

**NOAA**

# Annual US and Global Climate Analysis for 2015 and a preview of 2016

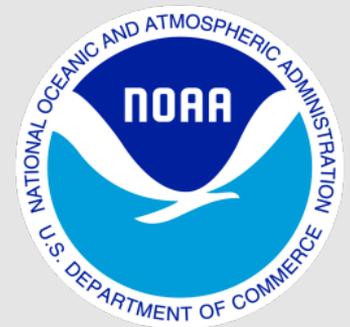
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NOAA's National Centers  
for Environmental Information*

January 28, 2016

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*Deputy Director  
NOAA's Climate Prediction Center*



# About this information

- Updated monthly at <http://www.ncdc.noaa.gov/sotc/>
  - US information on or about the 8<sup>th</sup>
  - Global information on or about the 20<sup>th</sup>
- Industry power users from:
  - Agriculture, Energy, Transportation, Retail, Science, Applied Science



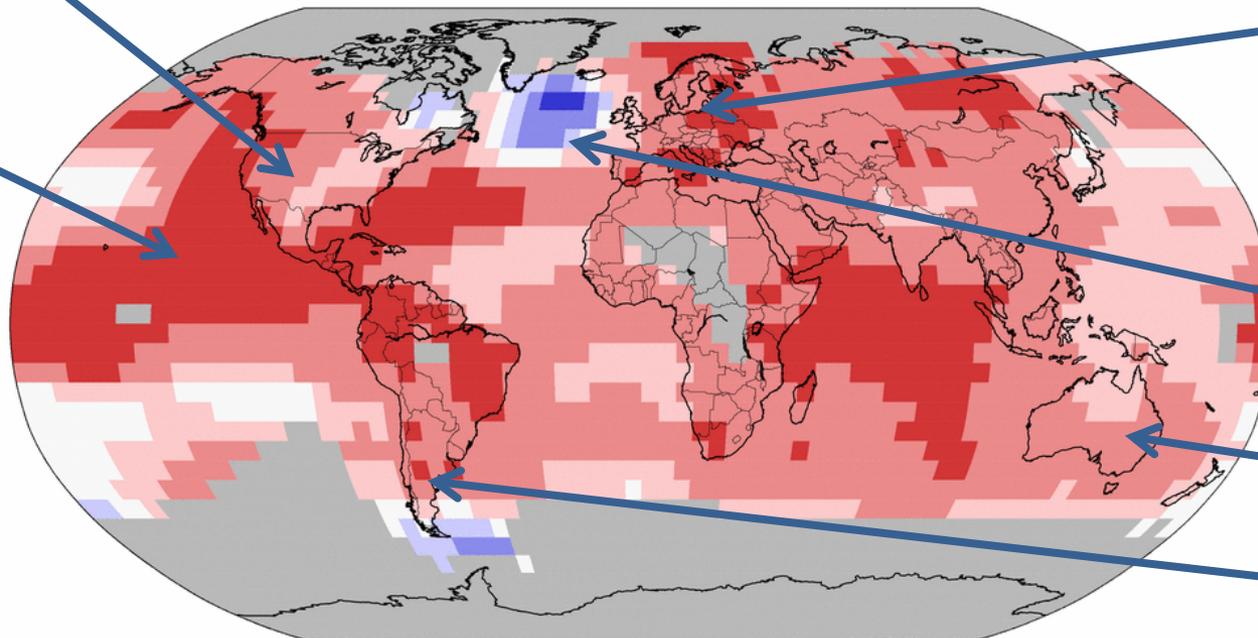
# NOAA 2015 Global Temperature

0.90°C / 1.62°F above 1901-2000 average; warmest year of record

## Land & Ocean Temperature Percentiles Jan–Dec 2015

NOAA's National Centers for Environmental Information

Data Source: GHCN–M version 3.3.0 & ERSST version 4.0.0



Record Coldest

Much Cooler than Average

Cooler than Average

Near Average

Warmer than Average

Much Warmer than Average

Record Warmest



Mon Jan 11 06:58:03 EST 2016

### USA (CONUS)

2<sup>nd</sup> warmest year  
3<sup>rd</sup> wettest year

### Tropical Pacific

El Nino develops

### NE Pacific

The "blob" persists

### Continental Temperatures

records begin 1910

Asia, S. America  
warmest year

Africa, Europe  
2<sup>nd</sup> warmest year

N. America  
5<sup>th</sup> warmest year

Oceania  
6<sup>th</sup> warmest year

Spain, Finland  
warmest year

Austria, France,  
Germany,  
Netherlands  
among five  
warmest years

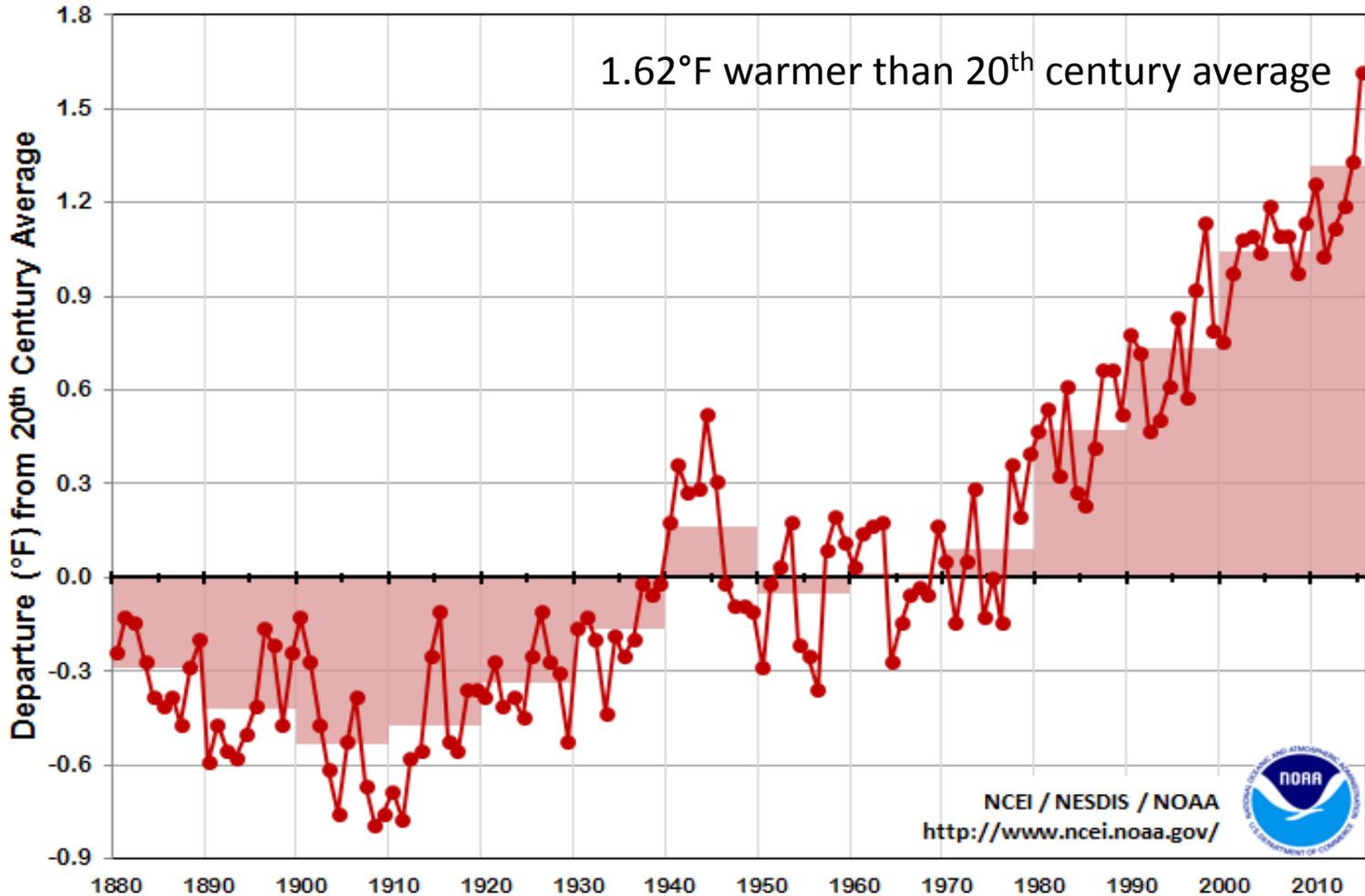
North Atlantic  
Persistent cool  
anomaly

