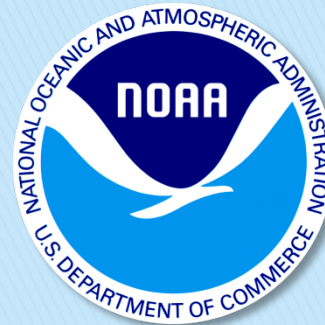


Winter 2015-16 Outlook

Summer 2016 Preview

Mark O'Malley



National Weather Service

Phoenix, AZ

www.weather.gov/phoenix

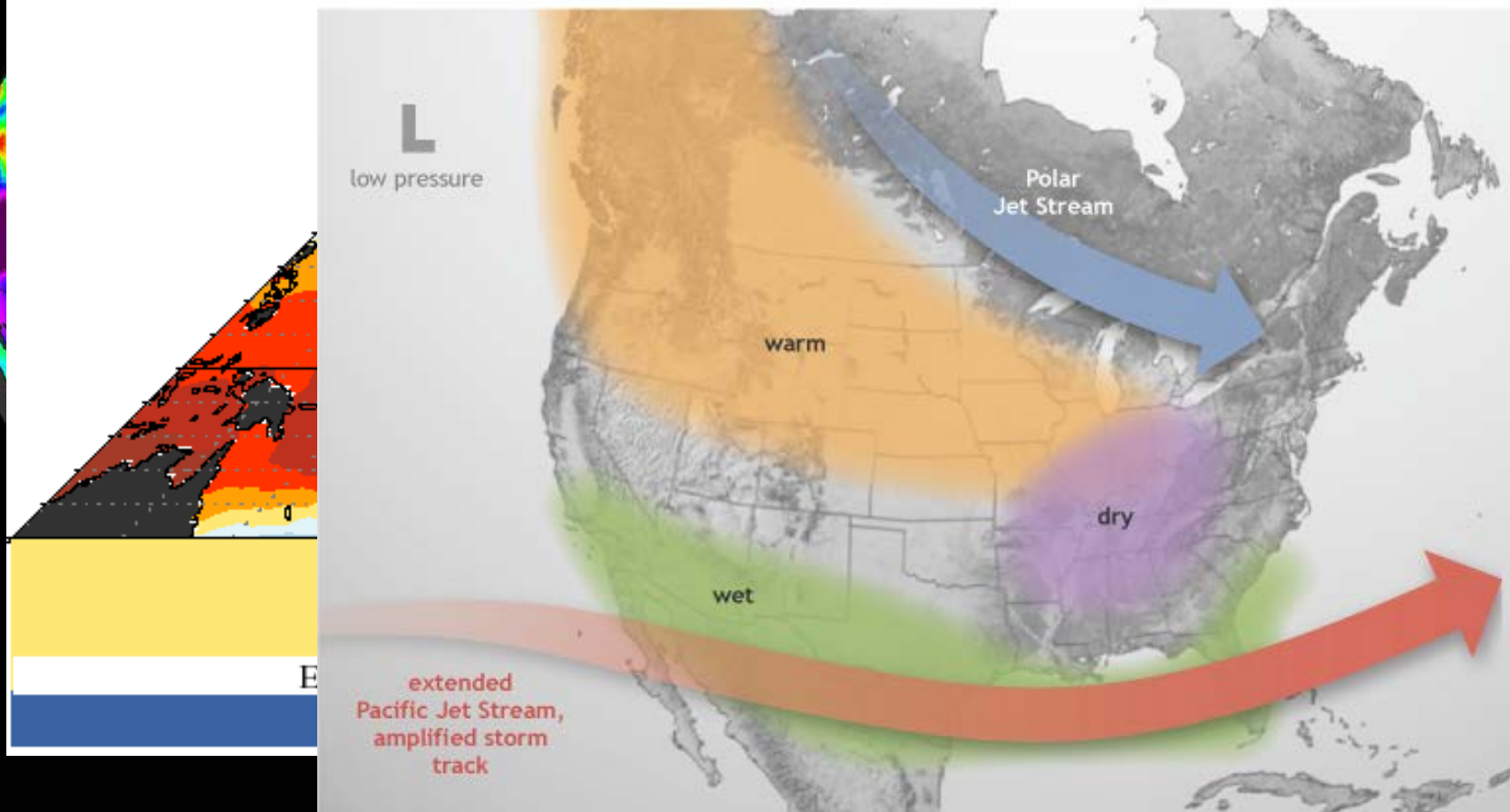


What will Affect Arizona Winter Weather and Water Supply?

AUG 5

December - February El Niño Conditions

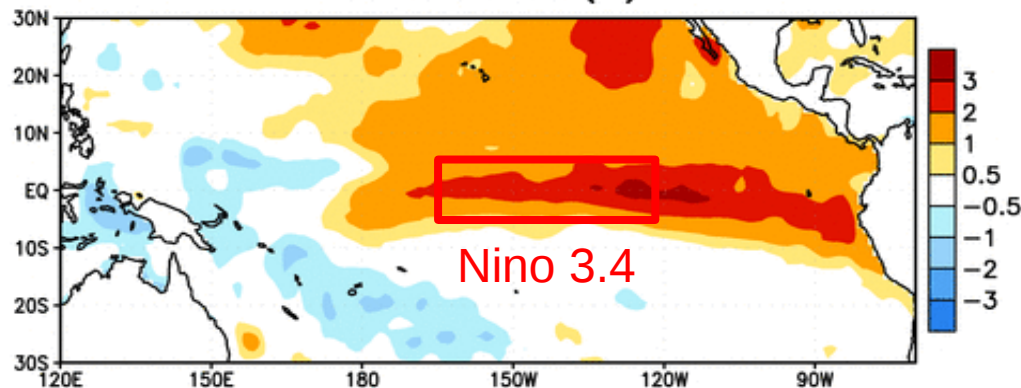
Wintertime El Niño pattern



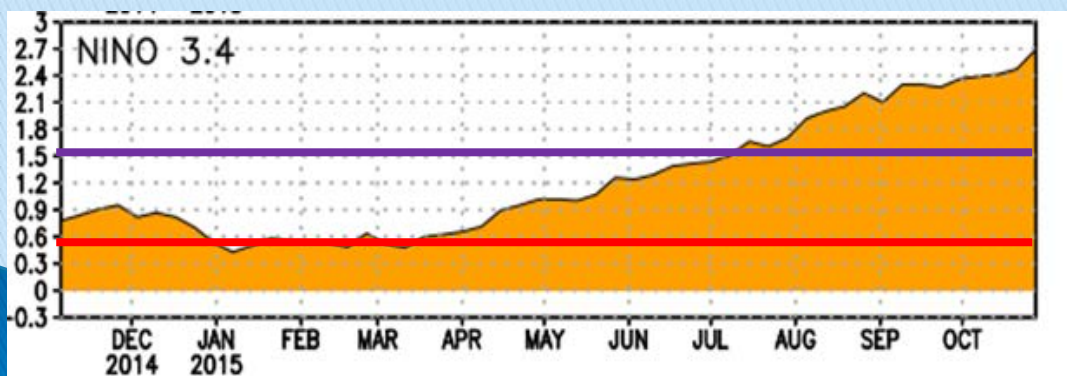


Conditions in Tropical Pacific

Week centered on 12 AUG 2015
SST Anomalies (°C)



