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Ag-Weather Update: Review of Summer Growing Season & Update on the Wet Forecast for Fall & Winter

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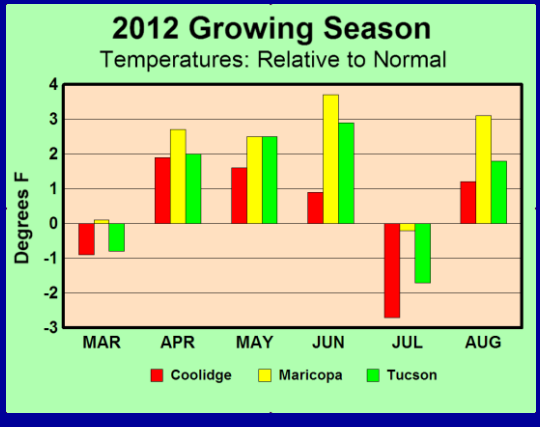
GROWING SEASON TEMPERATURES



--Cool March, Warm Spring & Early Summer, Cool July, Tough August.

--Prescription For Excellent Fruit Retention During Primary Bloom.

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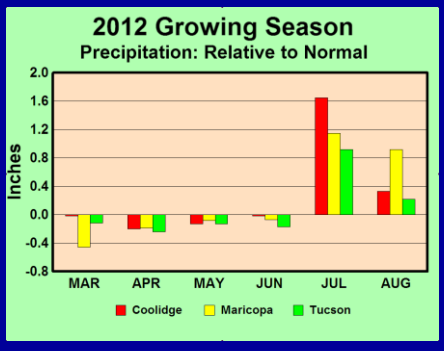
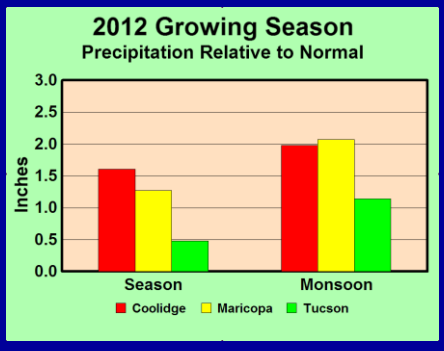
GROWING SEASON PRECIPITATION





-- Dry Spring, Wet Monsoon.

-- Above Normal Precipitation for Growing Season Driven By Wet Monsoon.

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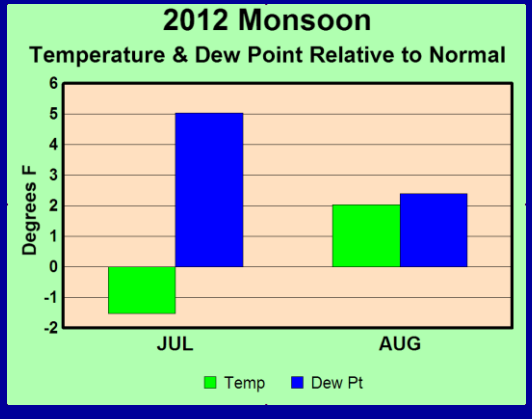
SUMMER WEATHER



-- Above Normal Dew Points in Both Monsoon Months.

-- Cool July; Temperatures Cooled Each Time Humidity Increased.

-- Difficult August: Above Normal Temperatures & Humidity.

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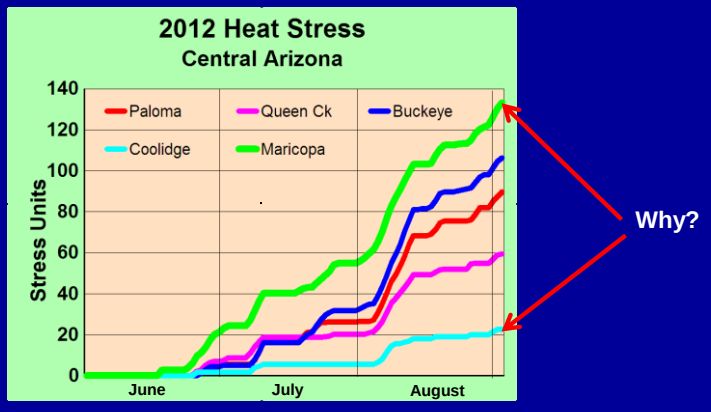
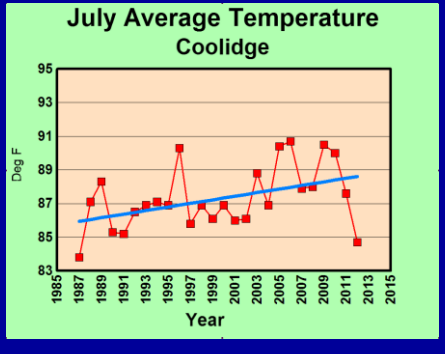
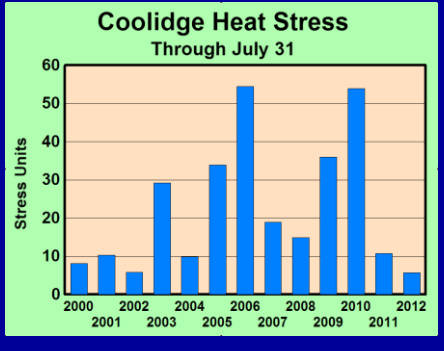
HEAT STRESS BY LOCATION