Australia  
5<sup>th</sup> warmest year

Argentina  
2<sup>nd</sup> warmest year

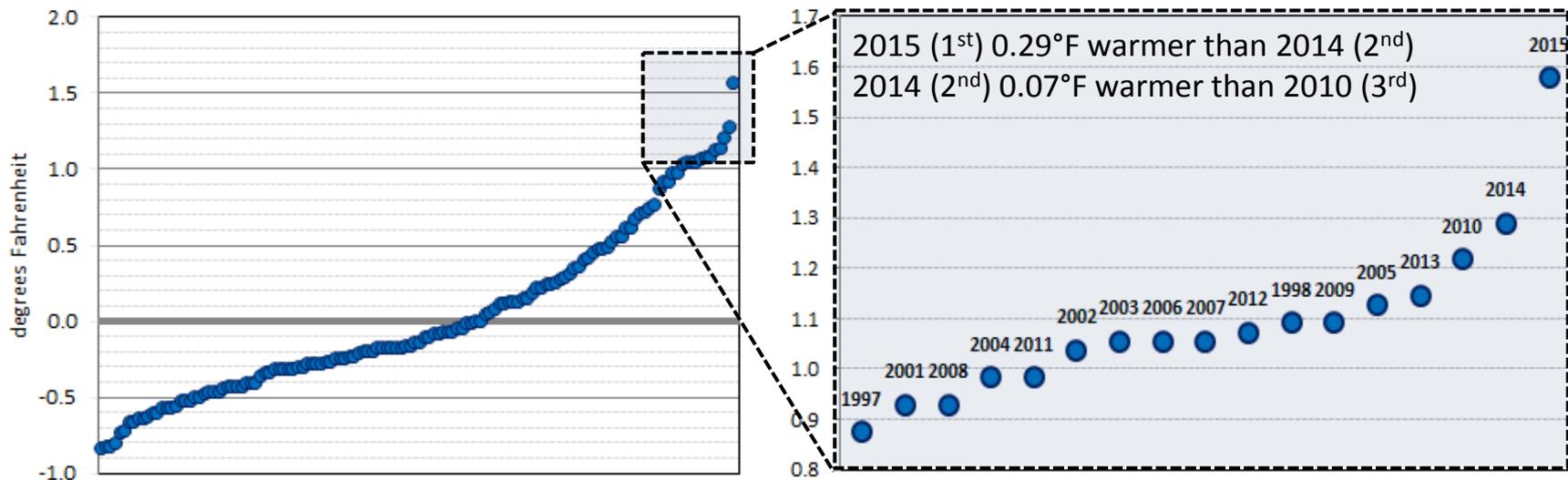


# Global Temperature Time Series



# 2015 Versus the Warmest Years

annual temperature departures ranked coolest to warmest  
using a 1951-80 base period