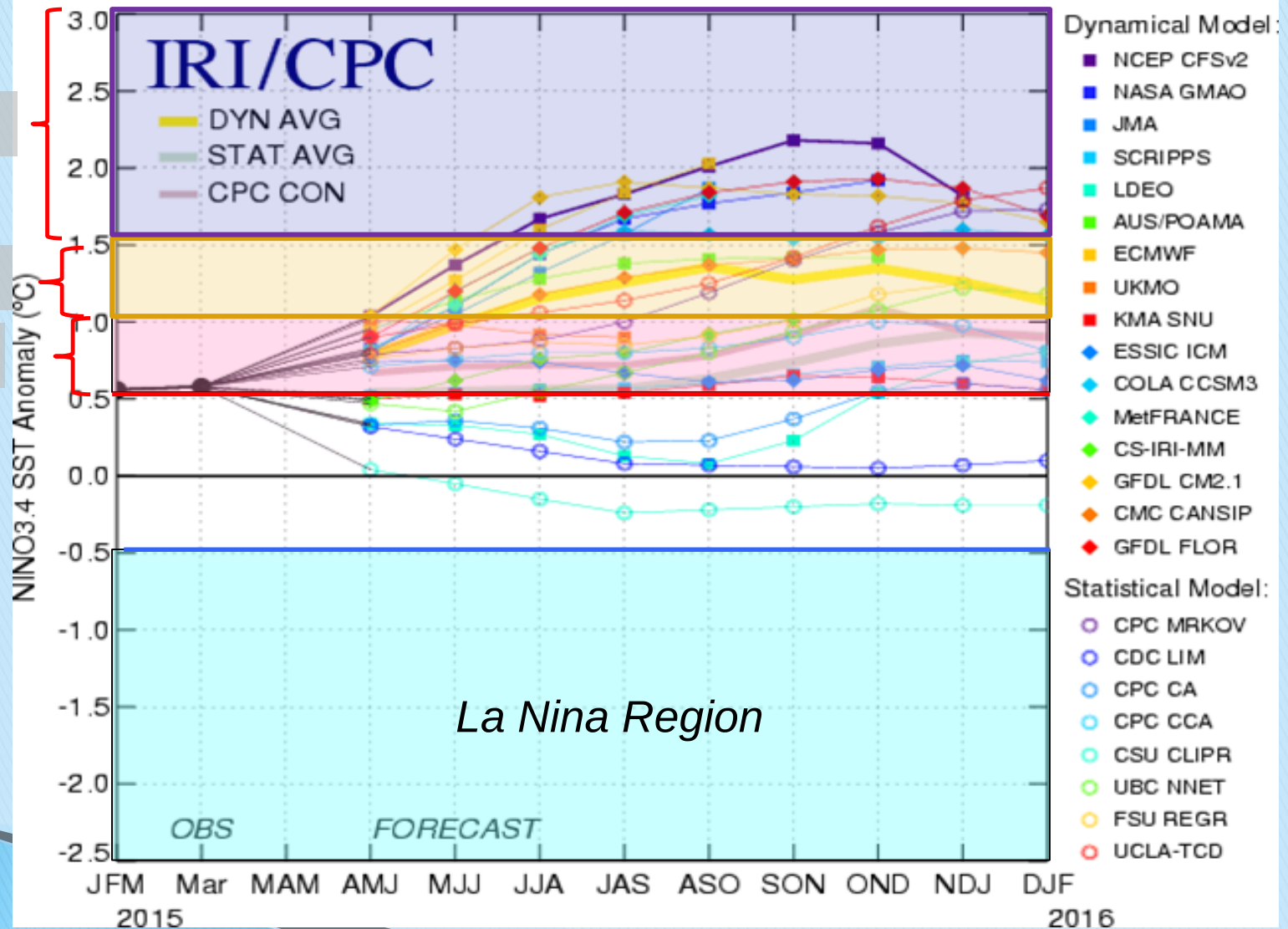
- ▶ Equatorial central Pacific waters have been warming since March 2014
- ▶ After fluctuations, sea surface temperatures (SST) finally reached El Nino definition in Feb 2015
- ▶ Strong El Nino conditions have matured and will persist through winter 2015-16, though likely waning in spring 2016





El Nino Outlook – April 2015

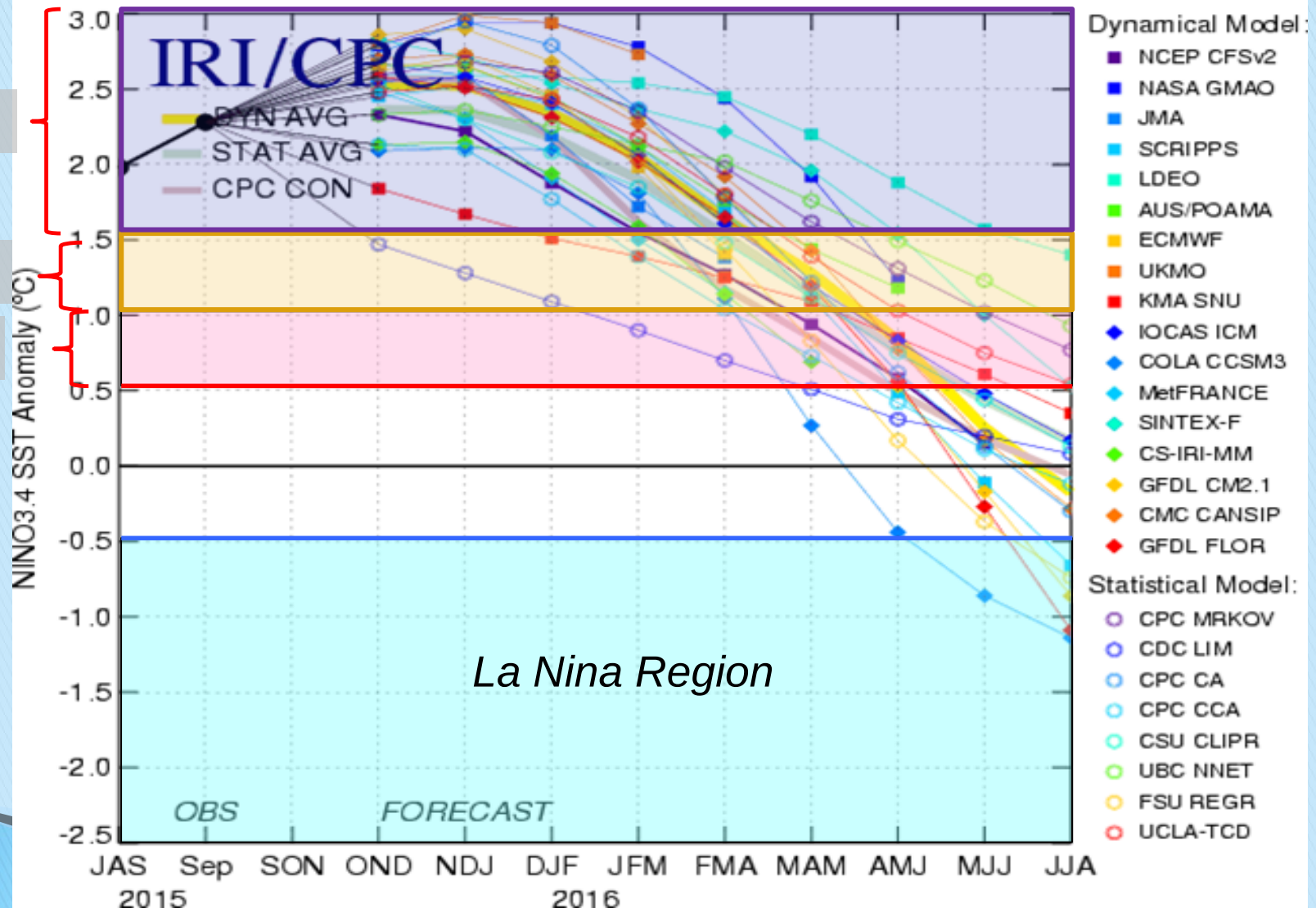
Mid-Apr 2015 Plume of Model ENSO Predictions





