What Can We Expect From El Nino This Winter?

Alert Users Group
2015 Fall Meeting and Winter Workshop

September 2015

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• What is El Niño?

• How is the current El Niño expected to develop?

• What can we expect in terms of seasonal precipitation from El Niño?
Through May 2015

MULTIVARIATE ENSO INDEX

NOAA ESRL ("CDC"), Wolter and Timlin
El Niño development and then influences on atmosphere.
Weather Outlook 2015-16

El Nino can bring:

more of a consolidated elongated Pacific Jet
Jet Stream Departure from normal

2013-2015

Strong El Nino years
Sea Surface Temperature Anomaly

2013-2015

Strong El Nino years
All ENSO + and All ENSO minus 1972, 1982 and 1997

Composite Precipitation Anomalies (inches)
Versus 1981-2010 Longterm Average

Precipitation October to April
1.5 strong El Nino ONI but peaked too early at 1.8 in OND

Strong El Nino but dry in Norcal

NOAA/NCDC Climate Division Precipitation Anomalies (in)
Oct to Apr 1965–66
Versus 1981–2010 Longterm Average

1965-66

Dry

Wet start

October to April
Major El Nino 2.0-2.3 ONI
Classic seasons of ENSO +

Precipitation Anomalies (inches)
Oct to Apr 1982–83
Versus 1981–2010 Longterm Average

Precipitation Anomalies (inches)
Oct to Apr 1997–98
Versus 1981–2010 Longterm Average

1982-83  October to April  1997-98
Precipitation All Strong El Nino Month by Month
Sea Surface Temperature Niño Regions
Observed Sea Surface Temperature
Observed Sea Surface Temperature

Observed Sea Surface Temperature Anomalies (°C)

WARM

2014

Now
Mid-May 2015 Plume of Model ENSO Predictions

IRI/CPC

NINO3.4 SST Anomaly (°C)

OBS  FORECAST

FMA 2015  Apr  AMJ  MJJ  JJA  JAS  ASO  SON  OND  NDJ  DJF  JFM 2016

Dynamical Model:
- NCEP CFSv2
- NASA GMAO
- JMA
- SCRIPPS
- LDEO
- AUS/POAMA
- ECMWF
- UKMO
- KMA SNU
- ESSIC ICM
- COLA CCSM3
- MeI FRANCE
- SINTEX-F
- CS-IRI-MM
- GFDL CM2.1
- CMC CANSIP
- GFDL FLOR

Statistical Model:
- CPC MKOV
- CDC LIM
- CPC CA
- CPC CCA
- CSU CLIPR
- UBC NNET
- FSU REGR
- UCLA TCD
- UNB/CWC
Mid-Sep 2015 Plume of Model ENSO Predictions

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Missing Years of Precipitation
1 to 2 years worth needed

The Missing Years
Since October 2011, nearly all of California is “missing” at least a year’s worth of rainfall. Parts of the southern Sierra Nevada and Los Angeles basin are missing over two year’s worth.

Credit Paul Iniguez
8-Station Index (Northern Sierra Precipitation)

Cumulative Actual Precipitation Vs. Cumulative Normal

October 2011 - June 2015

Normal Annual Precip: 50.0"

198.8 inches

45.59" Deficit

153.21 inches
5-Station Index (Central Sierra Precipitation)
Cumulative Actual Precipitation Vs. Cumulative Normal
October 2011 - June 2015

Normal Annual Precip: 40.8"

Actual Cumulative Precip
Normal Cumulative Precip

161.62 inches
72.18"
Deficit

89.44 inches
6-Station Index (Southern Sierra Precipitation)
Cumulative Actual Precipitation Vs. Cumulative Normal
October 2011 - June 2015

Normal Annual Precip: 29.3"

116.10 inches
52.09" Deficit
64.01 inches

Actual Cumulative Precip
Normal Cumulative Precip
CA Division 2 October-March Precipitation
(versus Southern Oscillation Index for prior June-November)

Years 1933/1934-2013/2014
$r^2 = 0.05$
Correlation $= -0.22$
Mean $= 32.83$ in
Mean all $= 29.44$ in
Mean $= 28.8$ in
Mean $= 28.0$ in

Western Regional Climate Center
CA Division 5 October-March Precipitation
(versus Southern Oscillation Index for prior June-November)

Years 1933/1934-2013/2014
$r^2 = 0.09$
Correlation = -0.3

Mean = 19.21 in
Mean all = 16.83 in
Mean = 16.83 in
Mean = 14.91 in

Western Regional Climate Center
CA Division 6 October-March Precipitation
(versus Southern Oscillation Index for prior June-November)

Years 1933/1934-2013/2014
$r^2 = 0.22$
Correlation = -0.47

Mean = 19.89 in
Mean = 15.45 in
Mean all = 15.30 in
Mean = 11.27 in

Western Regional Climate Center
CA 8-Station Index October-March Precipitation (versus Southern Oscillation Index for prior June-November)

Years 1933/1934-2013/2014
$r^2 = 0.02$
Correlation $= -0.13$

Mean = 47.4 in
Mean = 43.11 in
Mean all = 43.09 in
Mean = 41.38 in

Data Source: CA DWR
Western Regional Climate Center
CA 5-Station Index October-March Precipitation
(versus Southern Oscillation Index for prior June-November)

Years 1933/1934-2013/2014
$r^2 = 0.03$
Correlation = -0.17
Mean = 35.77 in
Mean all = 33.02 in
Mean = 32.74 in
Mean = 31.36 in

Data Source: CA DWR
Western Regional Climate Center
American River at Fair Oaks  Maximum 3-day Flow Each Winter (Daily Average) Adjusted Natural Flow
(versus Southern Oscillation Index for prior June - November)

Years used 1933/34 thru 1999/00.
Correlation $r = + 0.21$

Western Regional Climate Center
Summary of Expected El Nino Impacts

• El Nino is already strong and could be one of the strongest on record

• Temperatures will likely be above normal this winter in California

• Chances are high for above-normal precipitation in Southern California

• Chances for above-normal precipitation are less in Northern California

• Above-normal precipitation is most likely to occur in late winter and early spring
California Nevada River Forecast Center

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