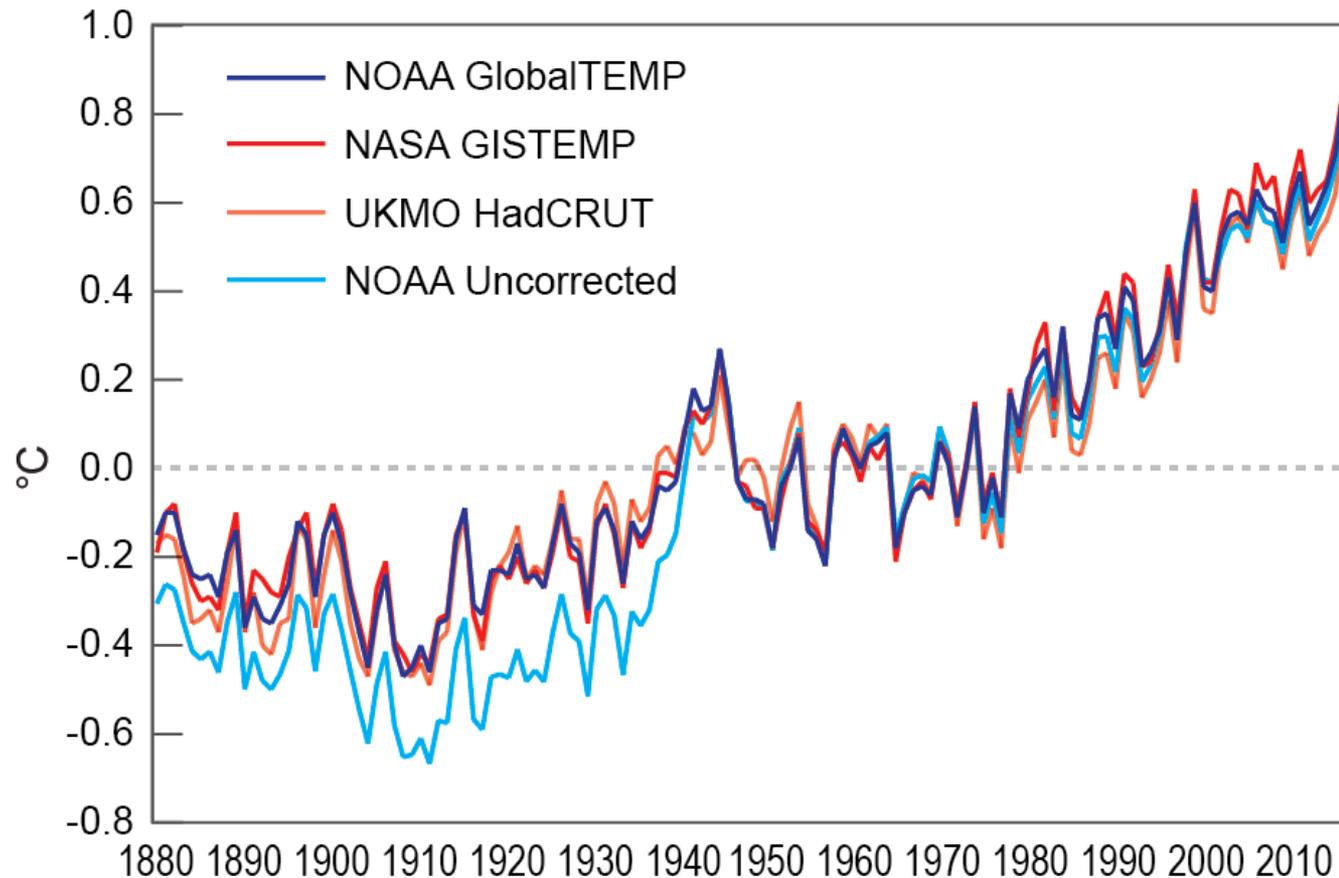


Dataset: NOAA GlobalTemp



# Global Analyses in Agreement

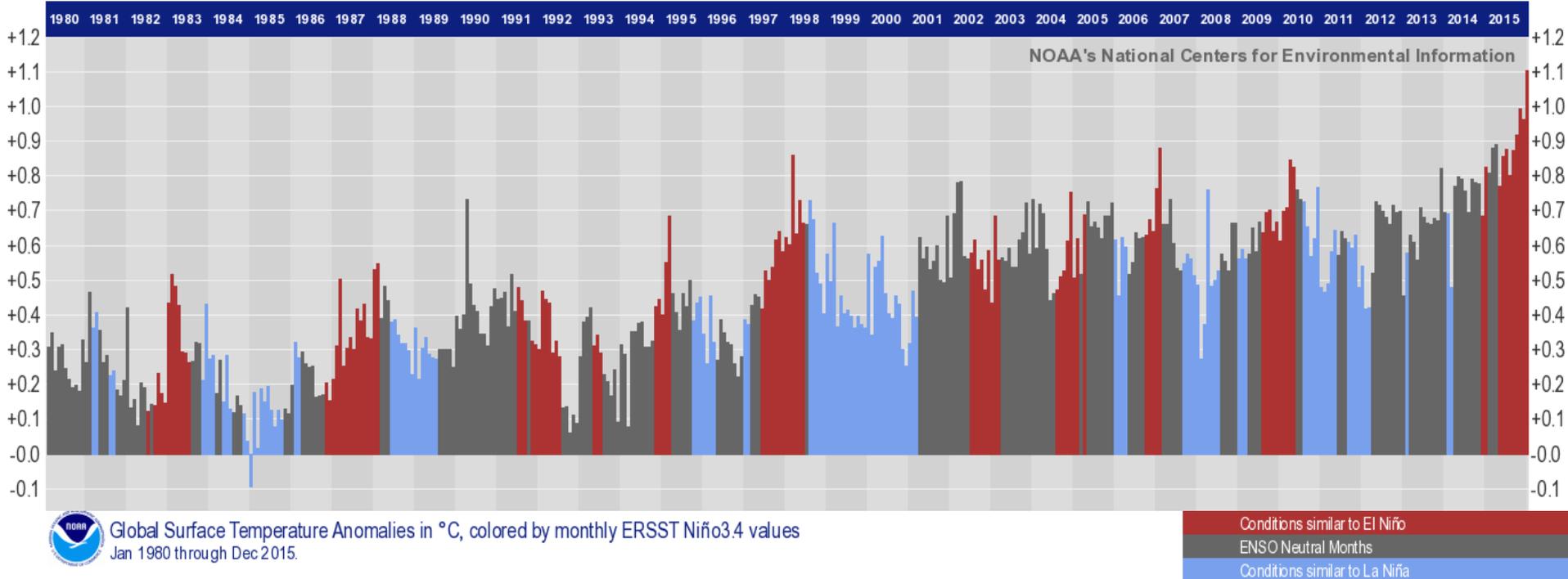
NASA, NOAA, MetOffice: relative to a common 1951 – 80 base period



<http://www.ncdc.noaa.gov/sotc/briefings>



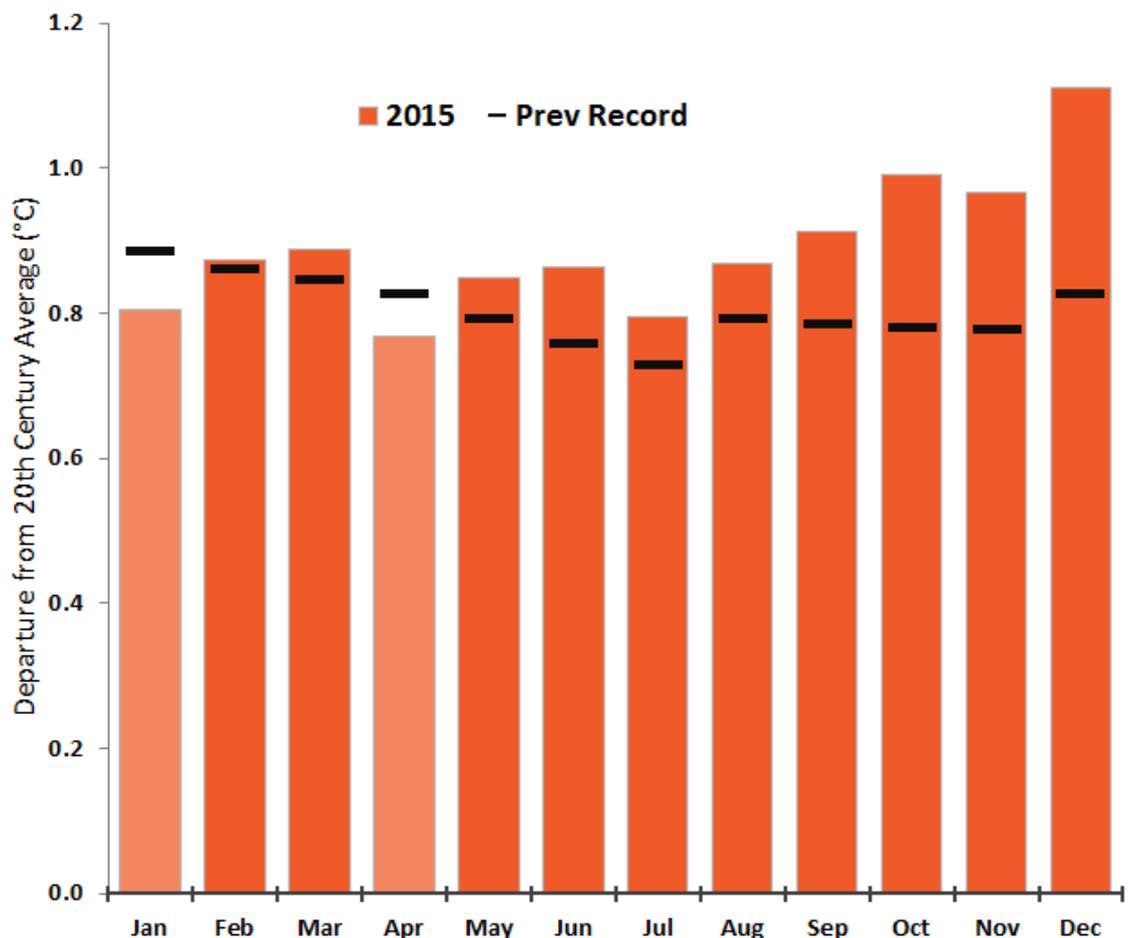
# El Niño and Global Temperature



Months with La Niña sea-surface temperature conditions in **blue**  
Months with El Niño sea-surface temperature conditions in **red**



# 2015 by the Month



Ten of 2015's monthly global temperatures tied or broke existing records

NOAA GlobalTemp

<http://www.ncdc.noaa.gov/sotc/global/2015/13>



# Atmospheric Temperatures

- Middle Troposphere (37 yr record)