El Nino Outlook – Oct 2015

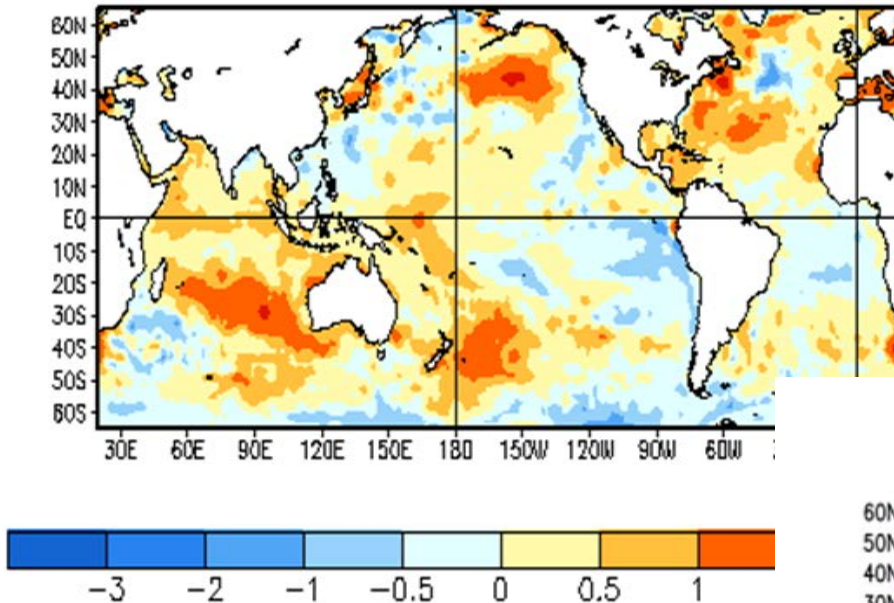
Mid-Oct 2015 Plume of Model ENSO Predictions





Latest Ocean Temperatures

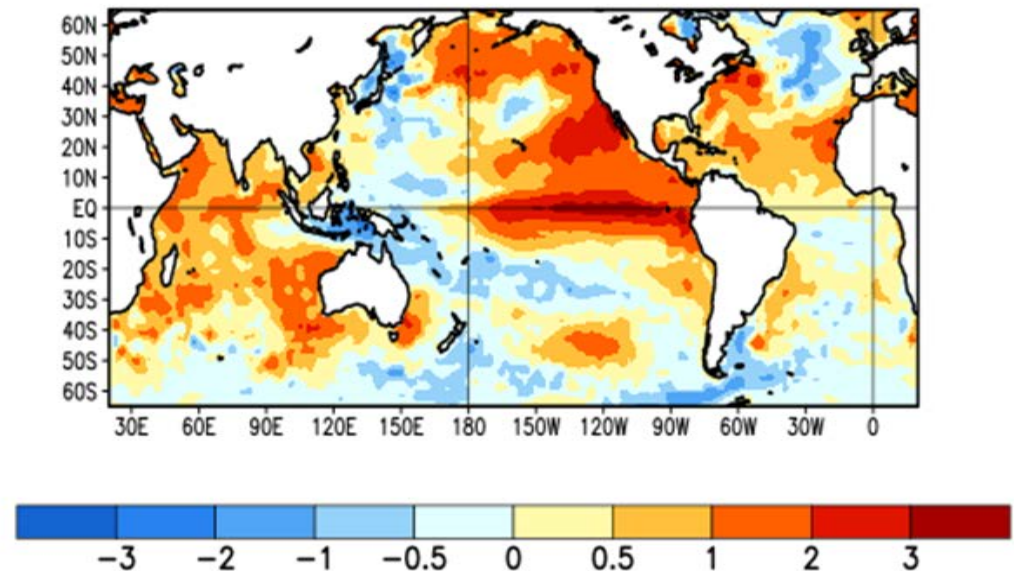
Average SST Anomalies
27 OCT 2013 – 23 NOV 2013



November 2013: Negative
PDO/Neutral ENSO

- Colder than normal water hugging U.S. West coast
- Warmer than normal water over North Central Pacific

Average SST Anomalies
4 OCT 2015 – 31 OCT 2015



October 2015: Positive
PDO/Strengthening El Nino

- Warmer than normal water hugging U.S. West coast
- Colder than normal water over the West and Central Pacific