-- Limited Heat Stress in June & July
-- Very Difficult Stretch of Level 2 Stress From 6-14 August
-- Less Stressful on East Side
-- Buckeye & Maricopa Received Greatest Stress

WARMING TREND

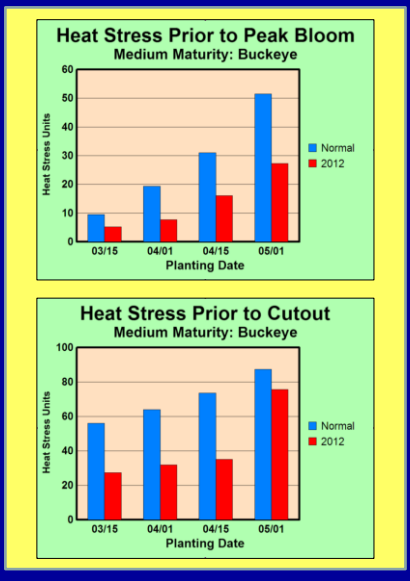


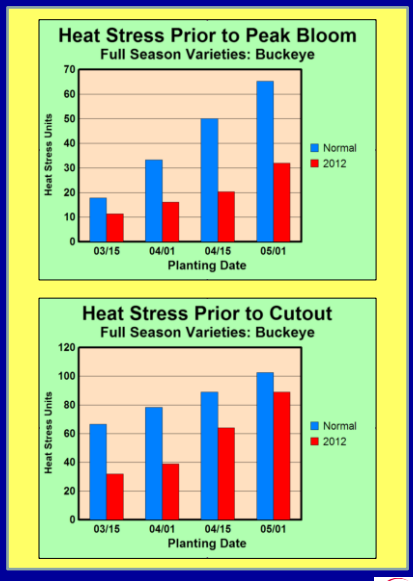


-- Warming Trend Less Apparent at Coolidge

-- Better Indicator of Heat Stress Relative to Past Years

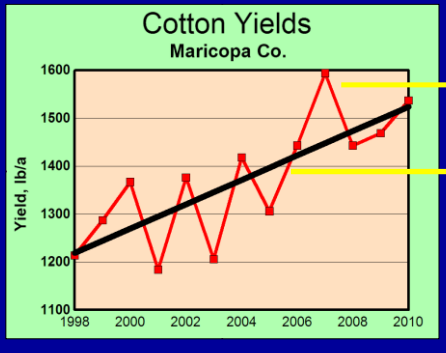
HEAT STRESS BY PLANTING DATE

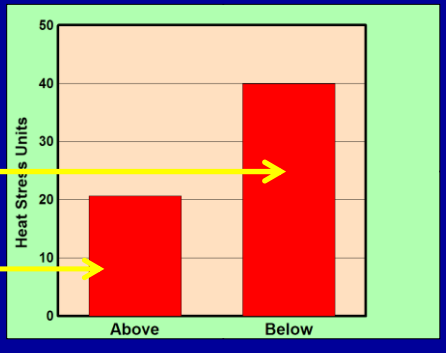




Less Stress @ Peak Bloom & Cutout, Especially Early Plantings

HEAT STRESS & YIELDS

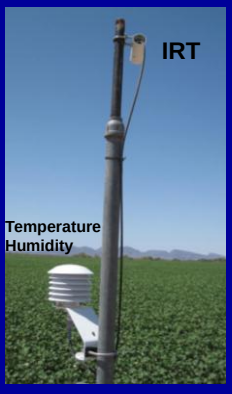


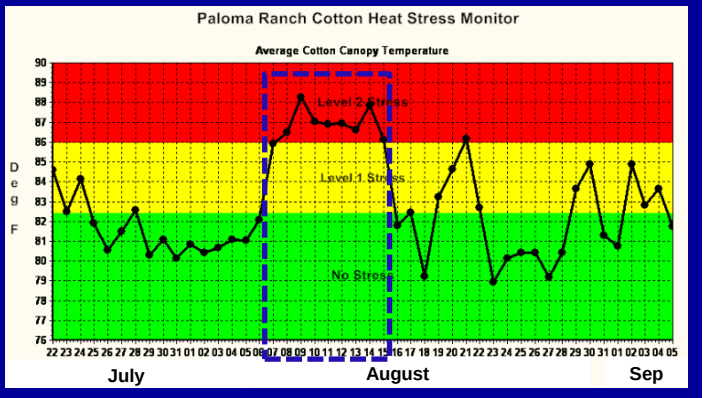


Years above trend line subjected to 50% less heat stress prior to peak bloom.

REAL TIME MONITORING

http://128.196.12.87:85/





--Real Time Assessment of Heat Stress

--Canopy Temperature Model Assessment/Improvement

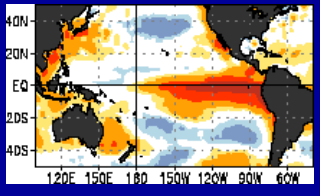
EL NIÑO UPDATE

