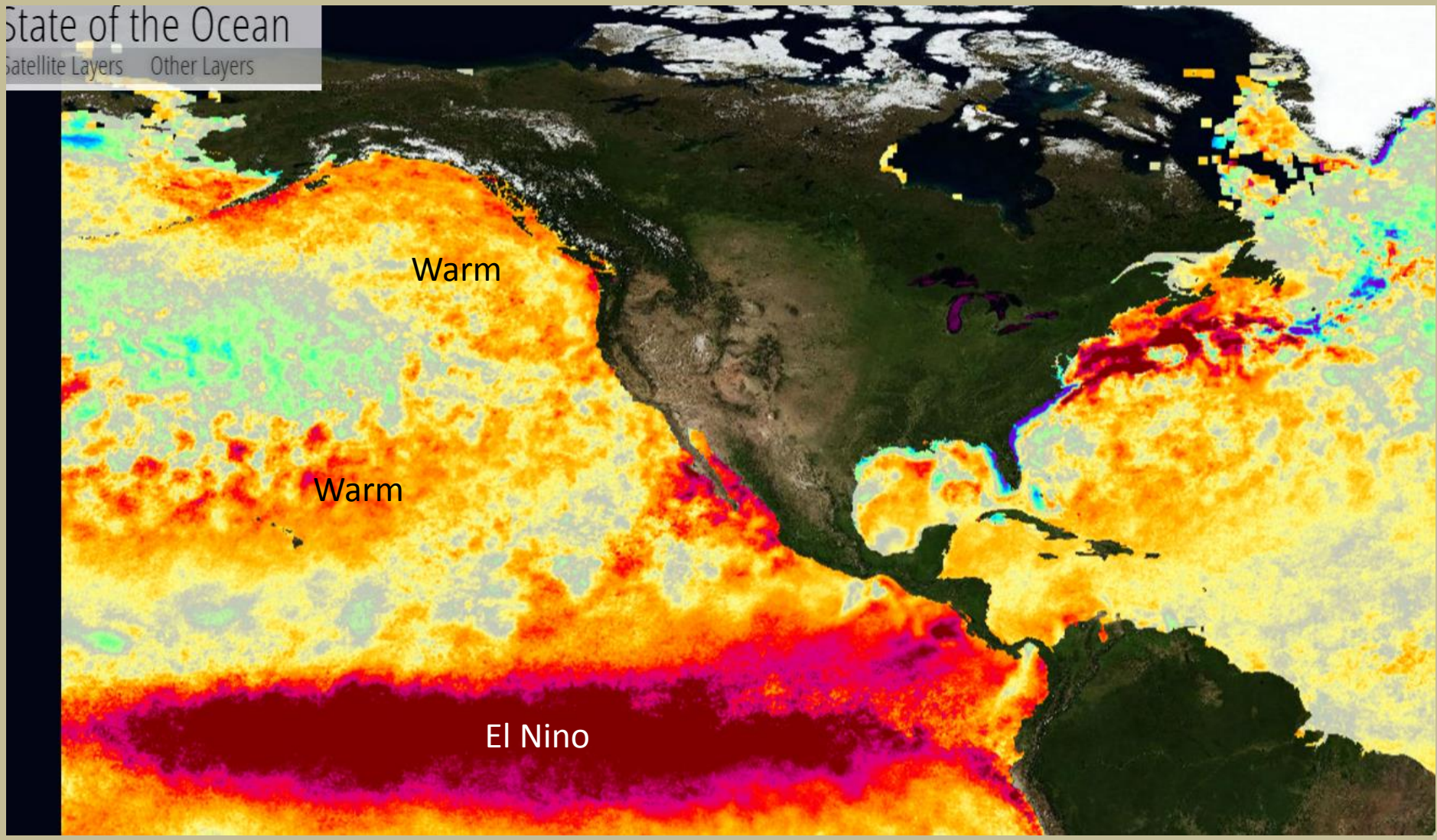




2013-2015

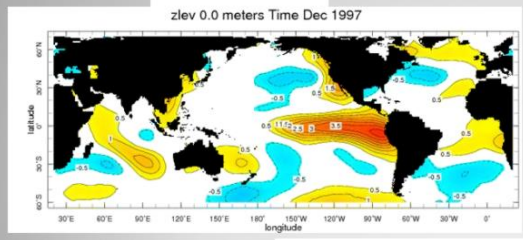
Strong El Nino

Pacific Ocean
Sea Surface Temperature (anomaly)

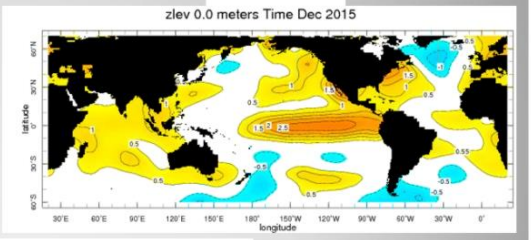


How December 2015 is Different from 1997 (ERSSTv4)

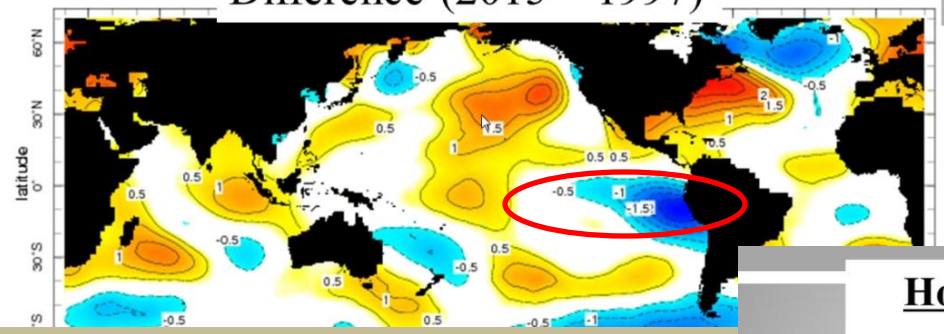
Dec 1997



Dec 2015

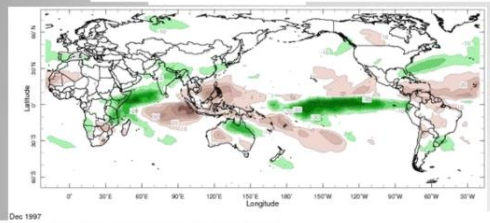


Difference (2015 – 1997)

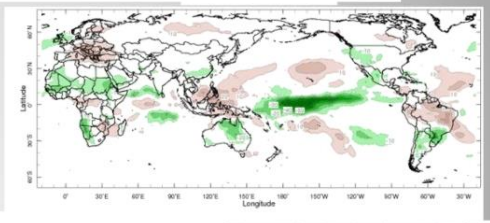


How December 2015 is Different from 1997 (OLR/Precipitation)