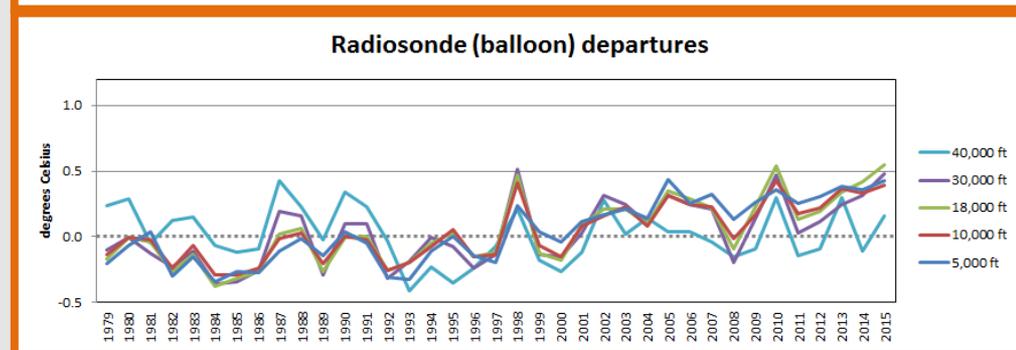
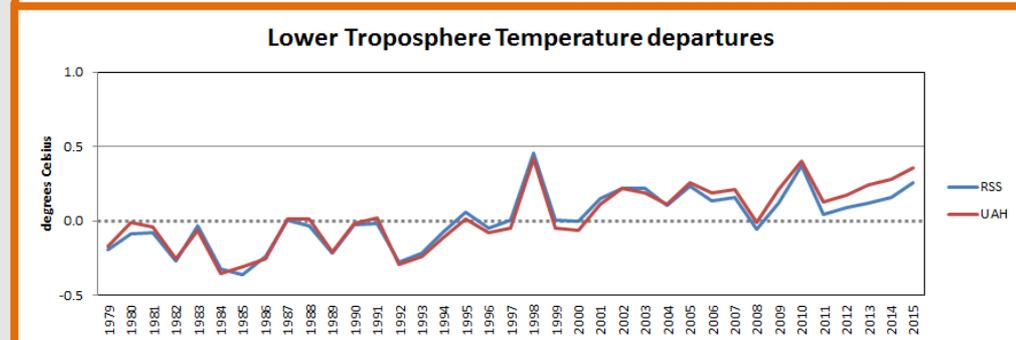
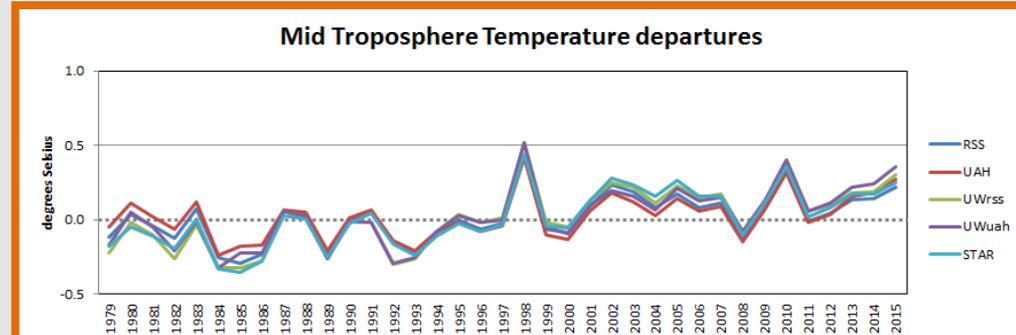
- UAH: 3<sup>rd</sup> warmest
- UW-UAH: 3<sup>rd</sup> warmest
- RSS: 4<sup>th</sup> warmest
- UW-RSS: 3<sup>rd</sup> warmest
- NESDIS STAR: 5<sup>th</sup> warmest

- Lower Troposphere (37 yr record)

- UAH: 3<sup>rd</sup> warmest
- RSS: 3<sup>rd</sup> warmest

- Radiosonde data (58 yr record)

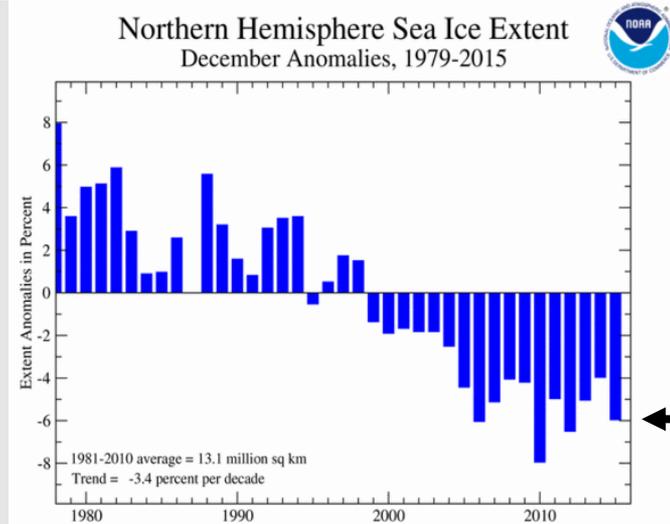
- ~5,000 ft (850mb): 2<sup>nd</sup> warmest
- ~10,000 ft (700mb): 3<sup>rd</sup> warmest
- ~18,000 ft (500mb): warmest
- ~30,000 ft (300mb): 2<sup>nd</sup> warmest
- ~40,000 ft (200mb): 14<sup>th</sup> warmest



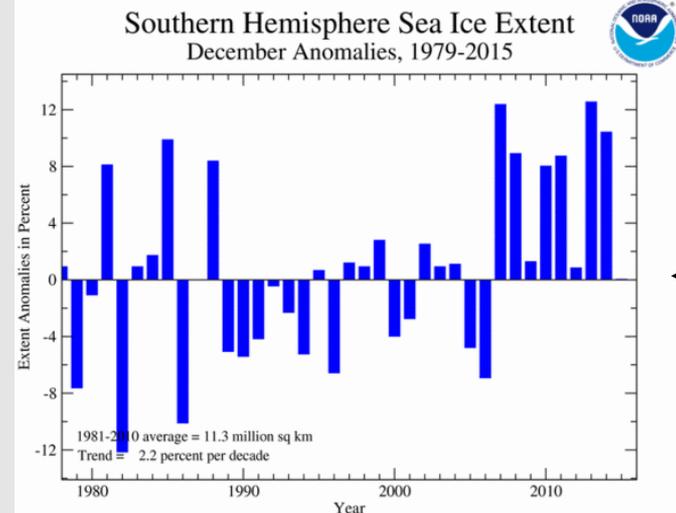
# 2015 Snow Cover & Sea Ice

<http://www.ncdc.noaa.gov/sotc/global-snow/2015/13>

- Northern Hemisphere snow cover:
  - Winter: near average
  - Spring: much below average
- Arctic sea ice (since 1979):
  - Feb 25<sup>th</sup> maximum: smallest on record
  - Sep 11<sup>th</sup> minimum: 4<sup>th</sup> smallest
- Antarctic sea ice (since 1979):
  - Feb 20<sup>th</sup> minimum: 4<sup>th</sup> largest
  - Oct 6<sup>th</sup> maximum: 16<sup>th</sup> largest