CLIMATE PREDICTION CENTER/NCEP/NWS
and the International Research Institute for Climate and Society
6 September 2012

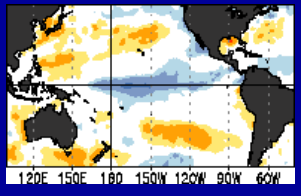
ENSO Alert System Status: El Niño Watch

Synopsis: El Niño conditions are likely to develop during September 2012.

El Niño Southern Oscillation (ENSO)



El Niño



La Niña

Oscillation of sea surface temperatures and wind flow in tropical Pacific Ocean

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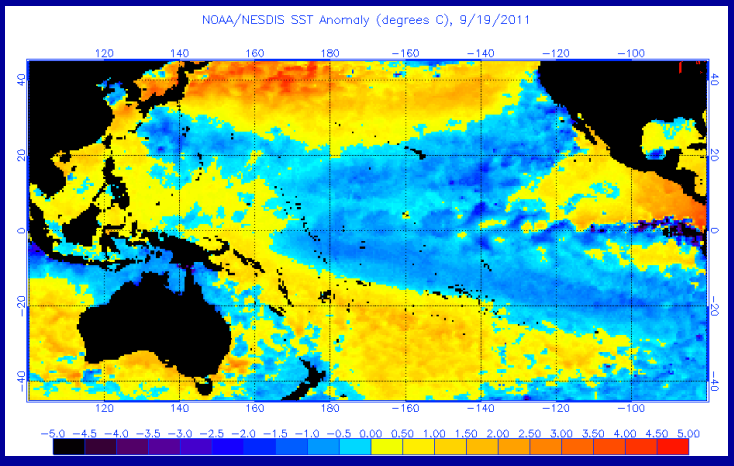
TROPICAL PACIFIC OCEAN

Last Year



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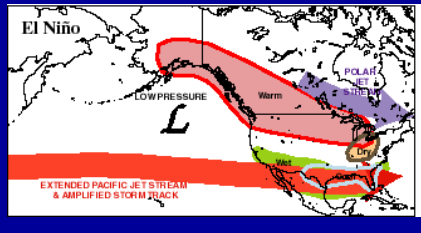
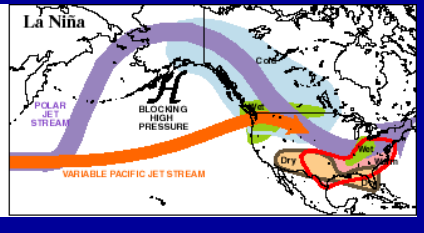
ENSO ALTERS CIRCULATION OF ATMOSPHERE

El Niño



Storm track often sets up in a more southerly location that allows wet, relatively warm storms to enter the Southwest.

La Niña



Circulation sets up in ridging pattern that diverts storms north of the Southwest leading to very dry conditions.