Jan-Feb-Mar El Nino Precipitation Distribution (in) for Arizona

KEY

Upper
1/3 cases

Middle
1/3 cases

Lower
1/3 cases

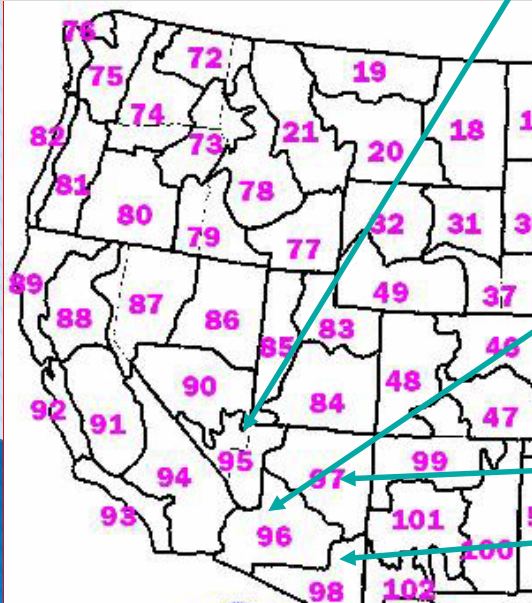
90%tile

67%tile

Median

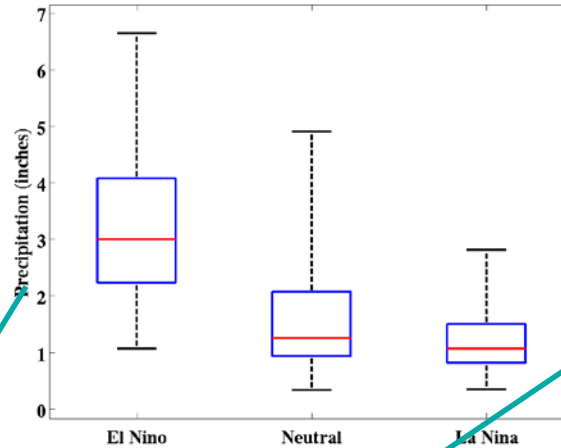
33%tile

10%tile



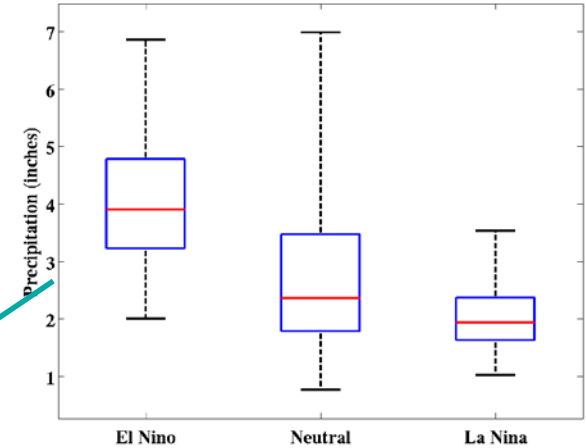
Climate Division 95

JFM Precipitation Distribution for Climate Div. #095



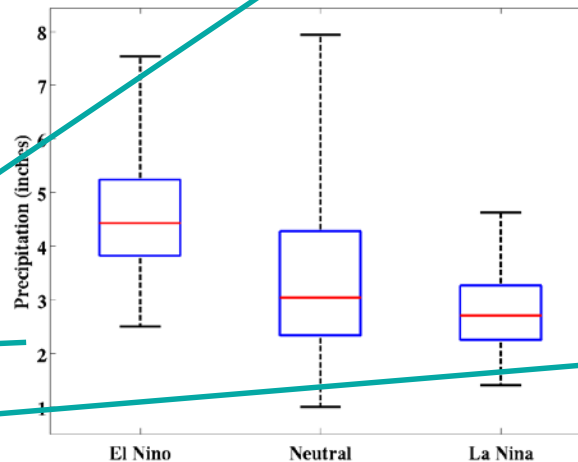
Climate Division 96

JFM Precipitation Distribution for Climate Div. #096



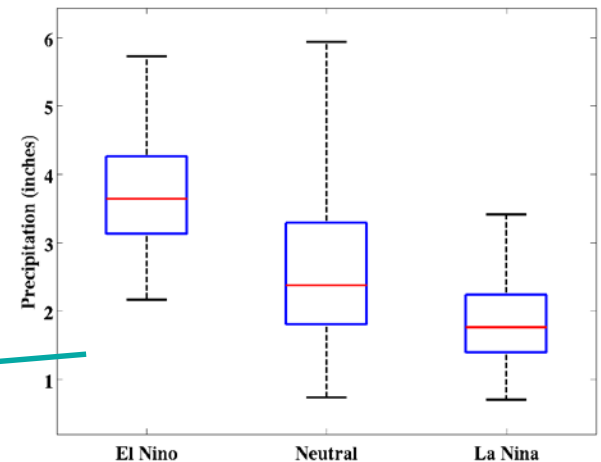
Climate Division 97

JFM Precipitation Distribution for Climate Div. #097



Climate Division 98

JFM Precipitation Distribution for Climate Div. #098

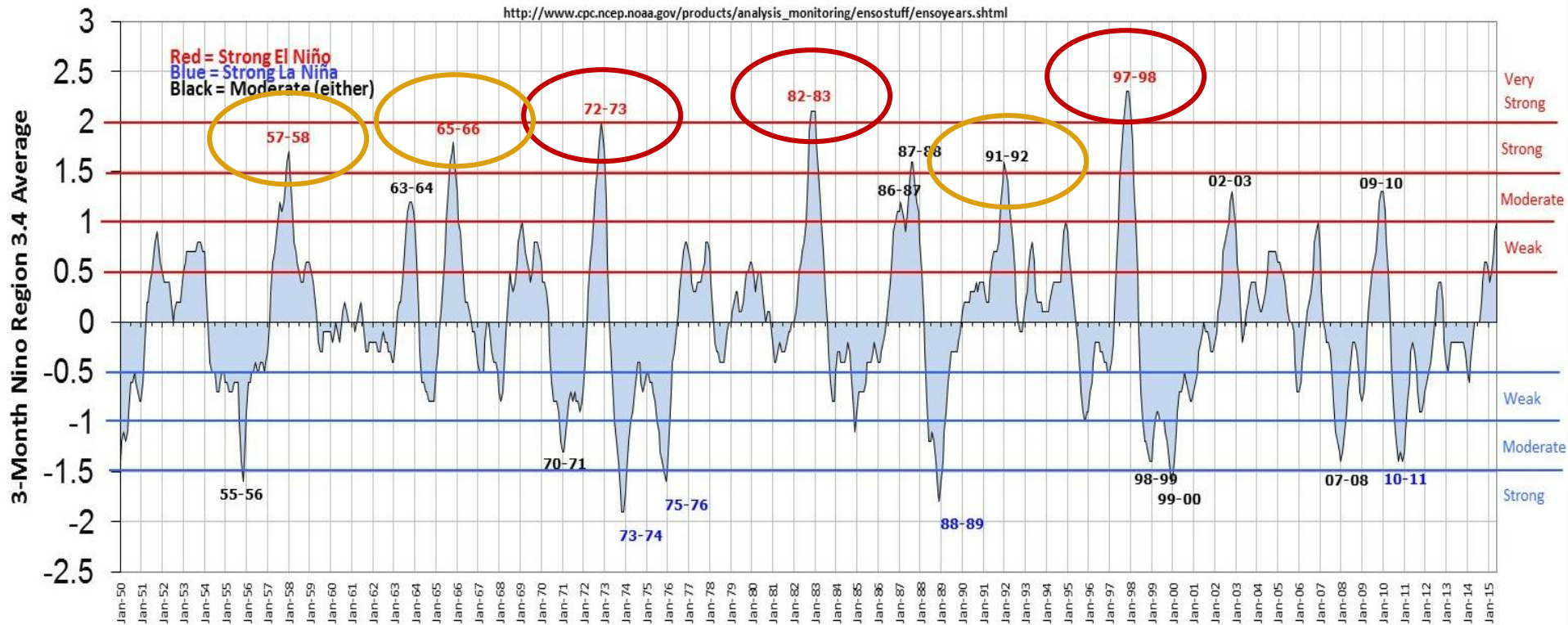


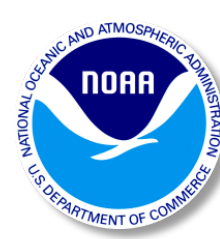


Historical Strong El Nino

Oceanic Niño Index (ONI)

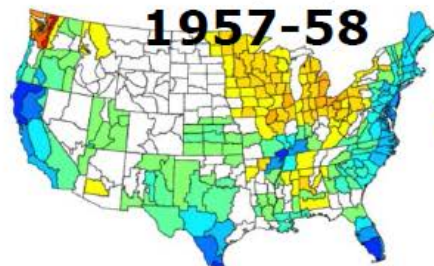
http://www.cpc.ncep.noaa.gov/products/analysis_monitoring/ensostuff/ensoyears.shtml



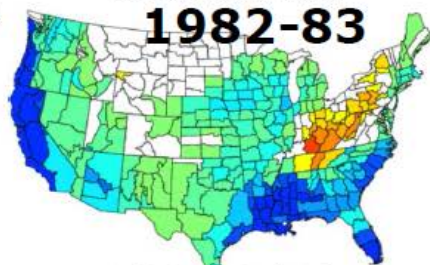


Precipitation Anomalies

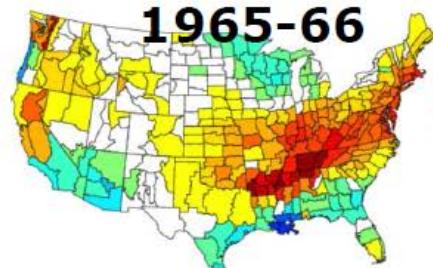
Precipitation Anomalies (inches)
Nov to Mar 1957-58
Versus 1950-2007 Longterm Average



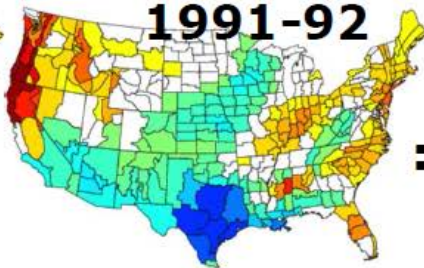
Precipitation Anomalies (inches)
Nov to Mar 1982-83
Versus 1950-2007 Longterm Average



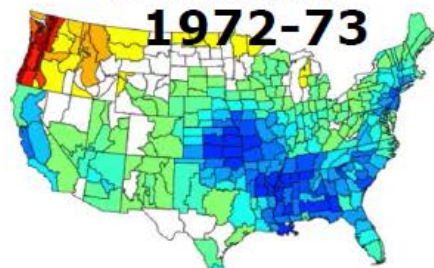
Precipitation Anomalies (inches)
Nov to Mar 1965-66
Versus 1950-2007 Longterm Average



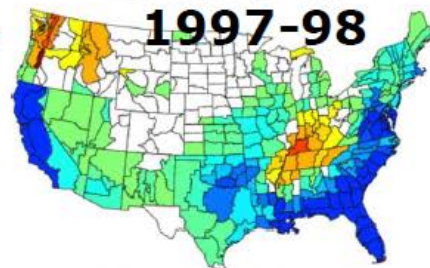
Precipitation Anomalies (inches)
Nov to Mar 1991-92
Versus 1950-2007 Longterm Average



Precipitation Anomalies (inches)
Nov to Mar 1972-73
Versus 1950-2007 Longterm Average

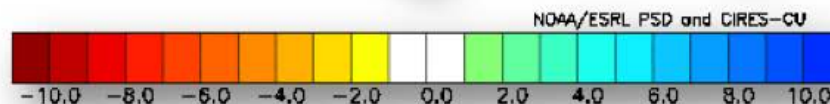
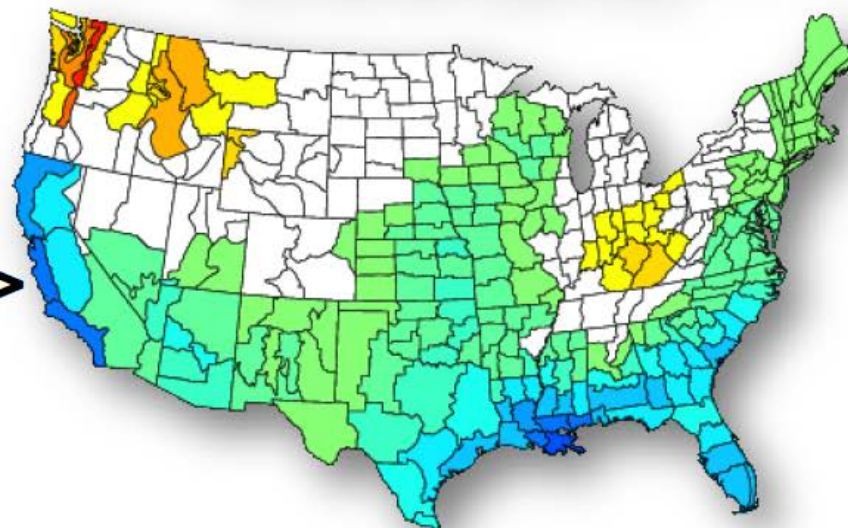