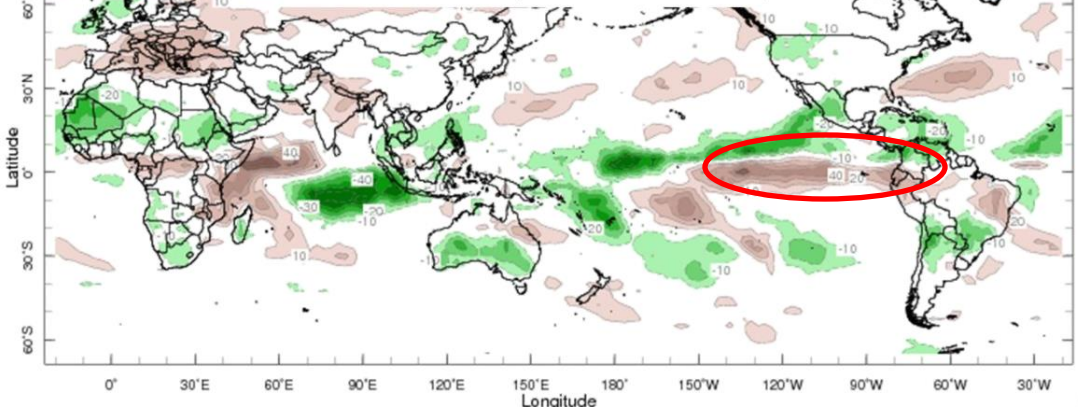
Dec 1997



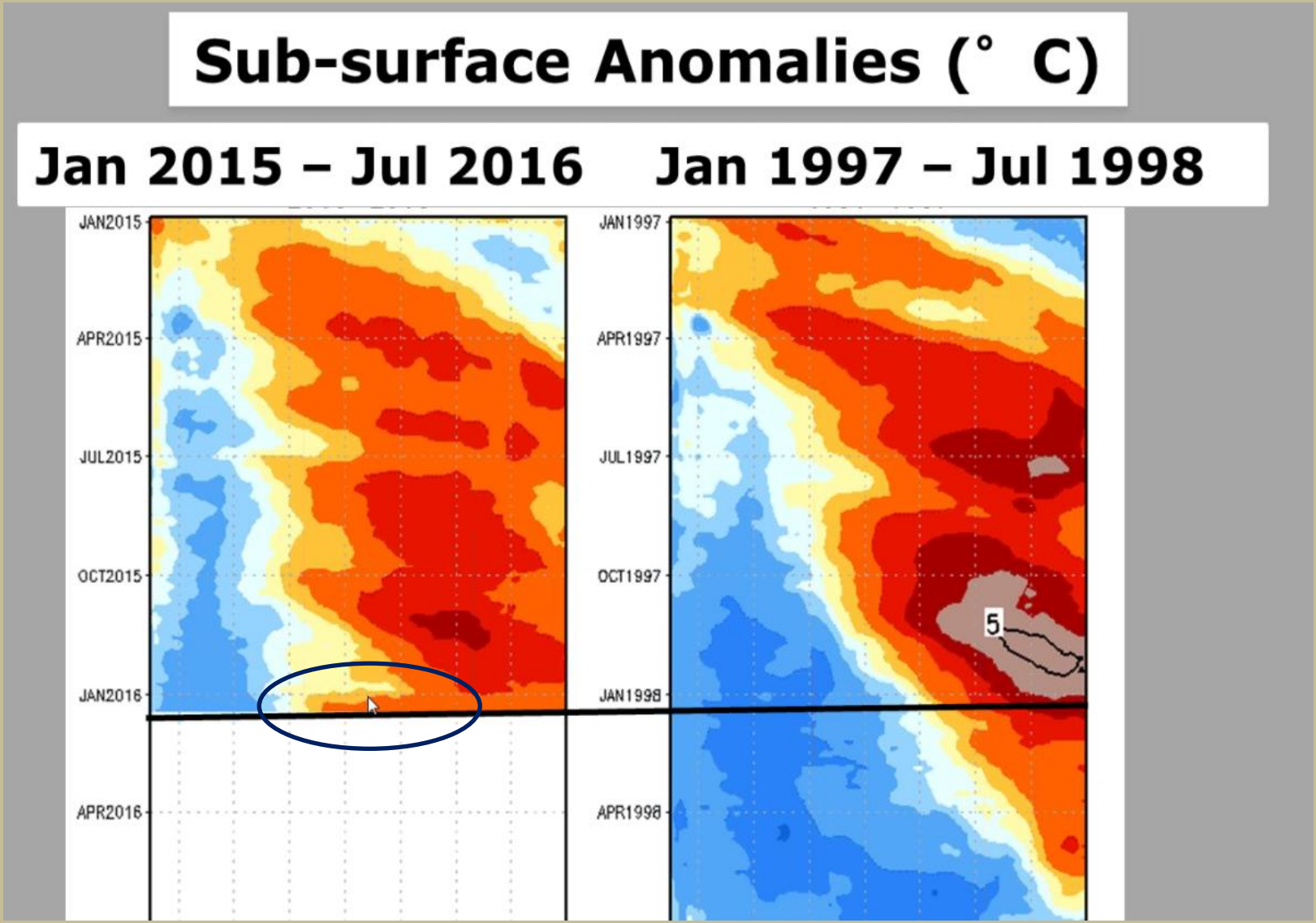
Dec 2015



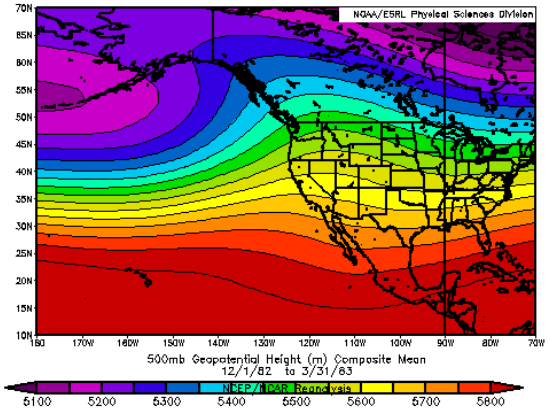
Difference (2015 – 1997)