Dec '15  
below  
average



Dec '15  
near  
average

Data from National Snow & Ice Data Center

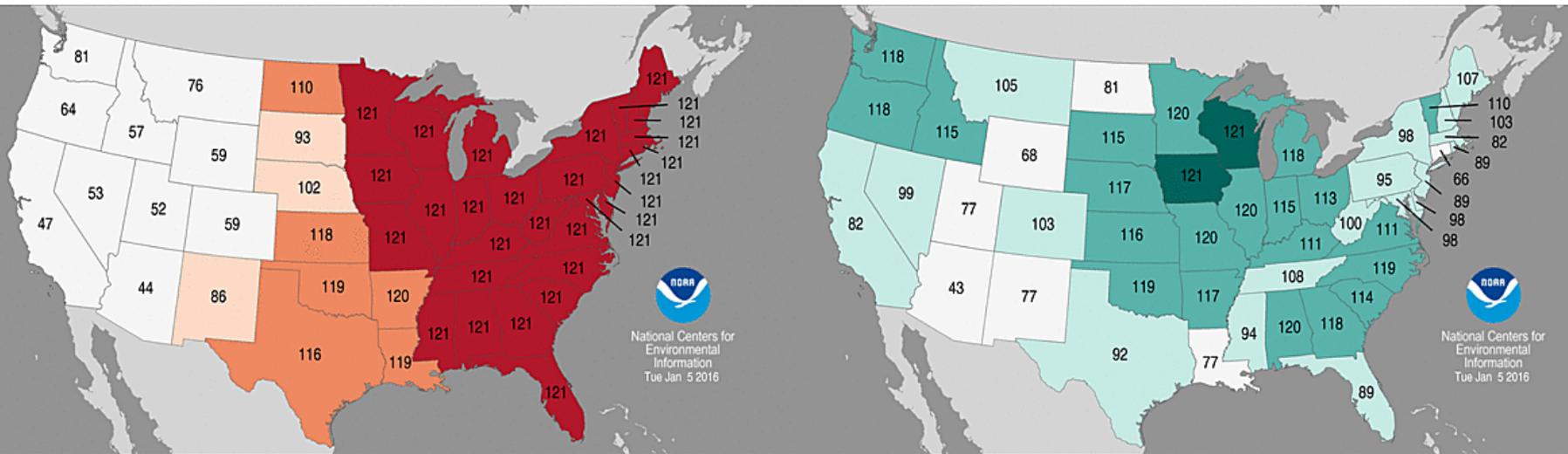


# Contiguous U.S. December 2015

*Only month in 1895-present record that is both record warm and record wet*

Statewide Temperature Ranks, Dec 2015  
Period: 1895-2015 (121 years)

Statewide Precipitation Ranks, Dec 2015  
Period: 1895-2015 (121 years)



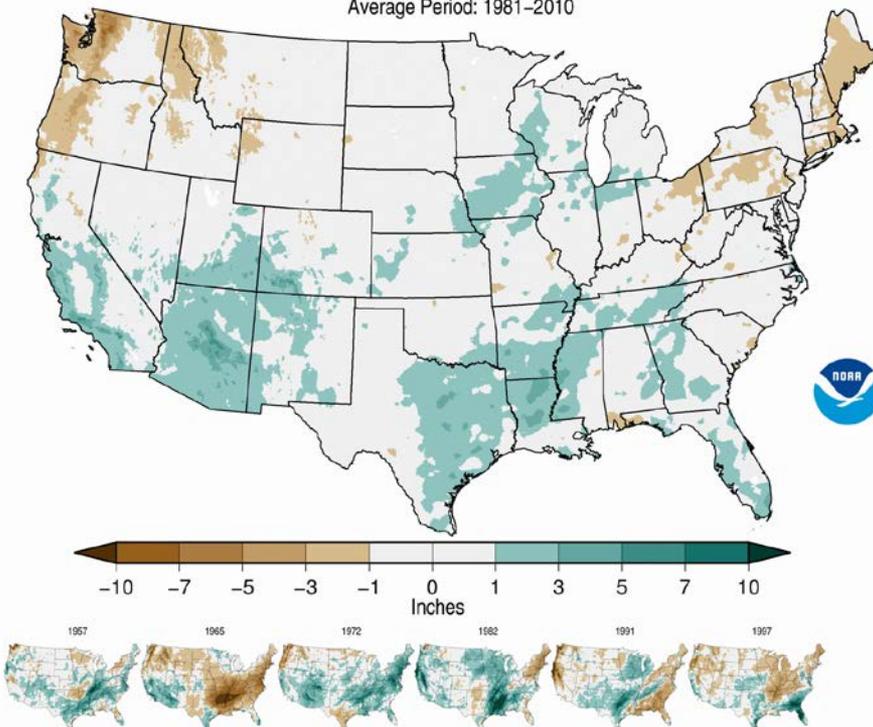
- December average temperature: 28.6°F
- 6.0°F warmer than 20<sup>th</sup> century average
- Warmest December on record, by 1.0°F

- December average precipitation: 3.93"
- 1.58" wetter than 20<sup>th</sup> century average and wettest December on record
- Dramatic drought improvement in Pacific Northwest

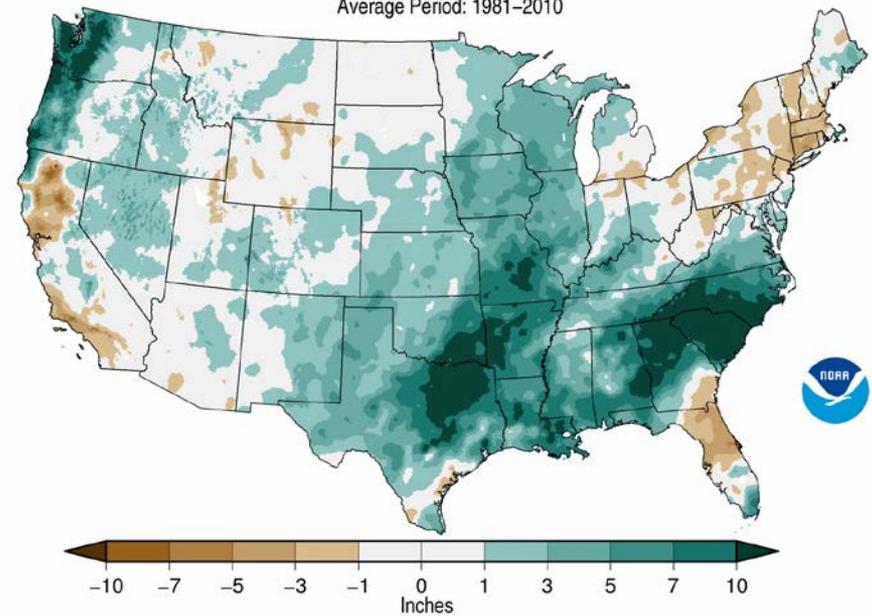


# End of year comparison to past El Niños

**Strong El Niño Precipitation Departure from Average**  
Composite: October–December 1957, 1965, 1972, 1982, 1991, 1997  
Average Period: 1981–2010



**Precipitation Departure from Average**  
October–December 2015  
Average Period: 1981–2010



Data source: 5km Gridded Dataset (nClimGrid)

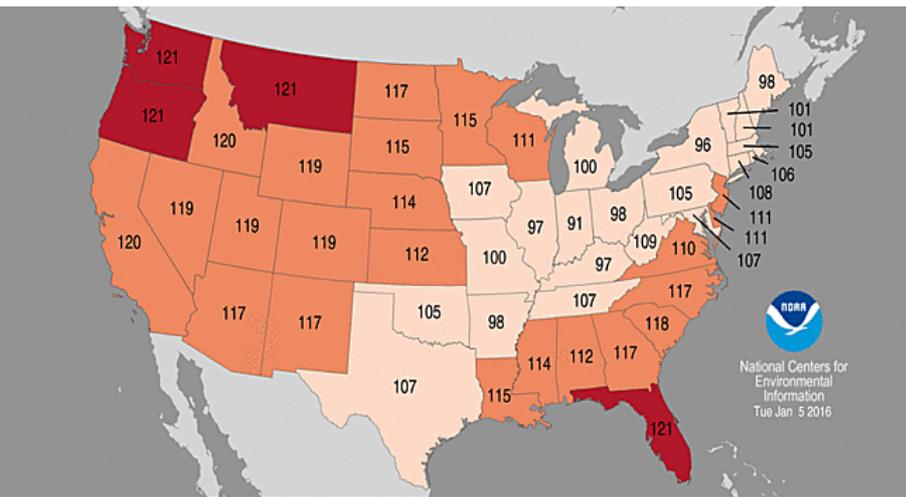
Created by NOAA National Centers for Environmental Information