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AREAS IMPACTED BY ENSO

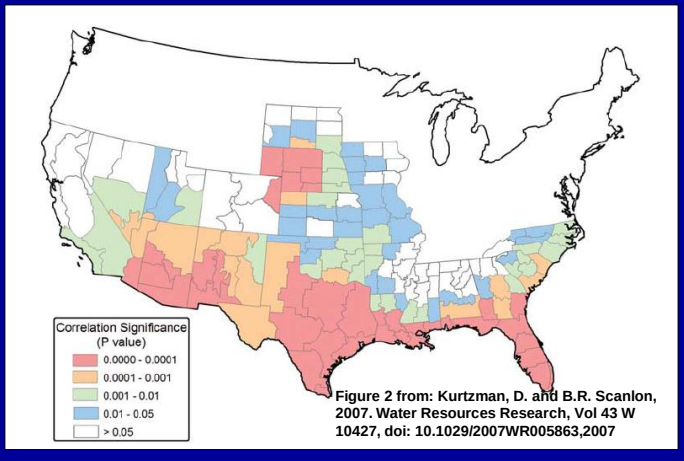
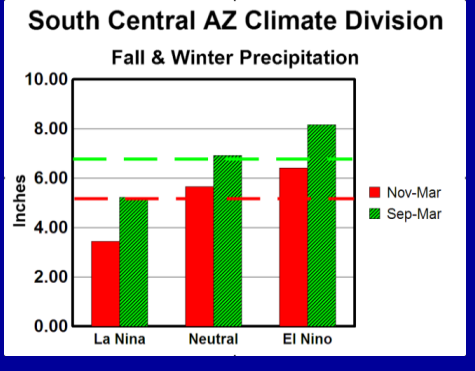


Figure 2 from: Kurtzman, D. and B.R. Scanlon, 2007. Water Resources Research, Vol 43 W 10427, doi: 10.1029/2007WR005863,2007

Pink & Orange Areas Exhibit Highest Correlation With ENSO Phase

FALL/WINTER PRECIPITATION

South Central Arizona



South Central Climate Division
Maricopa & Pinal Counties

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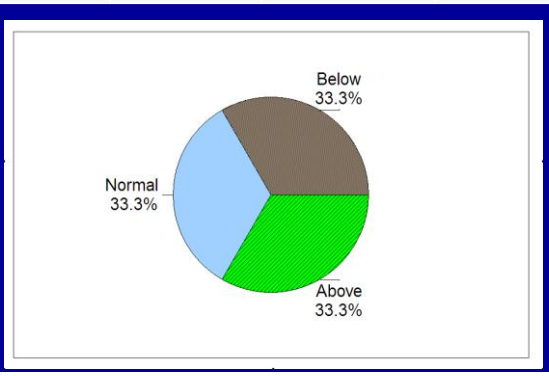
UNDERSTANDING NORMALS

South Central Arizona

Precipitation	Nov-Mar	Sep-Mar	Sep-Oct
Below Normal	<2.98”	<5.56”	<1.65”
Normal	2.98-4.91”	5.56-8.07”	1.65-2.78”
Above Normal	>4.91”	>8.07”	>2.78”
Average	4.77”	7.26”	2.49”



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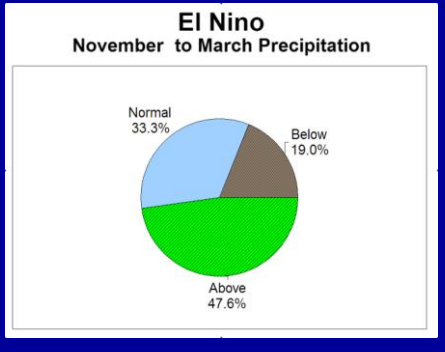
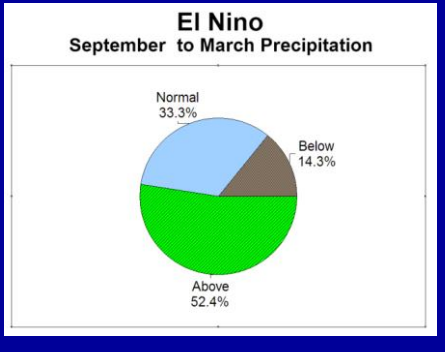
EL NIÑO