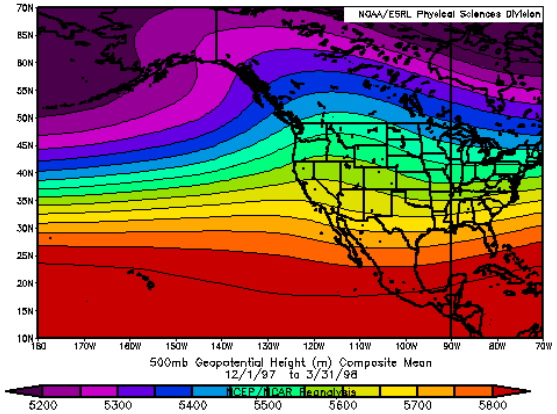


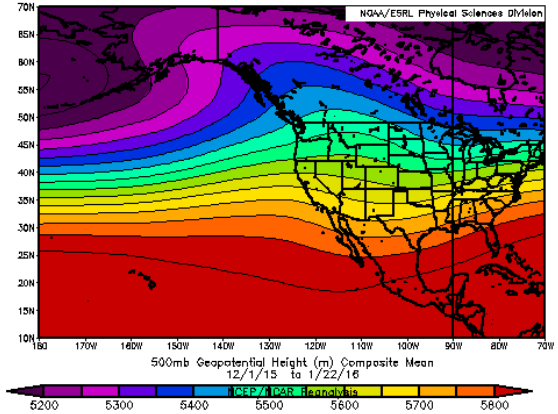
2016 is holding on longer



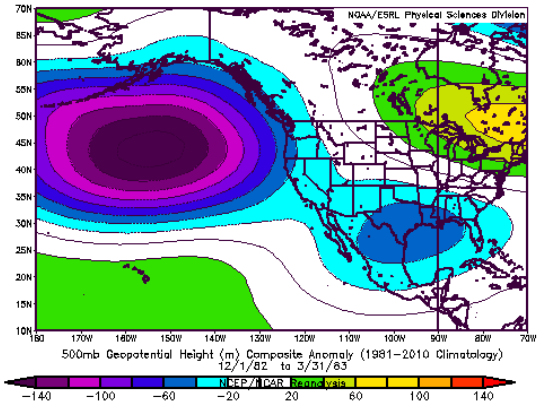
1982-83, 1997-98, 2015-16

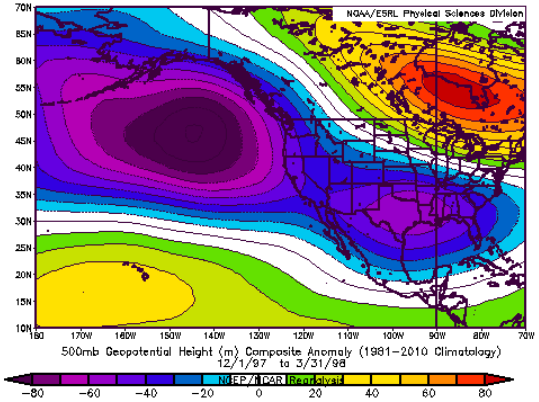


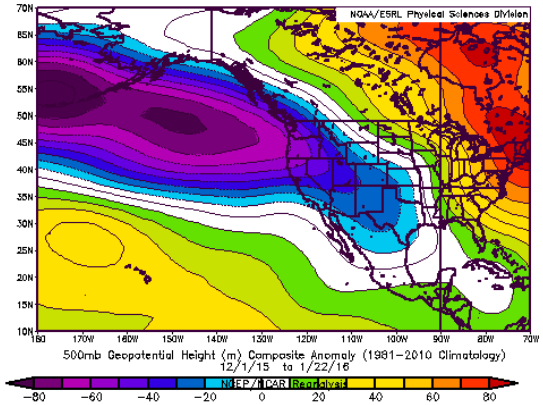




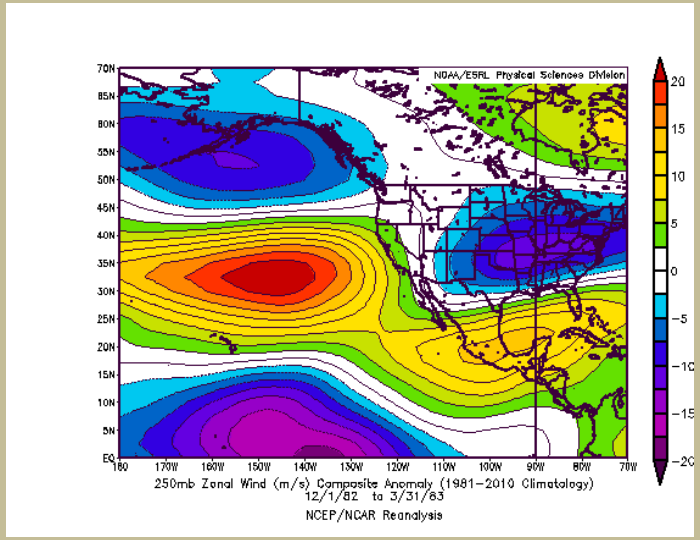
500 mb heights or storm track

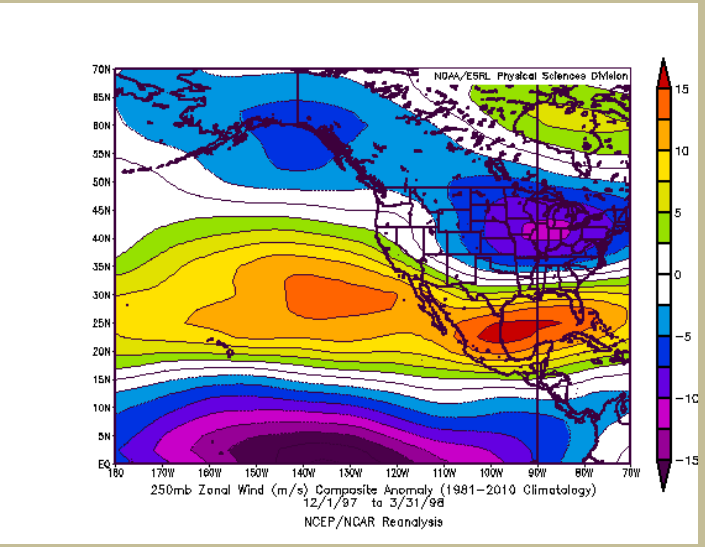




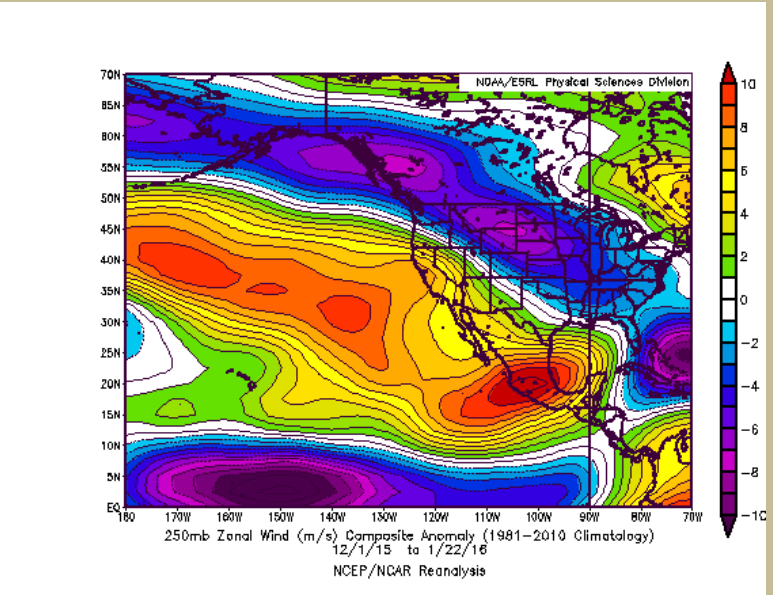


Jet zonal wind 1982-83, 1997-98



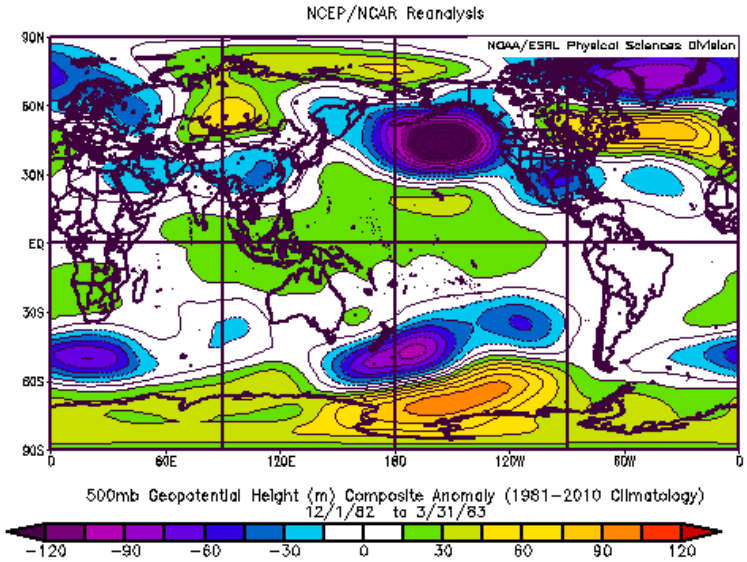


Jet zonal wind 2015-16

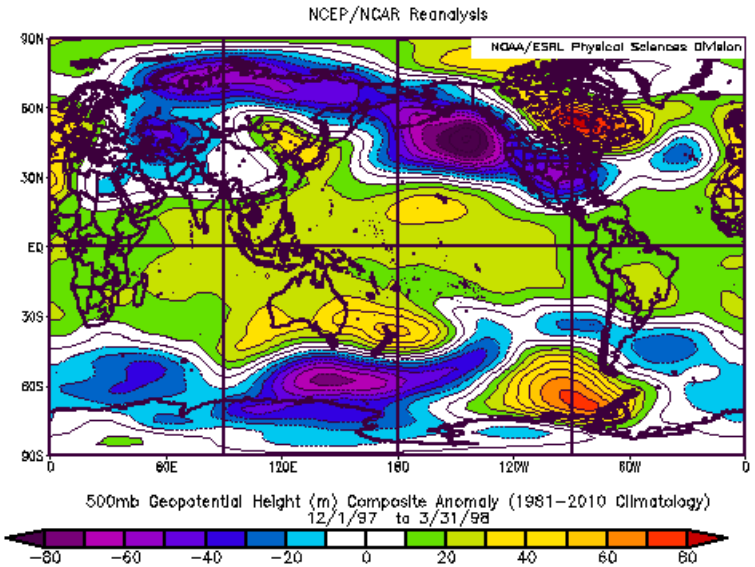


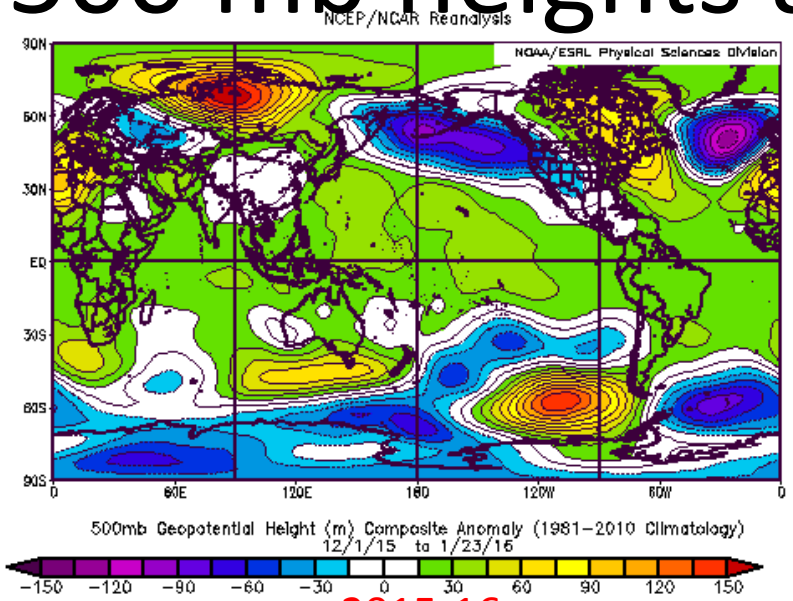
Global 500 mb heights anomaly

1982-83



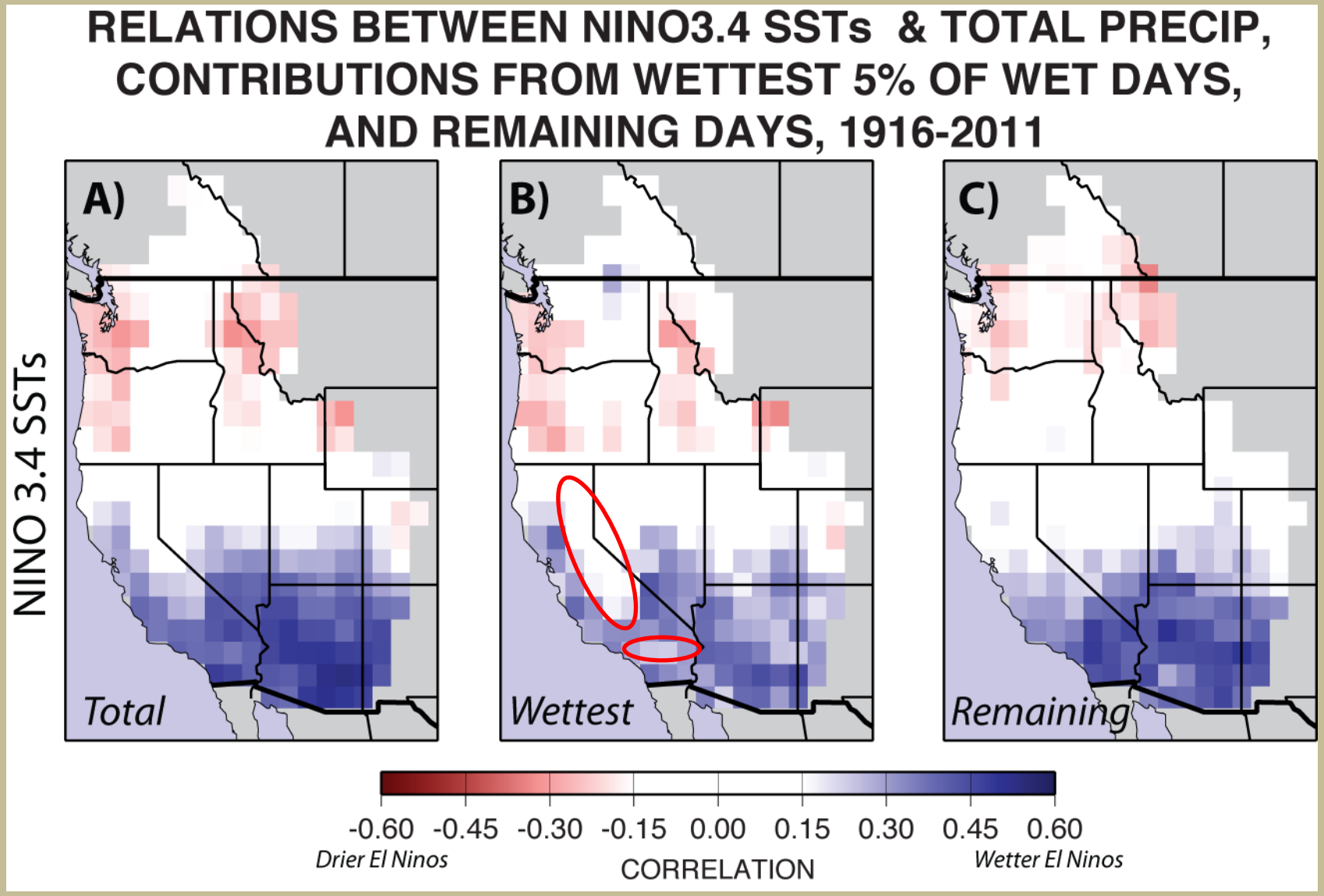
1997-98





2015-16

Atmospheric River major events can be any year



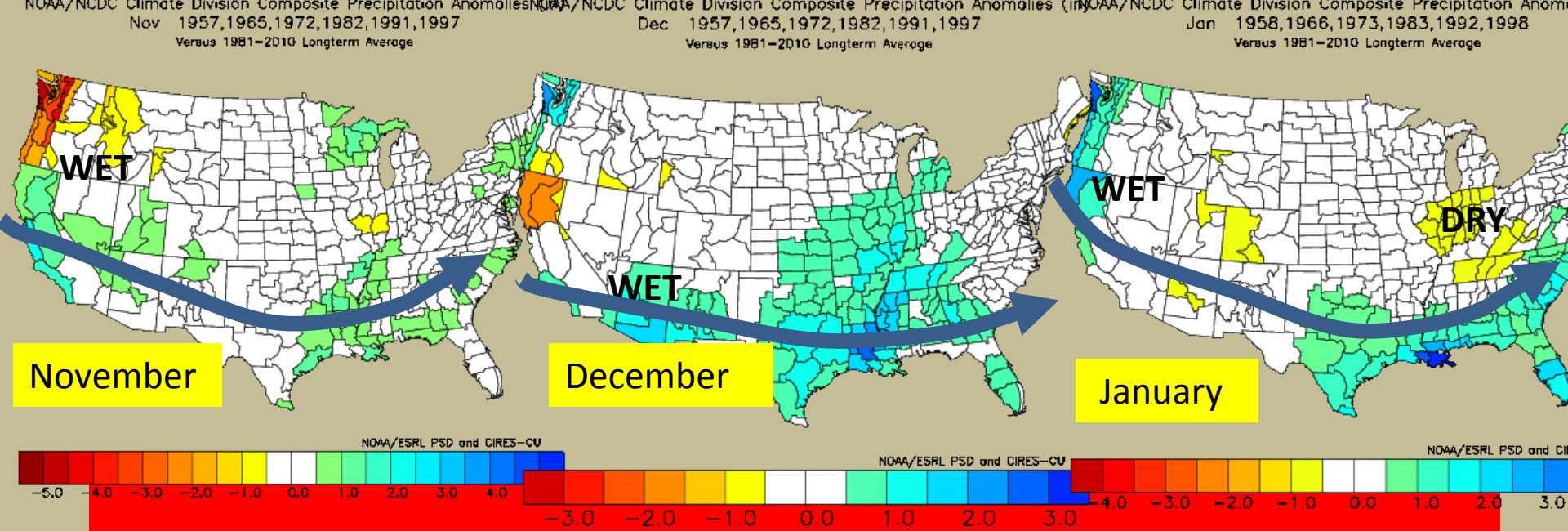
Credit: Scripps Institution of Oceanography

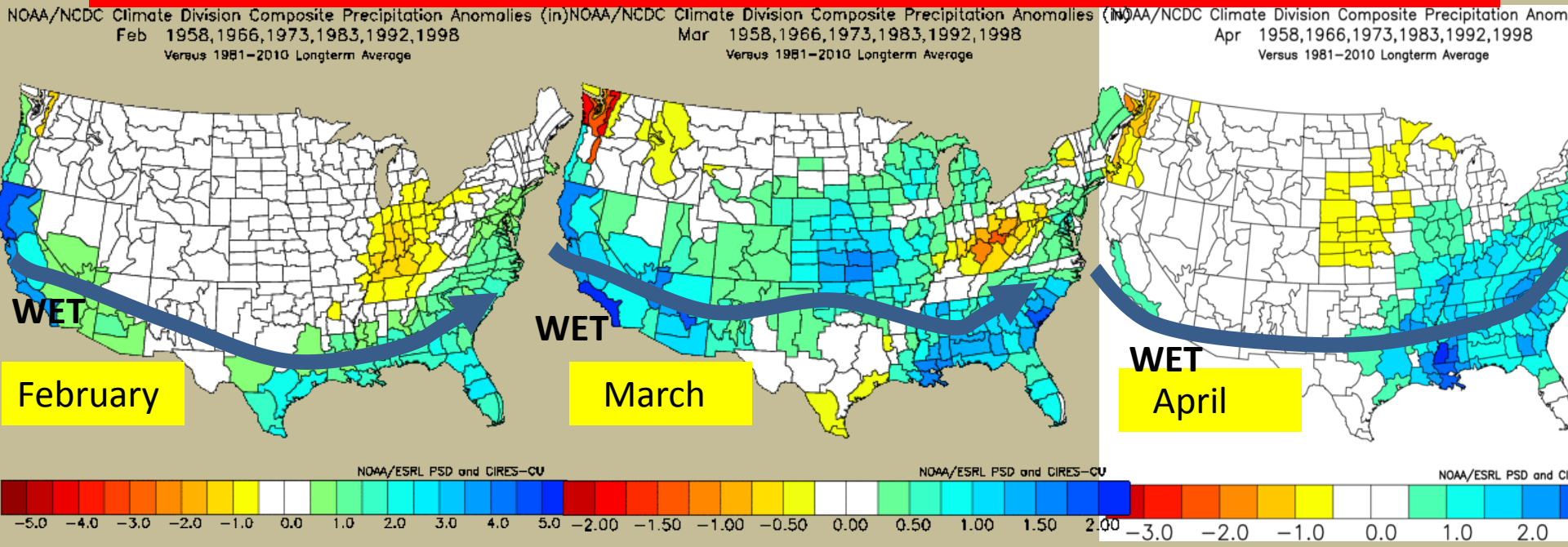