Precipitation Anomalies (inches)
Nov to Mar 1997-98
Versus 1950-2007 Longterm Average

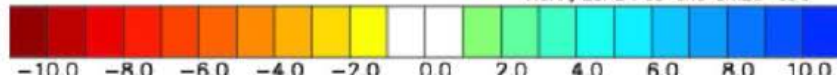


Composite

NOAA/NCDC Climate Division Composite Precipitation Anomalies (in)
Nov to Mar 1957-58, 1965-66, 1972-73, 1982-83, 1991-92, 1997-98
Versus 1950-2007 Longterm Average



NOAA/ESRL PSD and CIRES-CDC

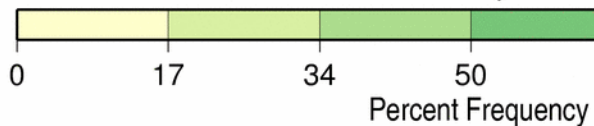
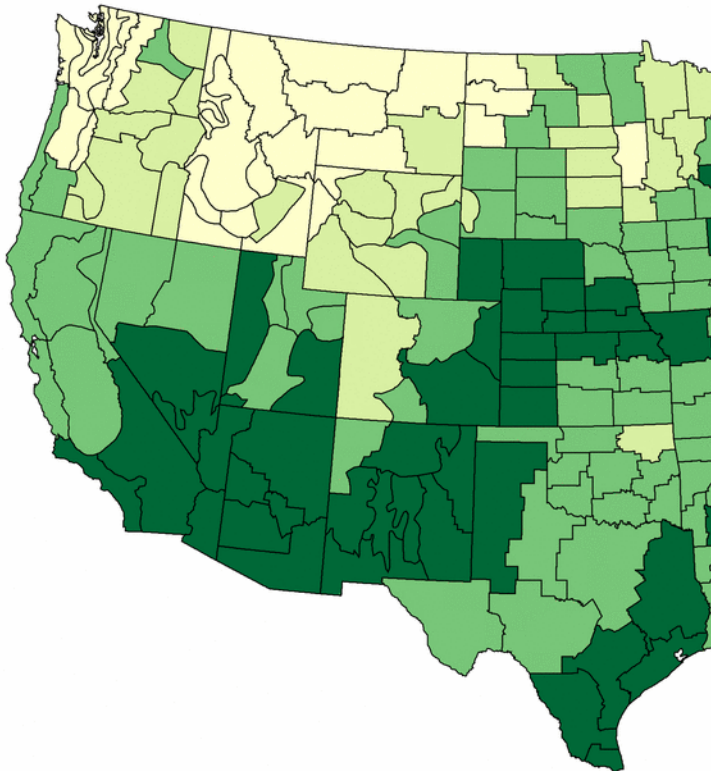




Precipitation Frequency during Strong El Niño Winters

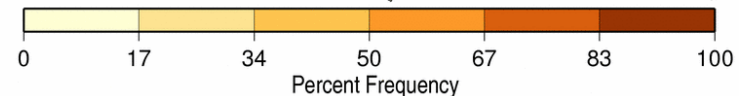
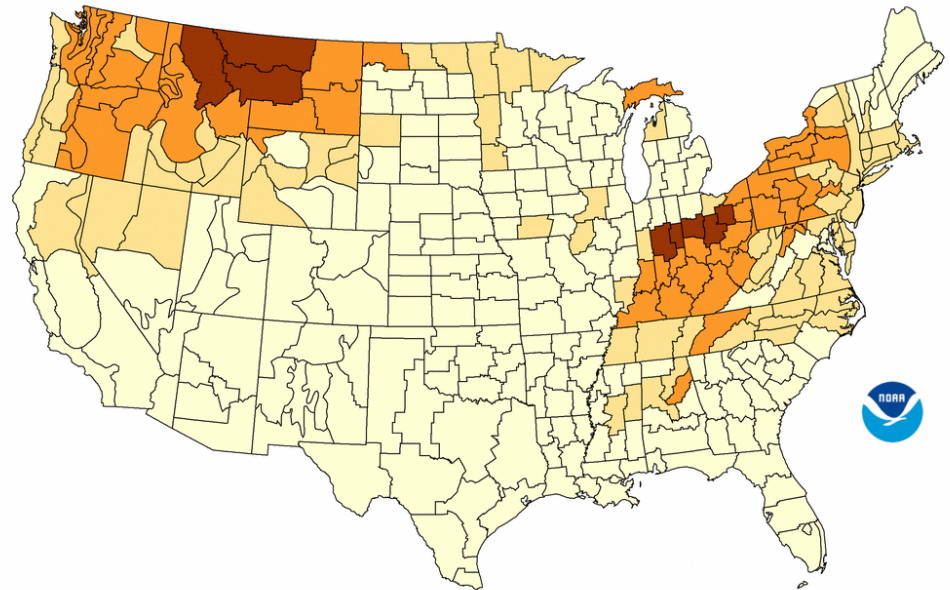
Frequency of Strong El Niños Ending in Wettest Third of Historical Record

Composite: October–March 1957–58, 1965–66, 1972–73, 1982–83, 1991–92, 1997–98



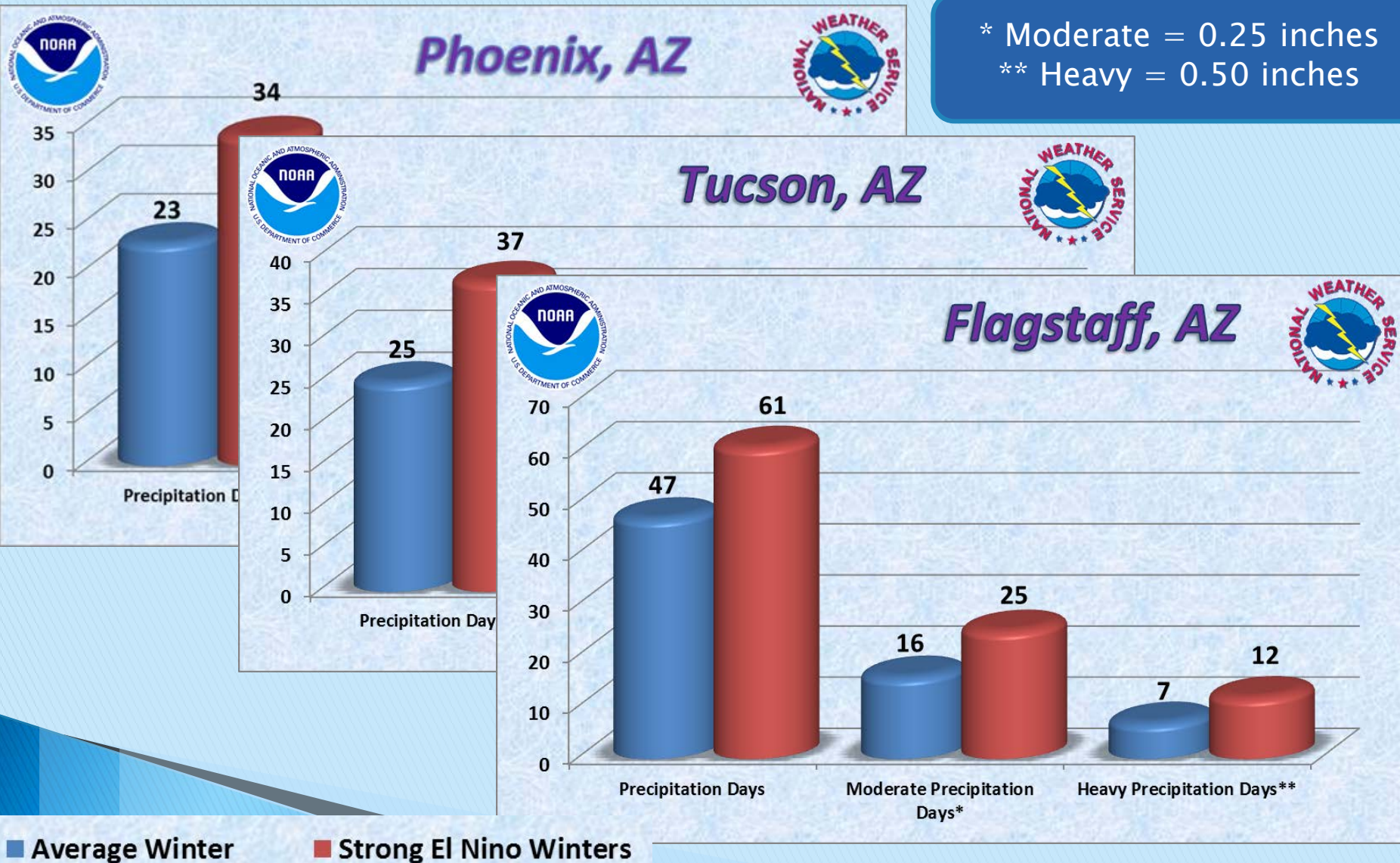
Frequency of Strong El Niños Ending in Driest Third of Historical Record