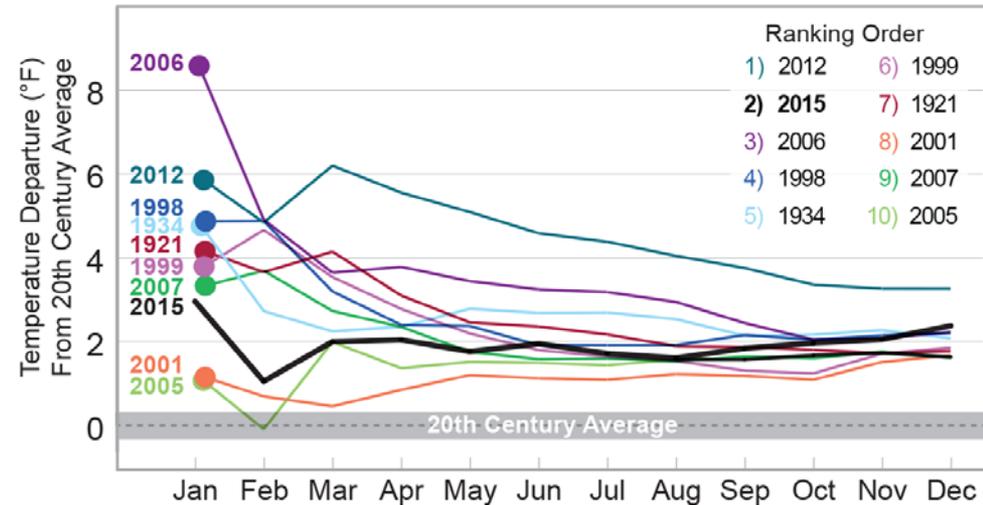
# Contiguous U.S. 2015: Temperature

2015 was the 2<sup>nd</sup> warmest year on record for the Contiguous United States

Statewide Temperature Ranks, Jan-Dec 2015  
Period: 1895-2015 (121 years)



Year-to-Date U.S. Temperature  
The 10 warmest years on record



- Annual Temperature: 54.4°F, +2.4°F above 20<sup>th</sup> century average. Only 2012 (55.3°F) was warmer
- Every state across the contiguous U.S. was warmer than average for 2015
- Florida, Montana, Oregon, and Washington each had their warmest year on record

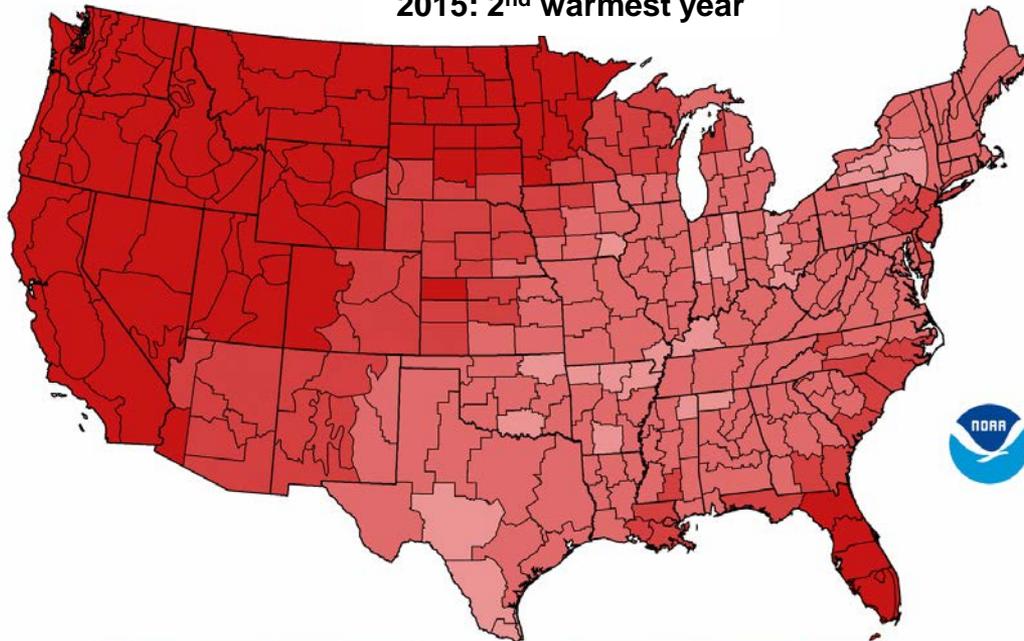
<http://www.ncdc.noaa.gov/sotc/national/2015/13>



# Mean Temperature Departure from Average

For Five Warmest Years on Record

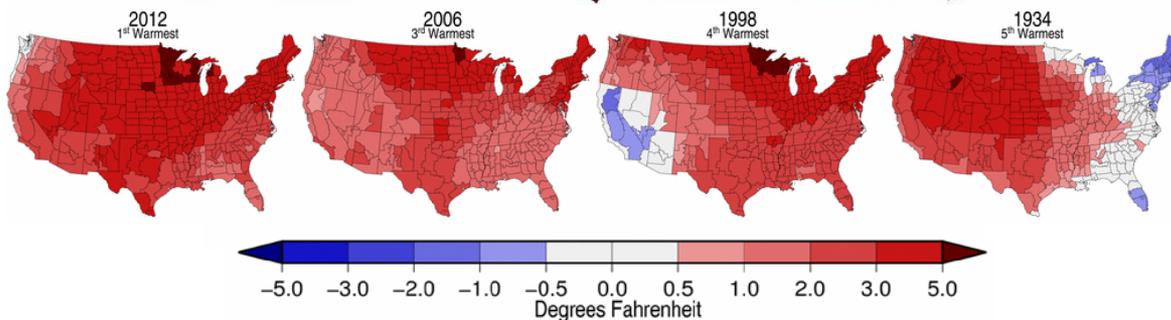
2015: 2<sup>nd</sup> warmest year



Five warmest years for Contiguous U.S.

Rank	Year	Departure from average
1	2012	+3.3F
2	2015	+2.4F
3	2006	+2.2F
4	1998	+2.2F
5	1934	+2.1F