San Diego Big Monthly Rainfall

Winter October to April

Month Year	Total Precipitation	October-April	ENSO ONI
January 1993	**9.09**	**17.81**	**0.2 (neutral)**
January 1995	8.06	16.63	1.3
February 1998	7.65	16.19	2.5
March 1991	6.96	11.77	0.4 (neutral)
March 1983	6.57	17.87	2.3
December 1965	6.60	14.74	1.5
January 1978 Drought Buster Year	5.95	16.54	0.7
February 2005	5.83	22.35	0.7
January 1979	5.82	14.03	-0.1 (neutral)
November 1965	5.82	14.74	1.5
January 1980	5.58	14.96	0.5
December 2010	5.00	12.18	-1.4
			2010-11

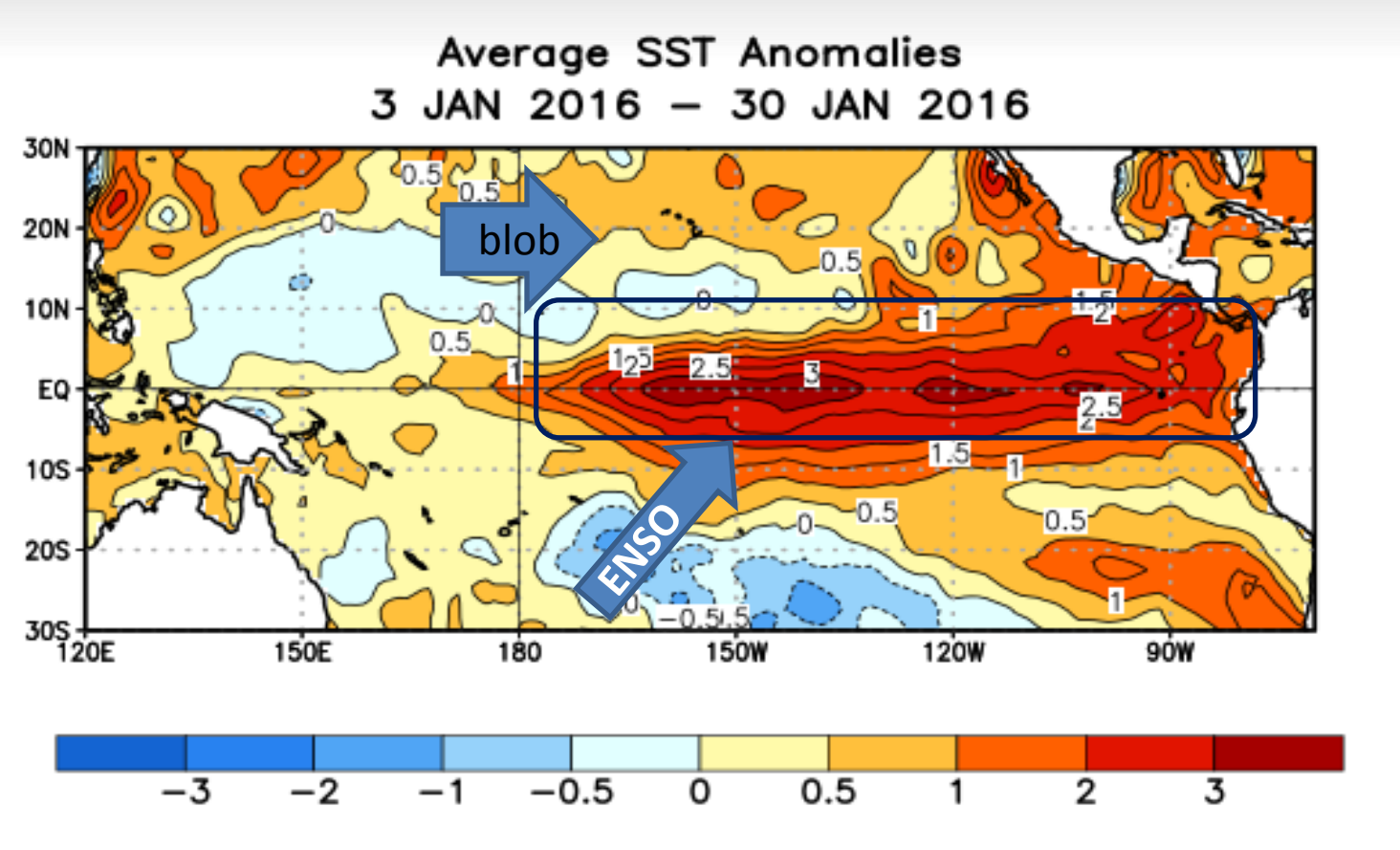
Precipitation All Strong El Nino Month by Month





SST Departures (ºC) in the Tropical Pacific During the Last Four Weeks

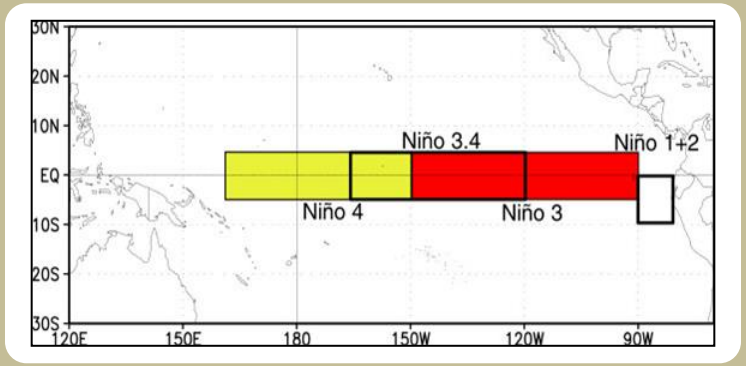
During the last four weeks, equatorial SSTs were above average across the central and eastern Pacific, with the largest anomalies off the coast of S. America.