Winter & Fall + Winter Precipitation





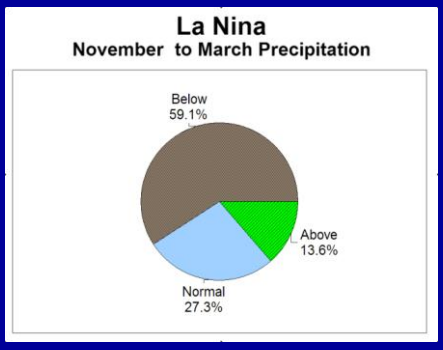
Above Normal: 47.6% of Time
Above Average: 66.7% of Time

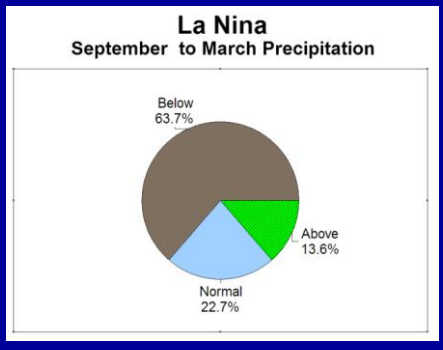
Above Normal: 52.4% of Time
Above Average: 71.4% of Time

Note! Higher Probabilities When Fall & Winter Combined. May Represent Occasional Fall Tropical Storms During El Niño Years.

LA NIÑA

Winter & Fall + Winter Precipitation





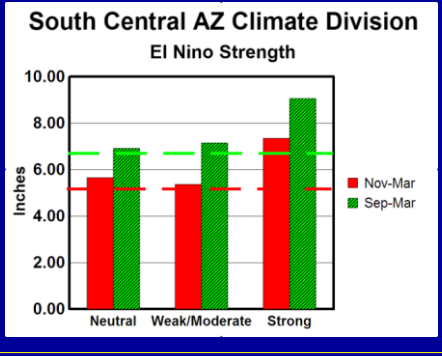
Below Normal: 59.1% of Time
Below Average: 86.4% of Time

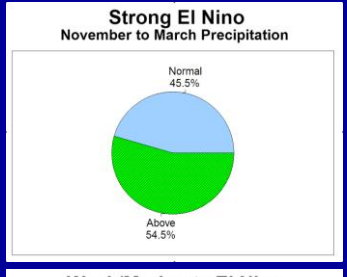
Below Normal: 63.7% of Time
Below Average: 72.7% of Time

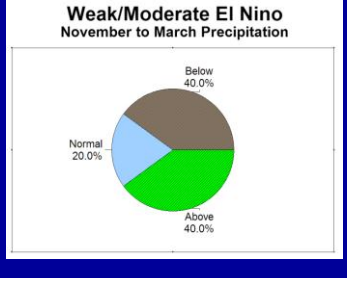
Precipitation Forecasts During La Niña Years Are More Reliable – Dry!

WHAT ABOUT THIS YEAR?

El Niño Forecasted to Reach Weak to Moderate Strength



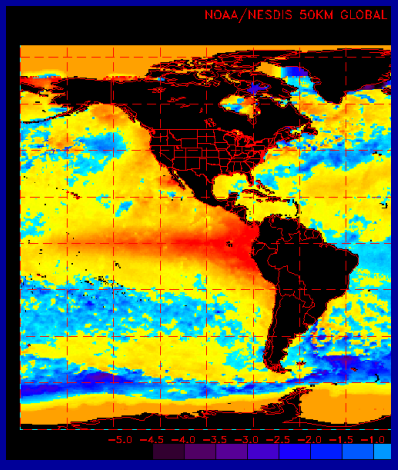




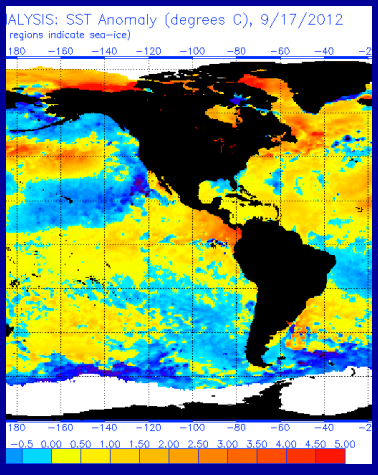
Precipitation totals are nearly the same in years with neutral and weak to moderate El Niño conditions. The probabilities of below normal & above normal precipitation are similar in weak/moderate El Niño years.

Precipitation forecasts are less definitive with weak/moderate El Niño's.