Departures with respect to 1901-2000

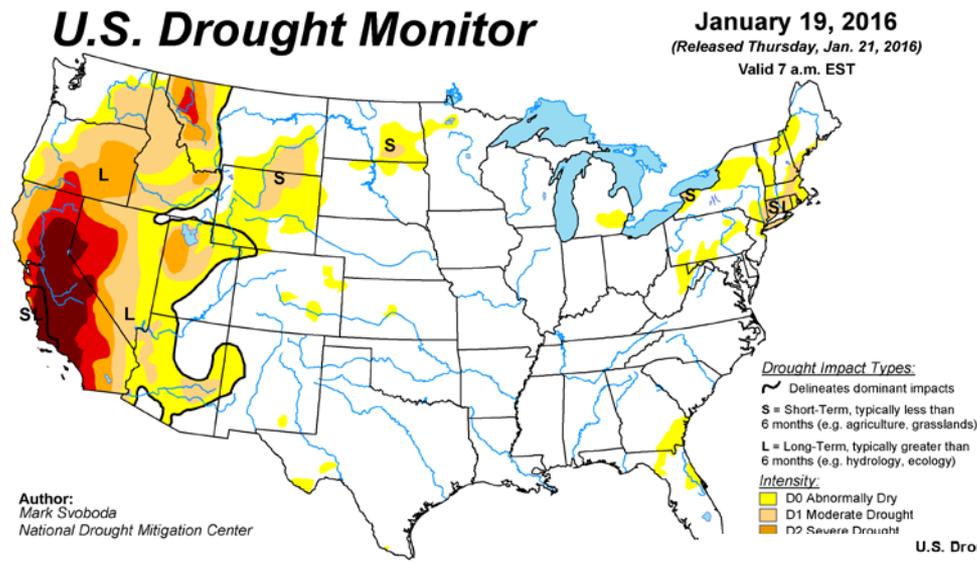


<http://www.ncdc.noaa.gov/sotc/national/2015/13>

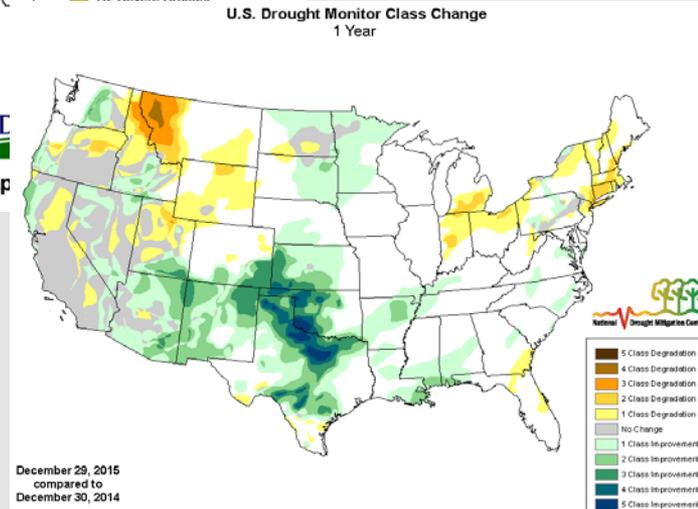


# Current Status of US Drought

- Jan 19, 2016:
  - 16.4% of CONUS in drought
  - 13.7% of US incl. AK, HI, PR
- Drought in 2015:
  - Intensified in Northern Rockies
  - Dramatically improved in parts of Northwest
  - Some improvement in the Southwest and Midwest



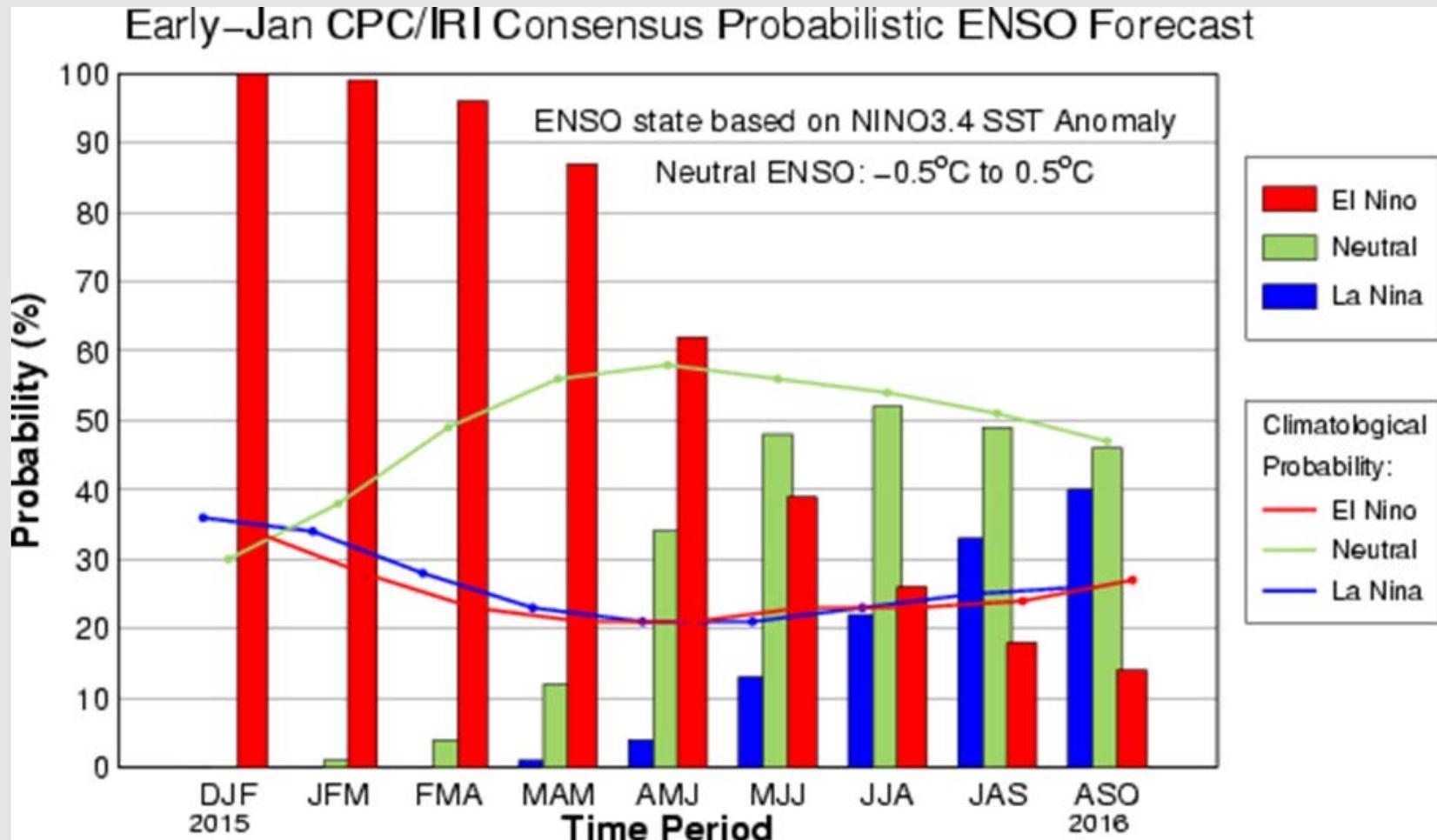
Current Drought:  
[www.drought.gov](http://www.drought.gov)