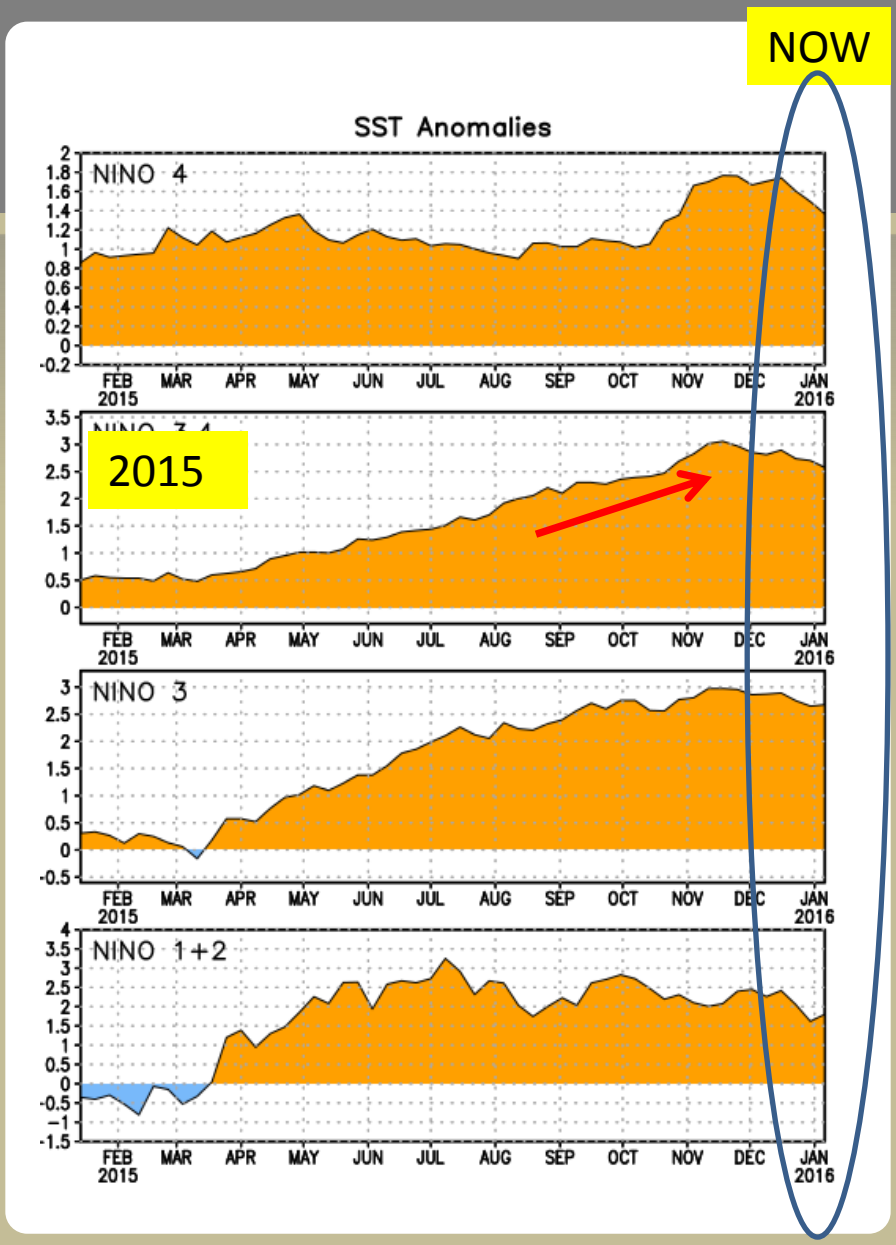
Niño Region SST Departures (°C) Recent Evolution

The latest weekly SST departures are:

Niño 4	1.3°C
Niño 3.4	2.5°C *
Niño 3	2.3°C
Niño 1+2	1.0°C

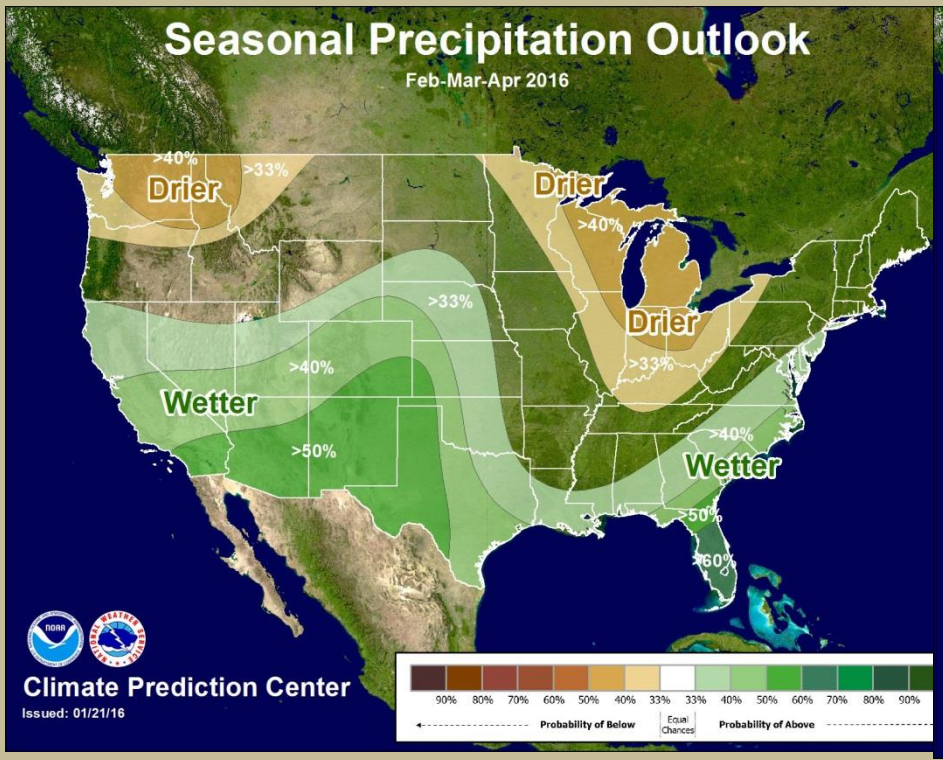


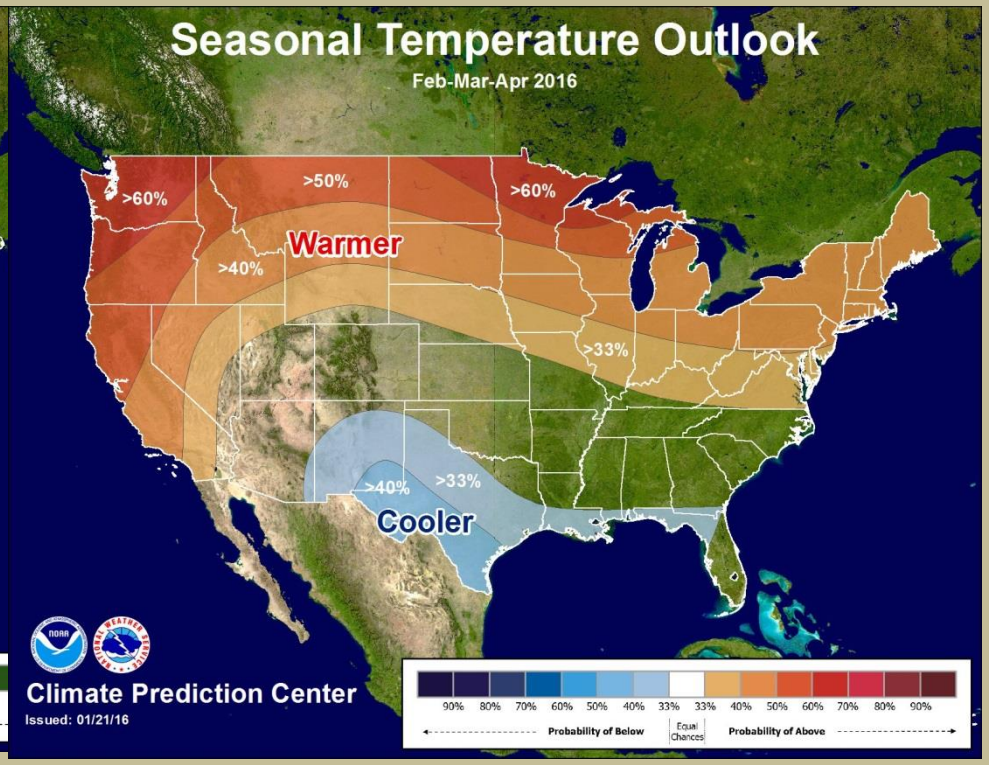
* Record High Weekly Average Value



Winter Outlook 2015-16

issued January 21

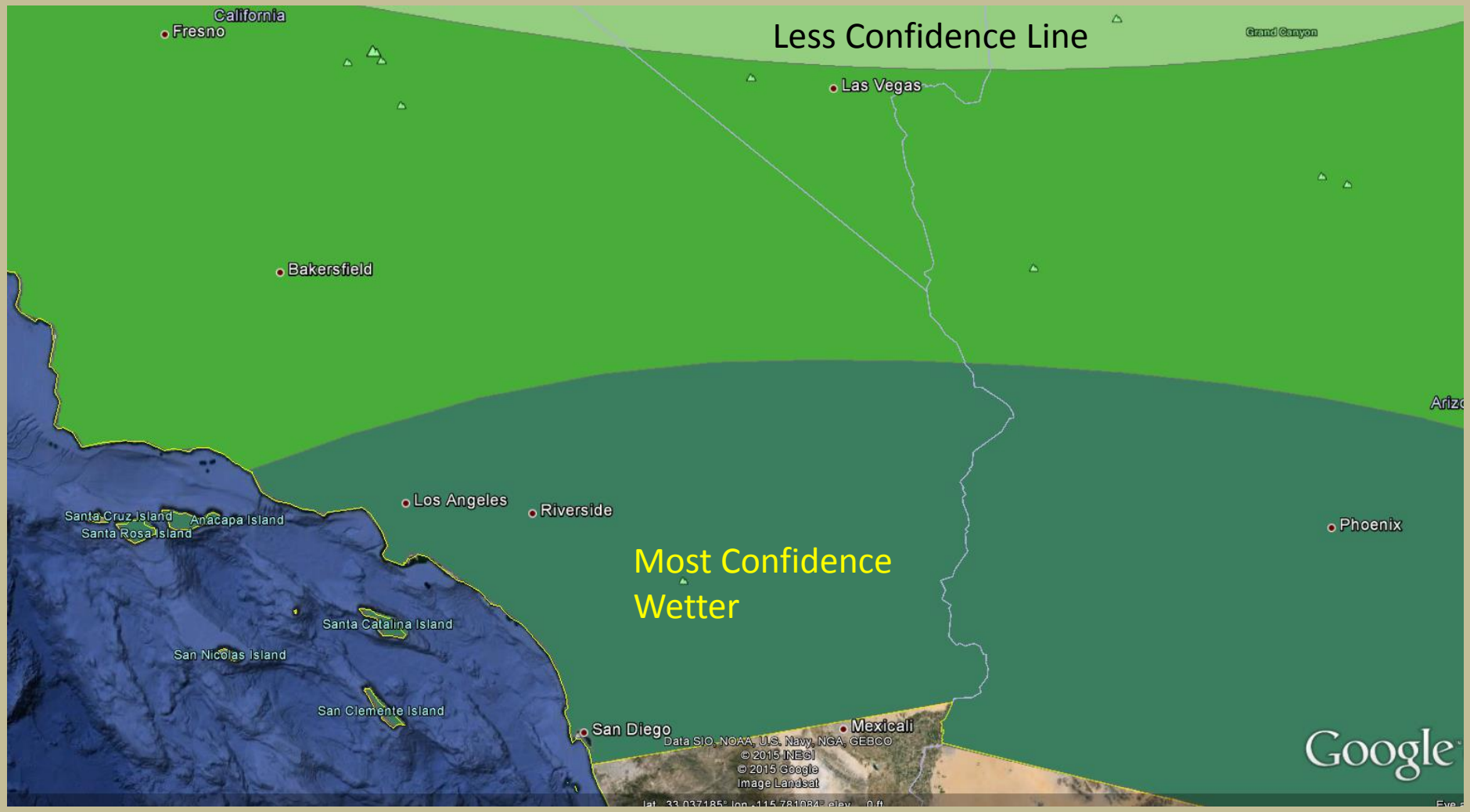




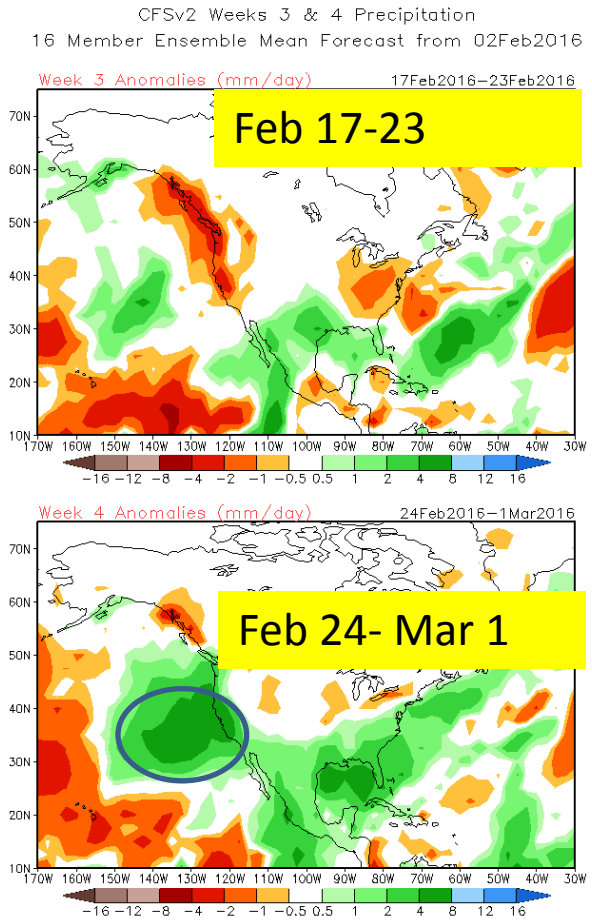
Southern California

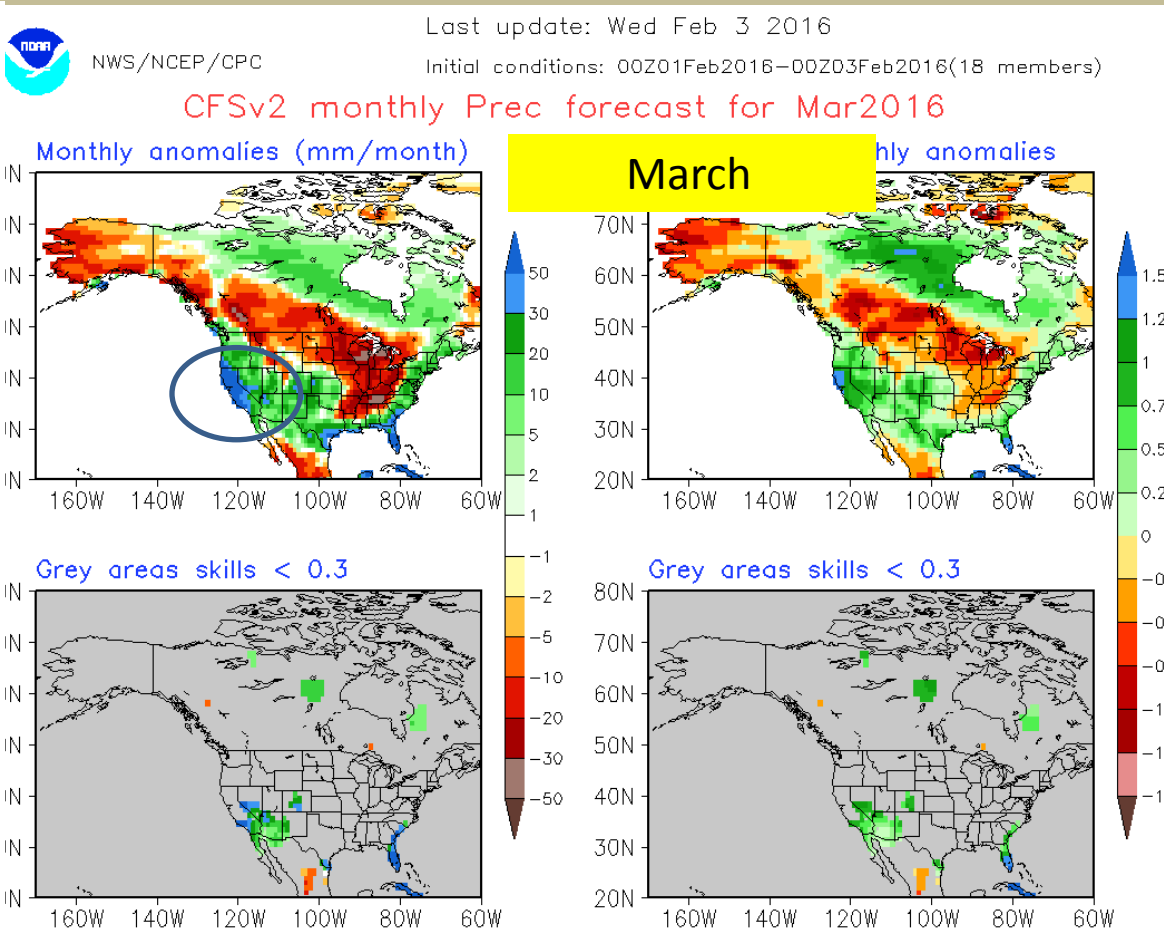
February to March

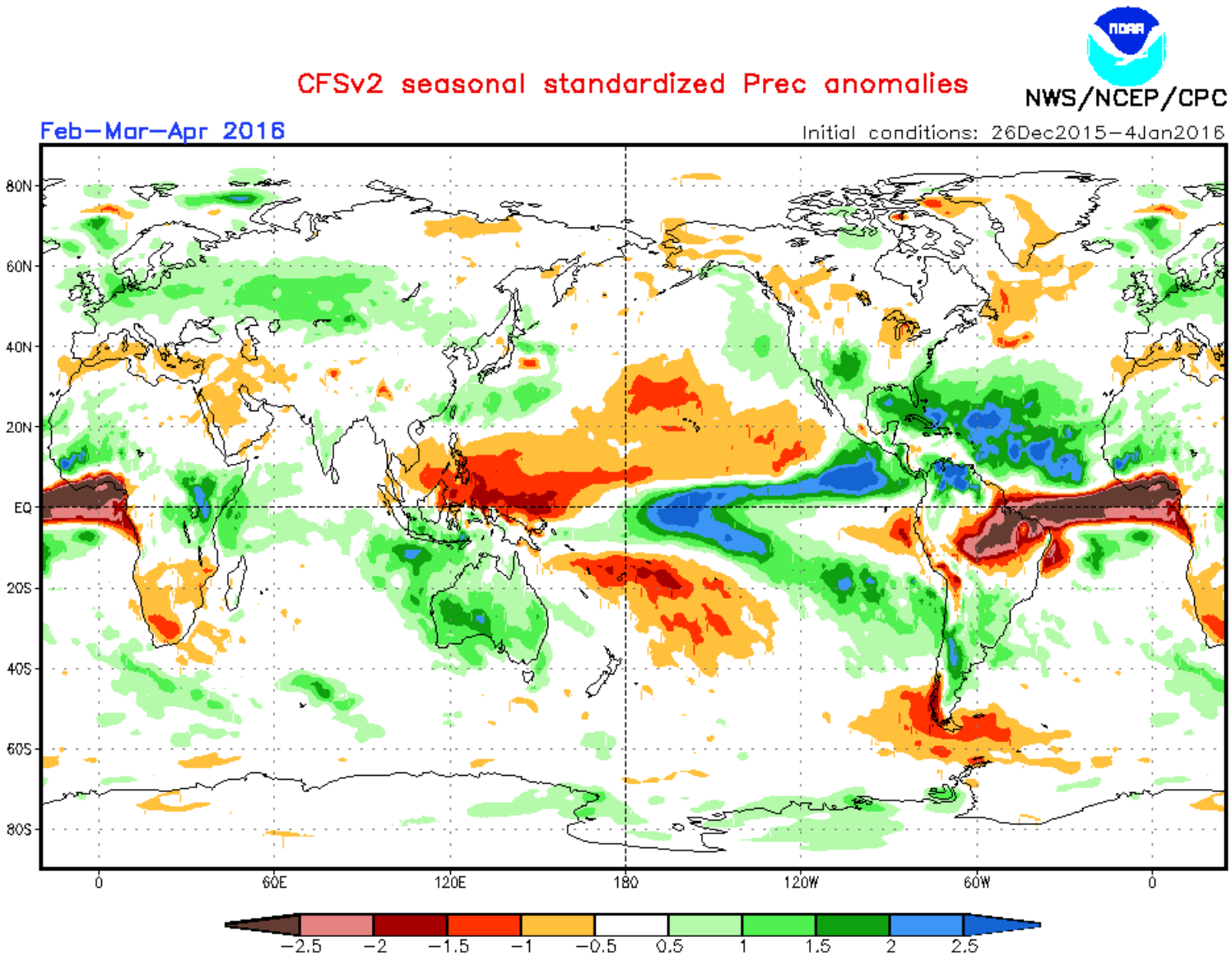
Precipitation Outlook



Weekly forecast through February 21






CFSv2 seasonal standardized Prec anomalies
NWS/NCEP/CPC
Feb–Mar–Apr 2016
Initial conditions: 26Dec2015–4Jan2016
80N
60N
40N
20N
EQ
20S
40S
60S
80S
0
60E
120E
180
120W
60W
0
−2.5
−2
−1.5
−1
−0.5
0.5
1
1.5
2
2.5

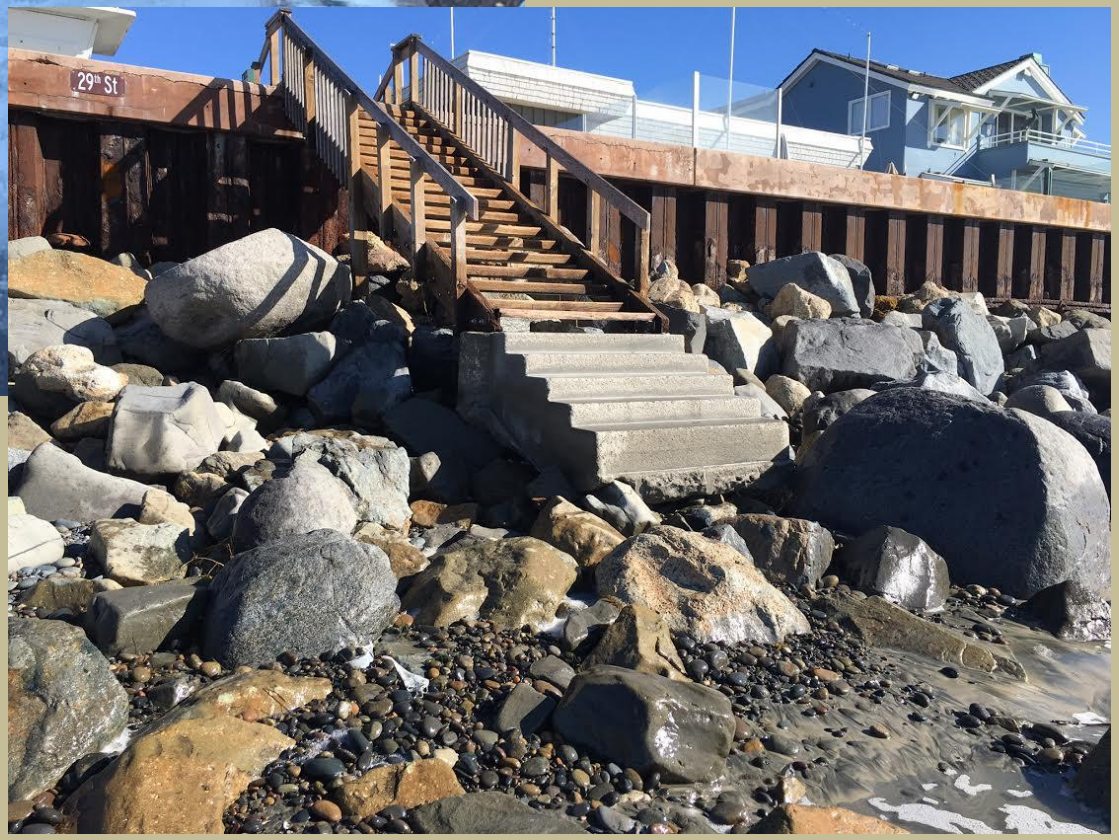
Summary of El Nino

- El Nino conditions are the unusual warming of the Sea Surface Temperatures in the Pacific Ocean along the equator (occurs every 3 to 7 years) after trade winds are weakened
- An El Nino can take the normal Jet Stream from Oregon and bring it south across Southern California for much of the winter and spring months
- El Nino can result in a pattern that brings a series of stormy periods in the winter and spring months, but not a particular storm
- Strong (2.3 °C running mean) El Nino is present and strengthening slowly through Fall
- El Nino at the strong phase correlates to above normal precipitation in southern California but not necessarily the whole state
- Currently it is the strongest El Nino on record (2.7 °C in the center)
- Above normal precipitation and frequent storms are expected for southern California with the best chance from December through March
- Santa Ana winds still occur in El Nino years (Santa Ana's peak in December)