STRONG vs. WEAK

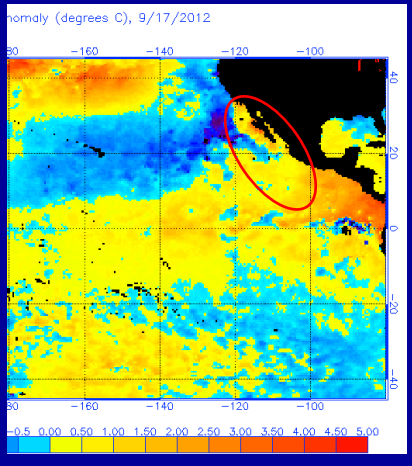


Strong
September 1997



Weak
September 2012

SEPTEMBER & OCTOBER



<u>All El Niño Falls</u>

--Above Normal: 38%

--Normal: 38%

--Below Normal: 24%

<u>Weak/Moderate El Niño Falls</u>

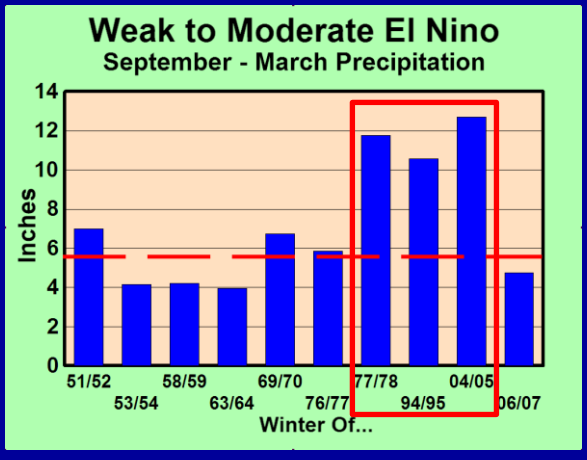
--Above Normal: 60%

--Normal: 30%

--Below Normal: 10%

Longer Monsoon?? Occasional Stronger Tropical Storms??

WEAK/MODERATE EL NIÑO



Heavy Precipitation In Three of Last Four Times With Weak/Moderate El Niño

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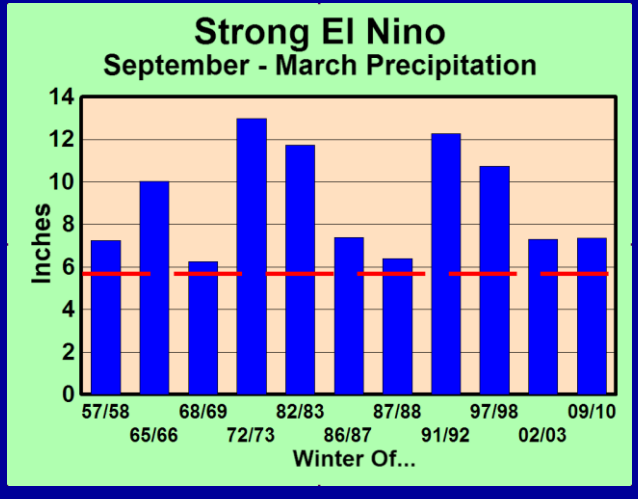
STRONG EL NIÑO