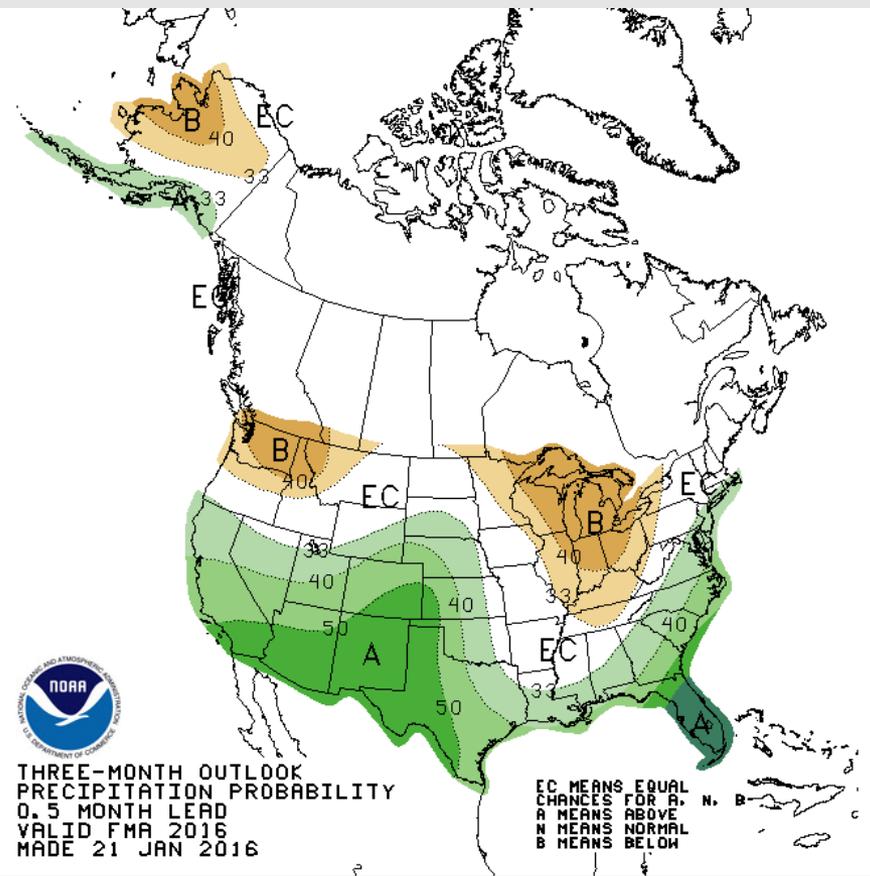
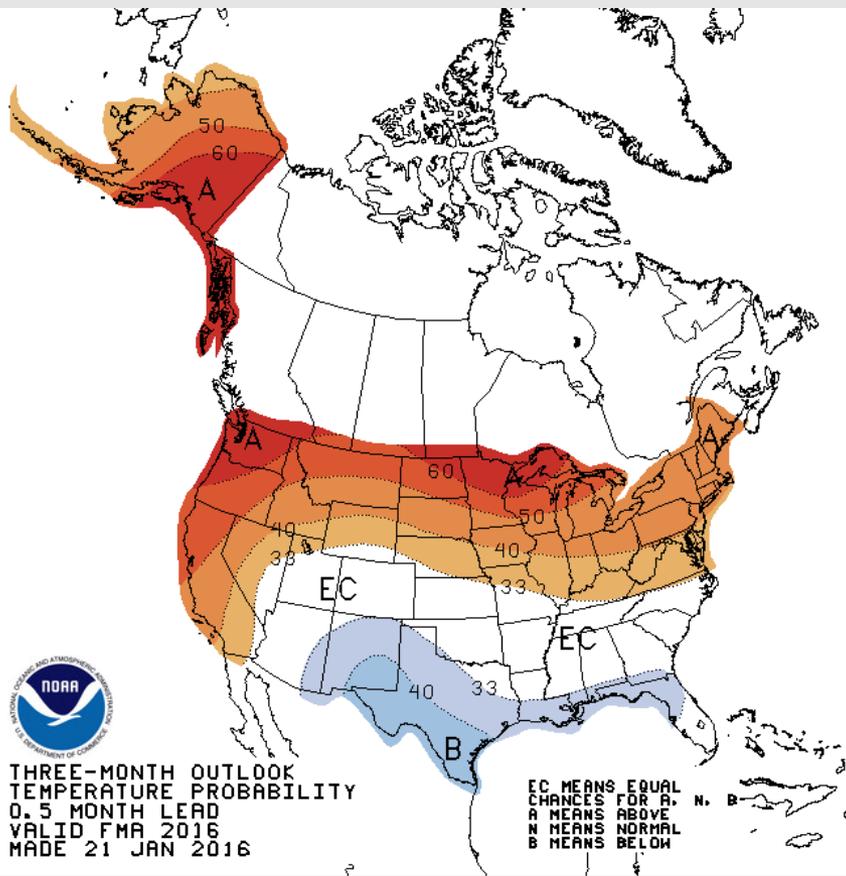
2015 drought change map: Nat'l Drought Mitigation Center, U. Nebraska-Lincoln



# ENSO Forecast



# Three-Month Seasonal Outlook

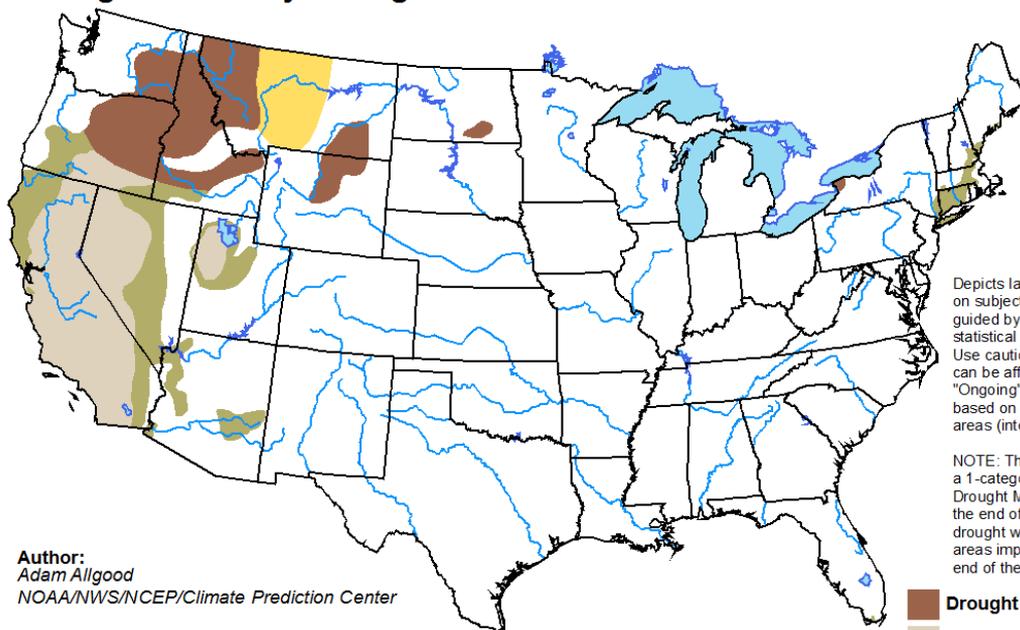


Colors indicate probability of outcomes (“confidence”) rather than intensity

# Three-Month Seasonal Drought Outlook

## U.S. Seasonal Drought Outlook Drought Tendency During the Valid Period

Valid for January 21 - April 30, 2016  
Released January 21, 2016

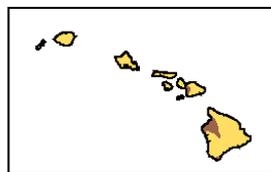
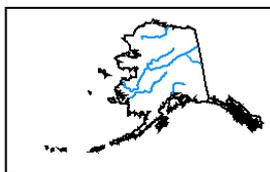


Depicts large-scale trends based on subjectively derived probabilities guided by short- and long-range statistical and dynamical forecasts. Use caution for applications that can be affected by short lived events. "Ongoing" drought areas are based on the U.S. Drought Monitor areas (intensities of D1 to D4).

NOTE: The tan areas imply at least a 1-category improvement in the Drought Monitor intensity levels by the end of the period, although drought will remain. The green areas imply drought removal by the end of the period (D0 or none).

Author:  
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NOAA/NWS/NCEP/Climate Prediction Center

-  Drought persists
-  Drought remains but improves
-  Drought removal likely
-  Drought development likely



<http://go.usa.gov/3eZ73>

# Thank you!

*For further information, please contact John Ewald in the NOAA  
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