- Moderate snow levels (not the tropical high snow events and not the artic air mass)
- The "blob" warm waters can enhance rainfall rates (more unstable)
- El Nino can impact the jet stream to bring more frequent storms during the wet season but not necessarily stronger storms (not just the Pineapple Express or Atmospheric River)
- Some of the wettest months have been El Nino years but individual large precipitation events have occurred in non- El Nino and La Nina years (such as January 1993 and December 2010)
- El Nino does not guarantee above normal precipitation and there have been several dry or average years in California during El Nino
- Drought will continue since 4-year deficits are 1 to 2 seasons missed and the entire state will need much above normal precipitation and above normal snowpack

Before and after impacts

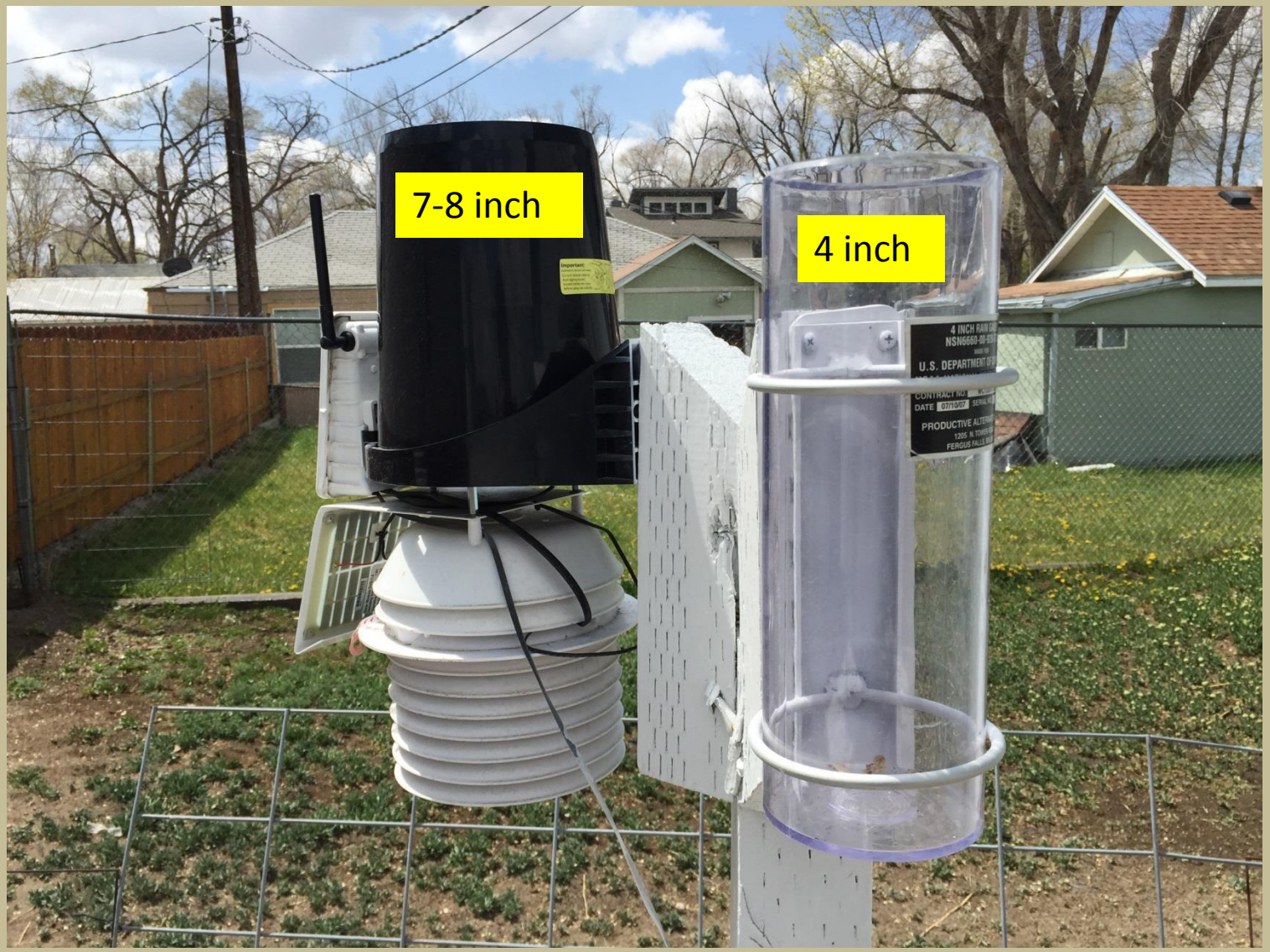
Impacts and Actions

- Flooding (river, urban, small stream) from repeated storms and saturated soils (not necessarily major storms) – locations may not have flooded for 5 to 25 years
- Beach and coastal erosion from repeated elevated surf and wind
- Clean storm drains and gutters, remove debris that can cause back-ups, contact city public works for road and drainage changes, check your tire tread, known alternate routes, check areas with historical flood impacts and have emergency supplies
- Check fire station locations for sand bags and they may not be provided with sand
- If you live near a slope, downstream of known debris flows or a fire burn scar (excessive rain will saturate soil and could cause steeper slopes move earth)
- Check your home owners insurance to see if it covers FLOODS
- Are you in a Flood Plain? http://gis.bam.water.ca.gov/bam/
- Download the FEMA flood plain app by Atkins