Strong El Niño Years: Far More Definitive Forecast for Wet Falls/Winters

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PACIFIC DECADAL OSCILLATION

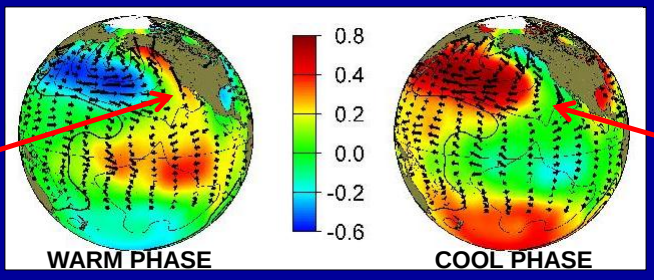
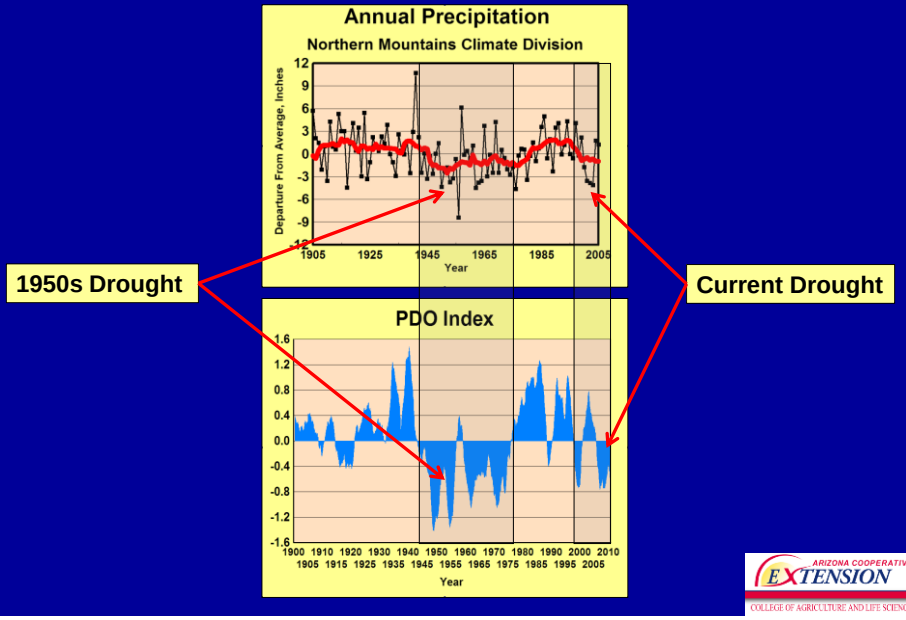


Figure: Joint Institute for Study of the Atmosphere and Ocean, Univ. of Washington

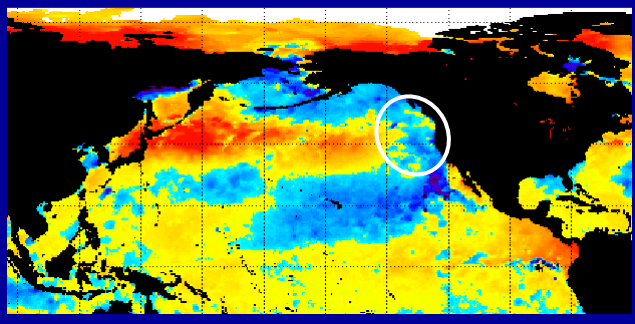
Longer term fluctuation in the temperature of the Pacific Ocean. Warm & cool phases relate to Pacific coast of US. Much greater changes occur in northern Pacific & exhibit opposite temperature anomalies.

PDO & LONGER TERM PRECIPITATION

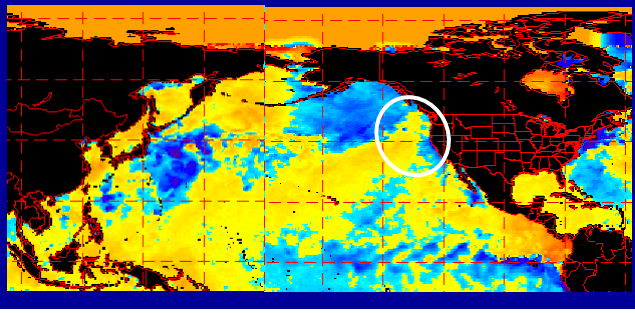


PDO

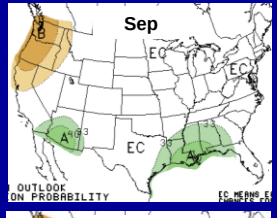
2012
Cold Phase

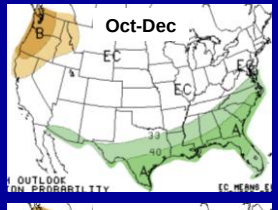


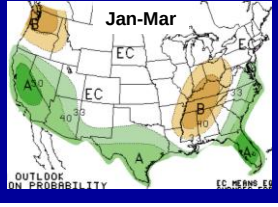
1996
Warm Phase



TAKE HOME MESSAGE







- El Niño Developing
  - Weak to Moderate Strength
- Falls/Winters Trend Wet
- Long Range Forecasts
  - Fall: Wet Bias
  - Winter: Wet Bias (Esp. Late)
- Weak/Moderate El Niño
  - Less Definitive Precipitation
  - Last 4 Occurrences
    - 1977/78: 174% of Average
    - 1994/95: 157% of Average
    - 2004/05: 188% of Average
    - 2006/07: 70% of Average
- Late Development
  - Wet Later in Winter?

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QUESTIONS???

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