Composite: October–March 1957–58, 1965–66, 1972–73, 1982–83, 1991–92, 1997–98





Number of Precipitation Days during Strong El Nino Winters

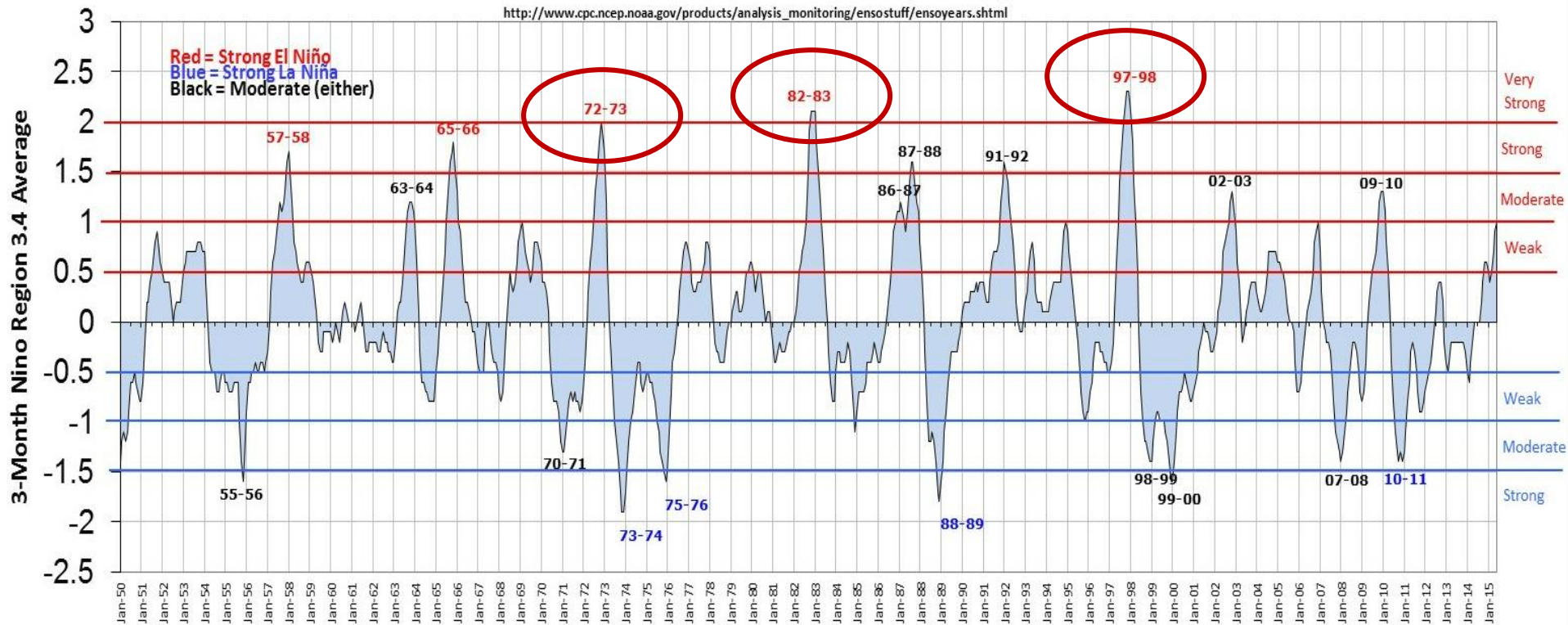




Historical Strongest El Nino

Oceanic Niño Index (ONI)

http://www.cpc.ncep.noaa.gov/products/analysis_monitoring/ensostuff/ensoyears.shtml