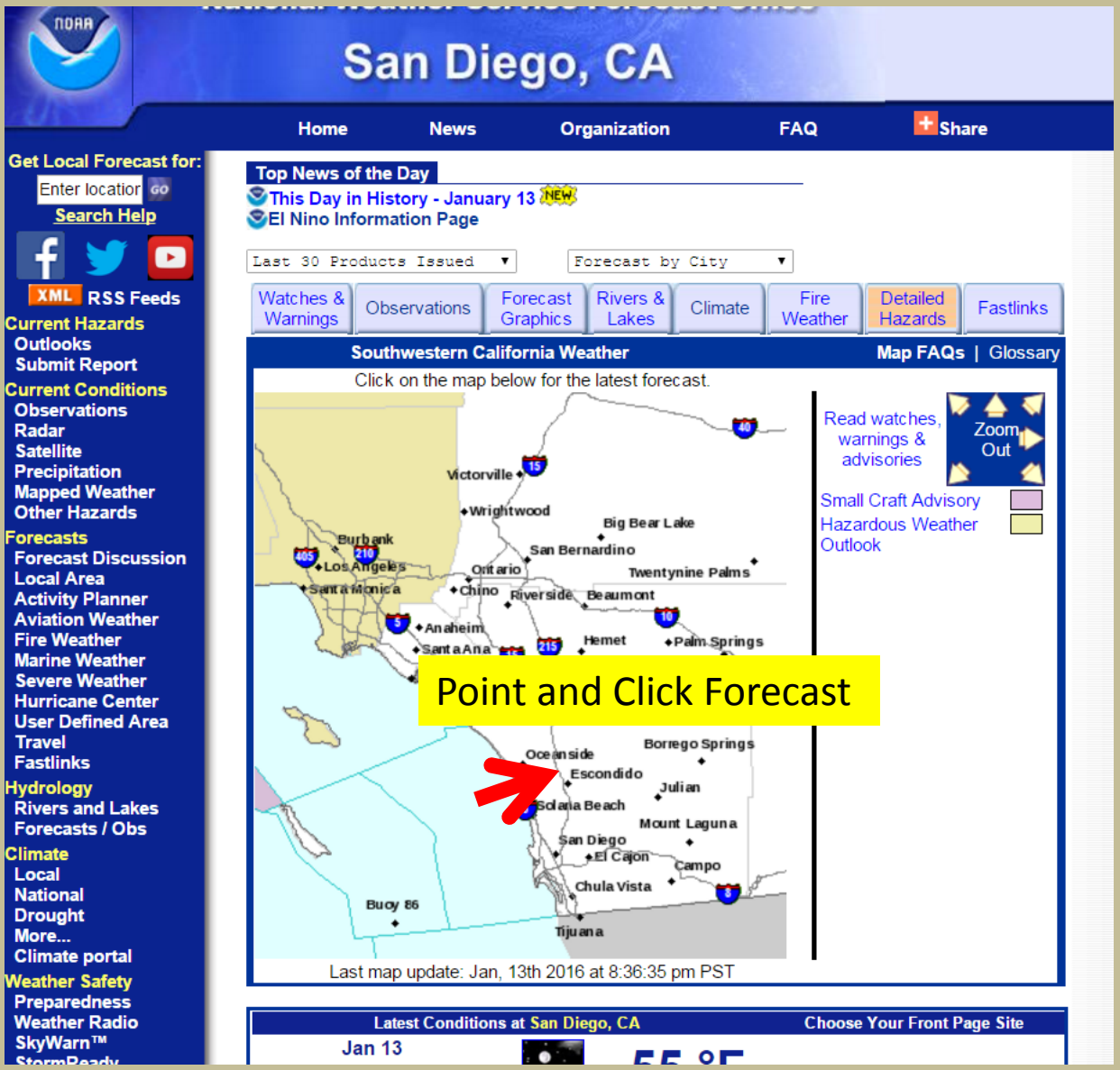


Lifeguard photos

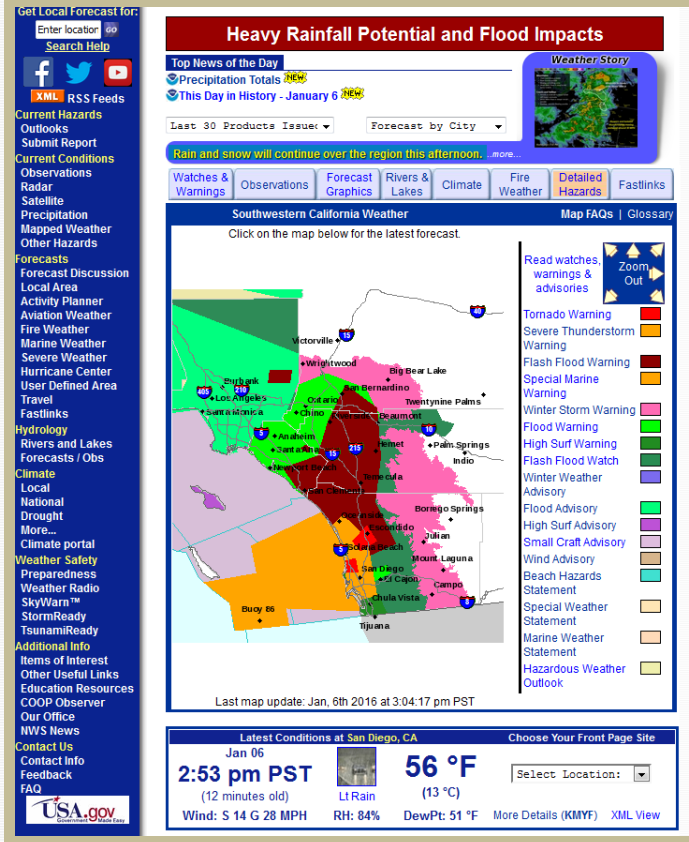
Measuring Rainfall Accurately



Watches, Warnings, Advisories



Highlights



Resources

Alex Tardy
alexander.tardy@noaa.gov
Warning Coordination Meteorologist
http://weather.gov/sandiego

Monitor Hazards

http://www.wrh.noaa.gov/wrh/whv/?wfo=SGX (all graphical hazards)

http://www.nws.noaa.gov/wtf/udaf/area/?site=sgx (area forecast)

http://digital.weather.gov (digital graphics)
http://mobile.weather.gov (mobile)
http://preview.weather.gov/edd (advanced)

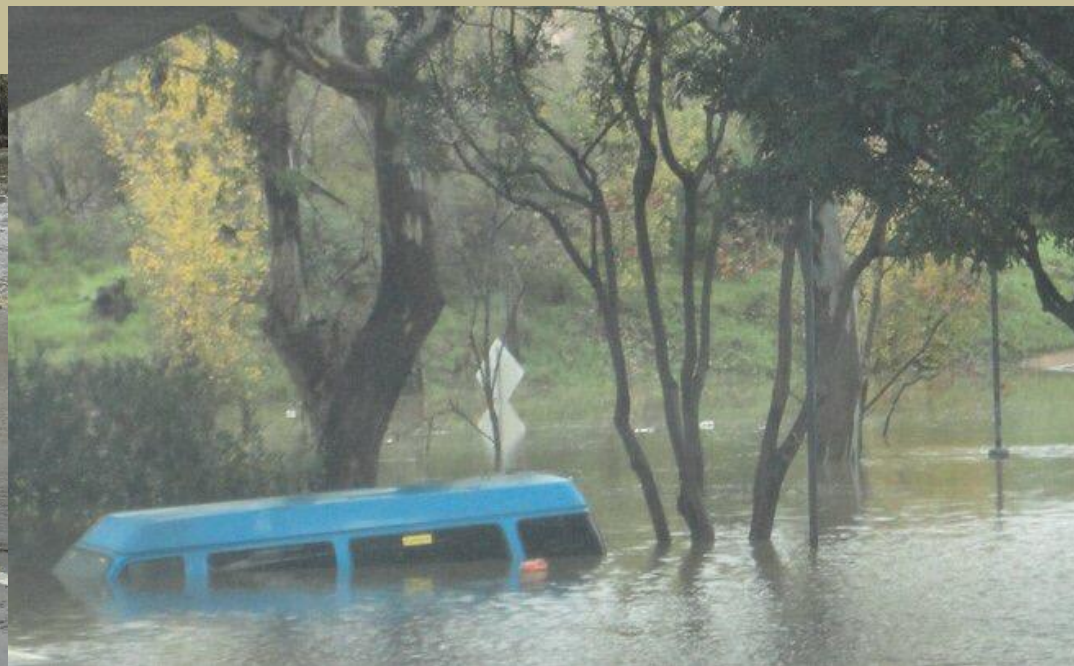
Monitor weather

http://www.wrh.noaa.gov/mesowest/gmap.php?map=sgx

Report and Follow on

visit http://weather.gov/sandiego

for WATCHES, ADVISORIES and WARNINGS

http://cpc.ncep.noaa.gov
El Nino updates

STOP