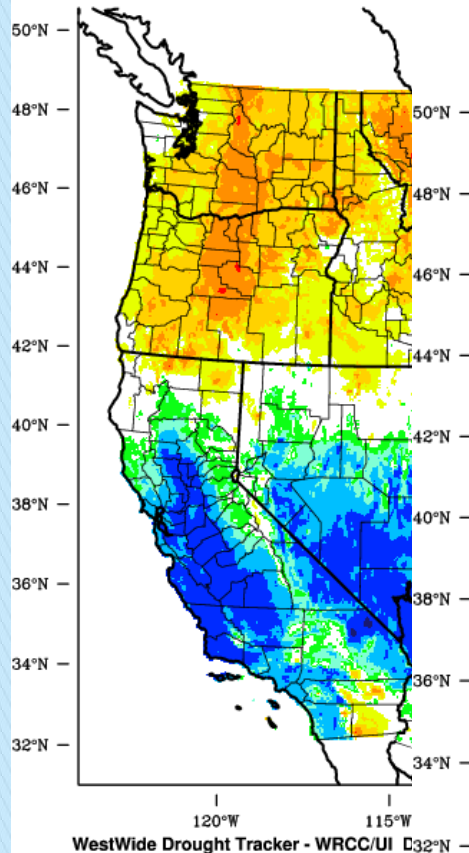




Strongest 3 El Nino Winter Precipitation Totals

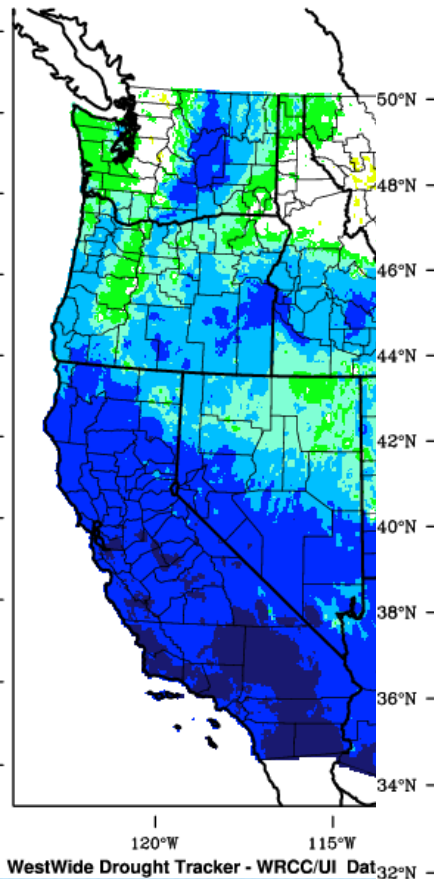
Western United States - Precipitation

November-March 1973 Percent of 1981-2010 Normal



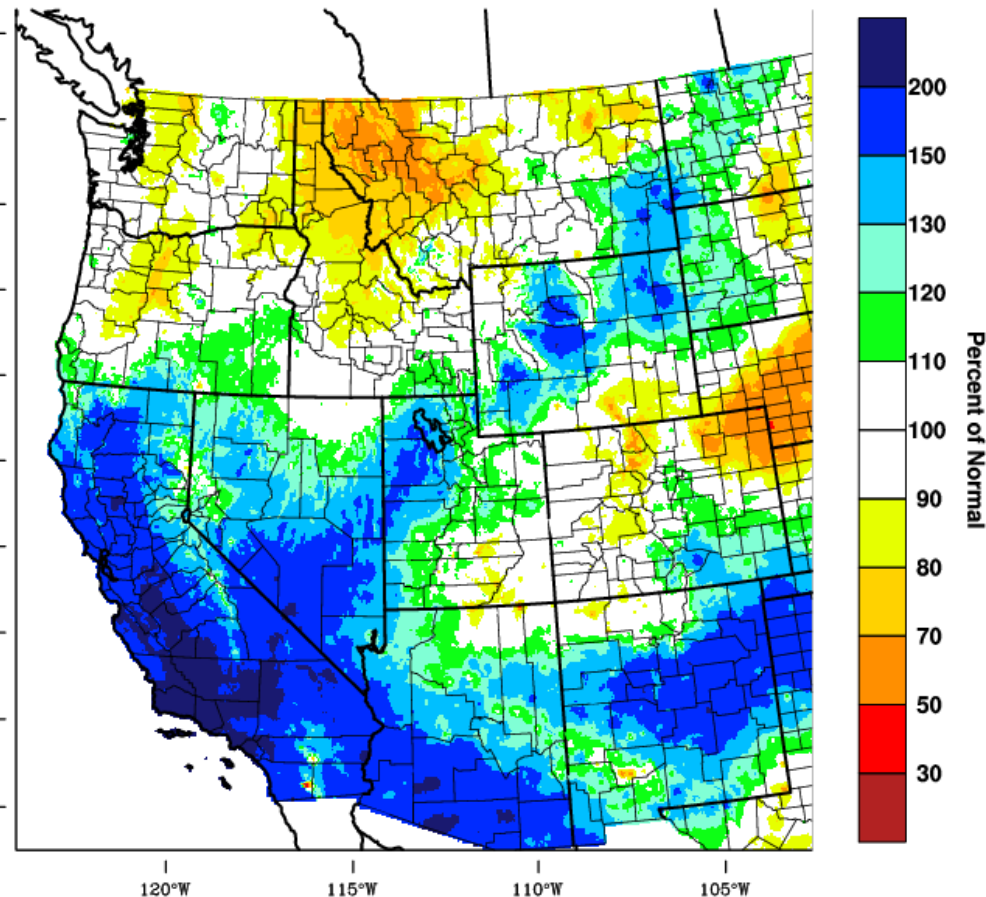
Western United States - Precipitation

November-March 1983 Percent of 1981-2010 Normal



Western United States - Precipitation

November-March 1998 Percent of 1981-2010 Normal



Percent of Normal

200
150
130
120
110
100
90
80
70
50
30

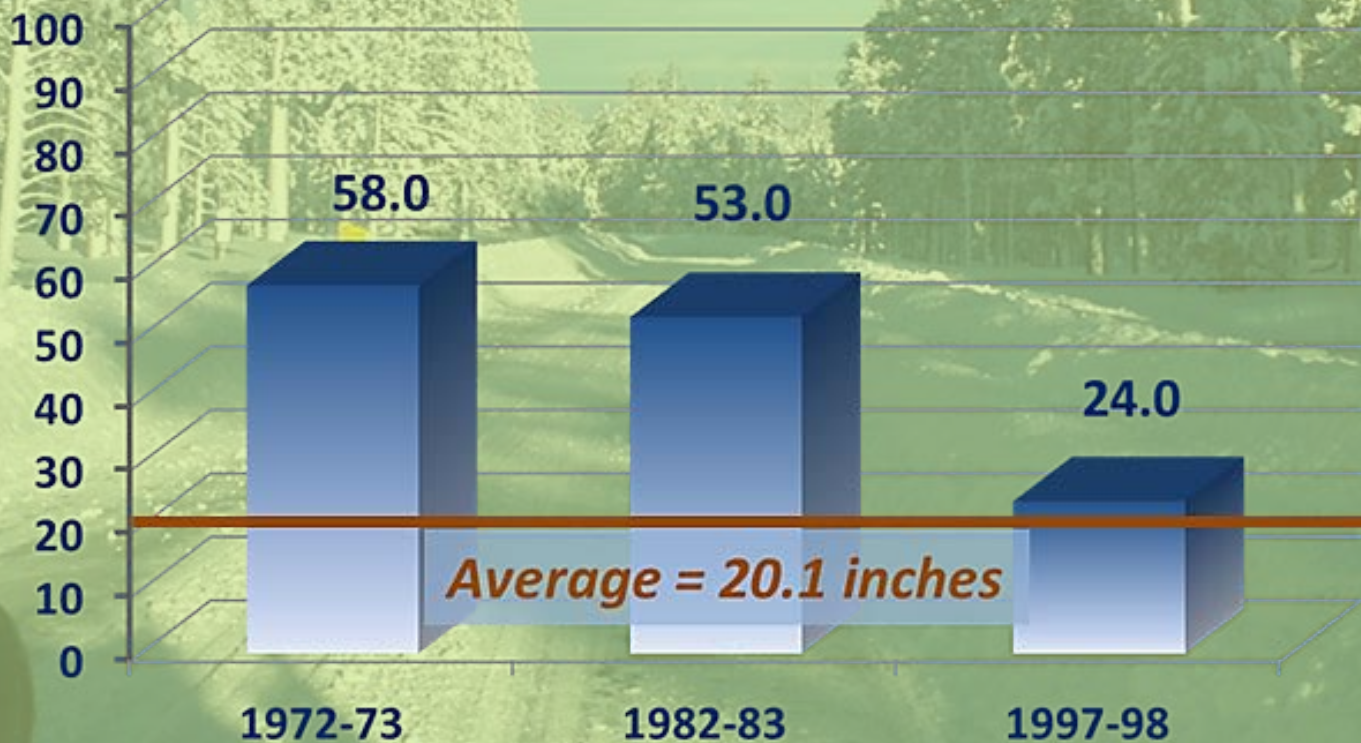


Strongest 3 El Nino Snowfall

Flagstaff, AZ Seasonal Snowfall

Pinetop, AZ Seasonal Snowfall

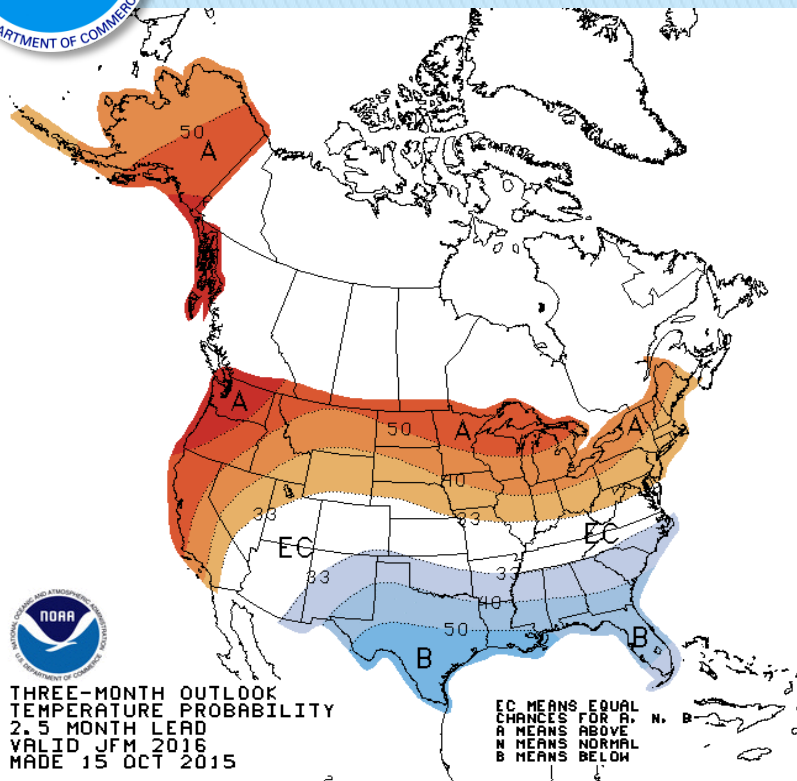
Payson, AZ Seasonal Snowfall





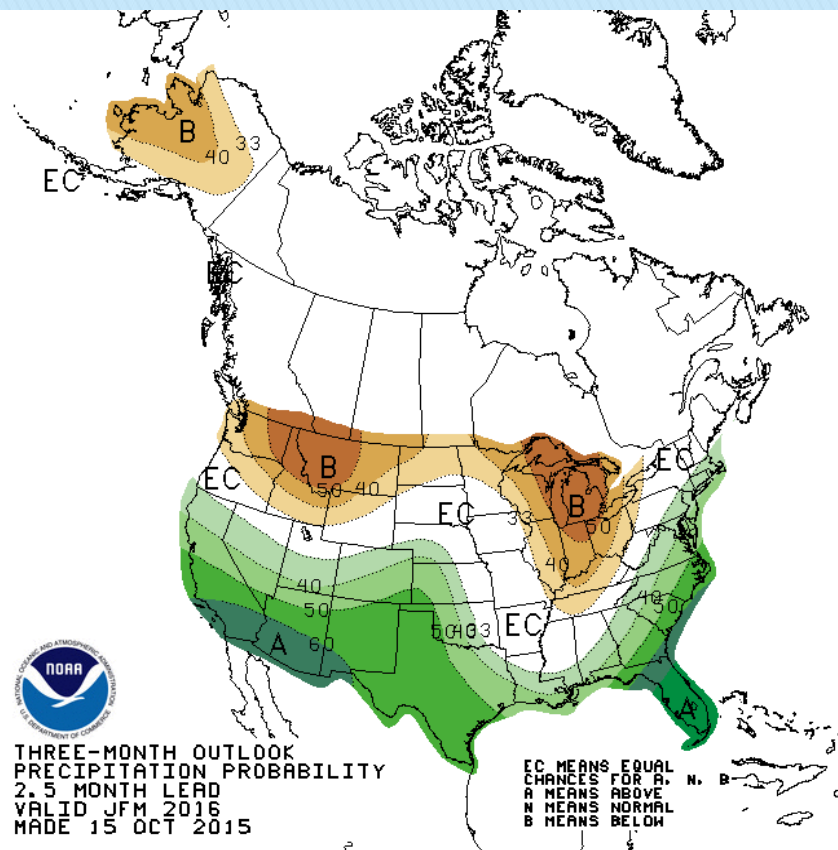
Outlook: Jan/Feb/Mar 2016

Three-month averages
Shading indicates chances
of above/below normal



Near equal odds for above,
below, or near normal
temperatures

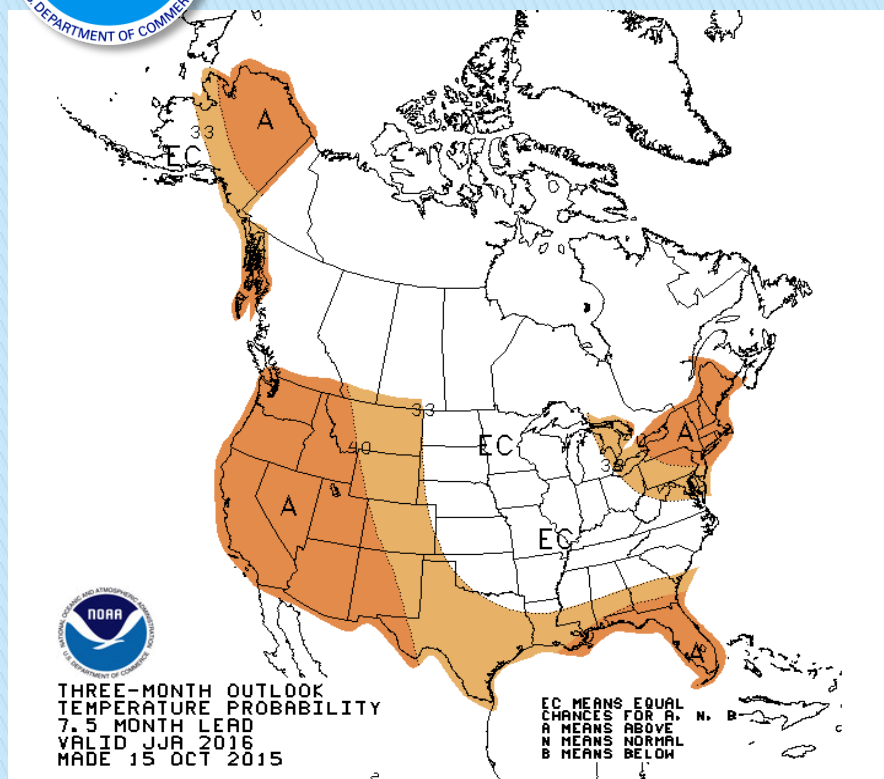
Much better odds of above
average precipitation





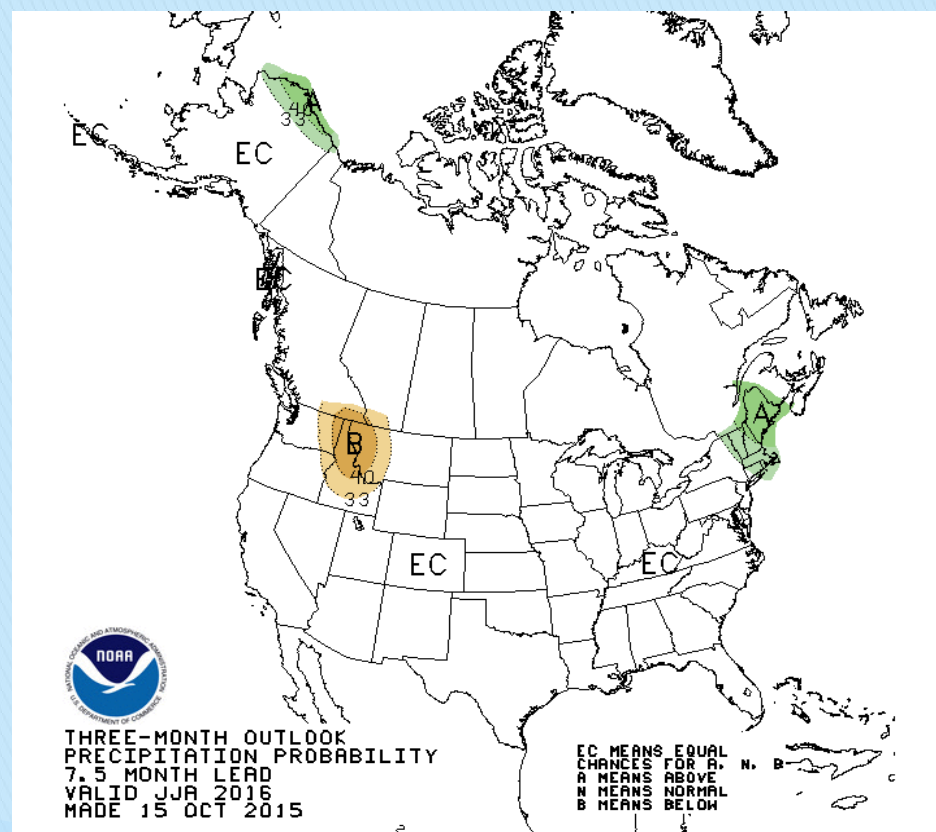
Outlook: Jul/Aug/Sep 2016

Three-month averages
Shading indicates chances
of above/below normal



Temperatures most likely
warmer than normal

No tilt in odds for
precipitation totals





Summary

- ▶ The outlook for winter 2015–16 indicates a **better than 95% chance** for El Nino conditions continuing into the Spring
- ▶ This will very likely be a **strong** El Nino episode with a gradually weakening into Spring 2016
- ▶ El Nino will be the **dominant mechanism** influencing weather patterns this winter
- ▶ These strong El Nino episodes have the **most predictable influence** for wet weather across Arizona
- ▶ Odds are decidedly shifted towards **wetter than normal winter**, though no signal exists for temperatures
- ▶ The 2015 summer outlook favors better chances for above normal temperatures, but no precipitation signal



Questions? Contact us!

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