



NOAA West Watch

*Reporting Regional Environmental
Conditions & Impacts in the West*

January 23, 2017

Call Agenda



- Project Recap & Updates (Ruth Howell)
- El Niño and Regional Climate brief (Dan McEvoy)
- IOOS Nearshore Conditions brief (Jan Newton, Aric Bickel, Clarissa Anderson)
- Environmental conditions and impacts reporting and discussion:
 - Media (Ruth Howell)
 - NWS
 - NMFS
 - Others
- Discussion

Regional Coordination Goals



1. Document and share environmental conditions information and impacts on human systems and NOAA mission at the regional scale.
2. Improve awareness of environmental observations and human system impacts across NOAA mission lines.
3. Improve regional communication and coordination across NOAA mission lines and between NOAA and NOAA-funded regional partners involved in monitoring and communicating changing climate conditions and impacts.
4. Improve external communication of regional impacts from changing environmental conditions, including but not limited to El Niño. Target audience is regionally connected elected officials and representative groups (e.g., WGA)



Regional Coordination Action Plan



New: Bi-Monthly webinars

- Brief on regional climate conditions/forecast and discuss deviations from “normal”.
 - NWS, NESDIS and OAR report on terrestrial observations;
 - NMFS and NOS report on coastal and marine observations; and
 - Partner network observations (WRCC, IOOS, RISA, Sea Grant, etc)
- Exchange information on terrestrial and coastal-marine impacts

Bi-Monthly communication

- Information will enrich existing products such as the [State of the Climate](#) monthly summaries
- Communication to in-region elected officials (in coordination with NOAA OLIA).

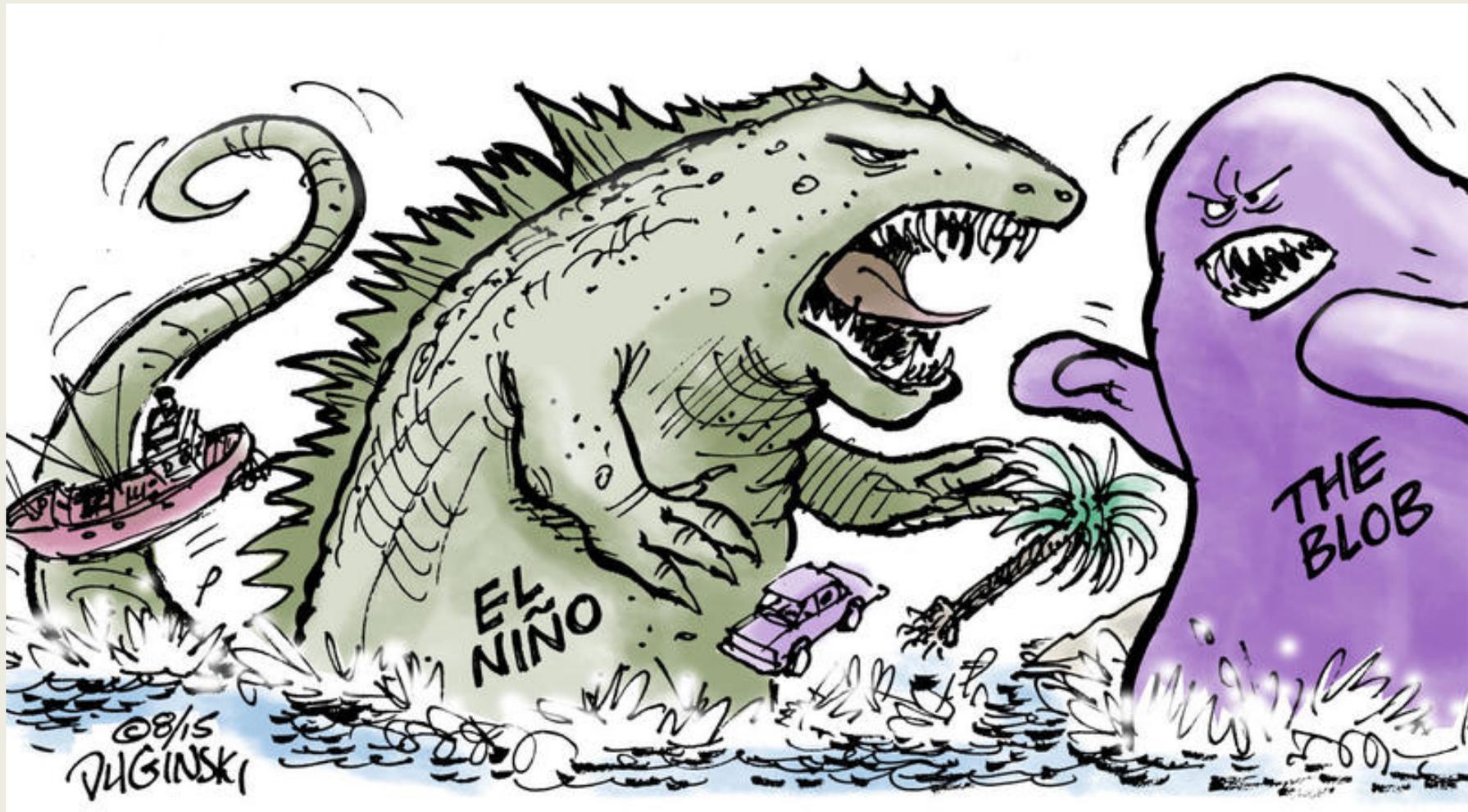
Documentation

- Regionally specific updates and observed changes in the terrestrial and coastal and marine environments (as informally reported) will be summarized at the projects end.
 - The summary will informally characterize changing environmental conditions and impacts over the NOAA West Watch project period.
 - The summary will not include attribution of impacts, but could serve to inform a retrospective analysis of the human system impacts of environmental phenomena – including ENSO.

Climate Brief: Dan McIvoy, WRCC

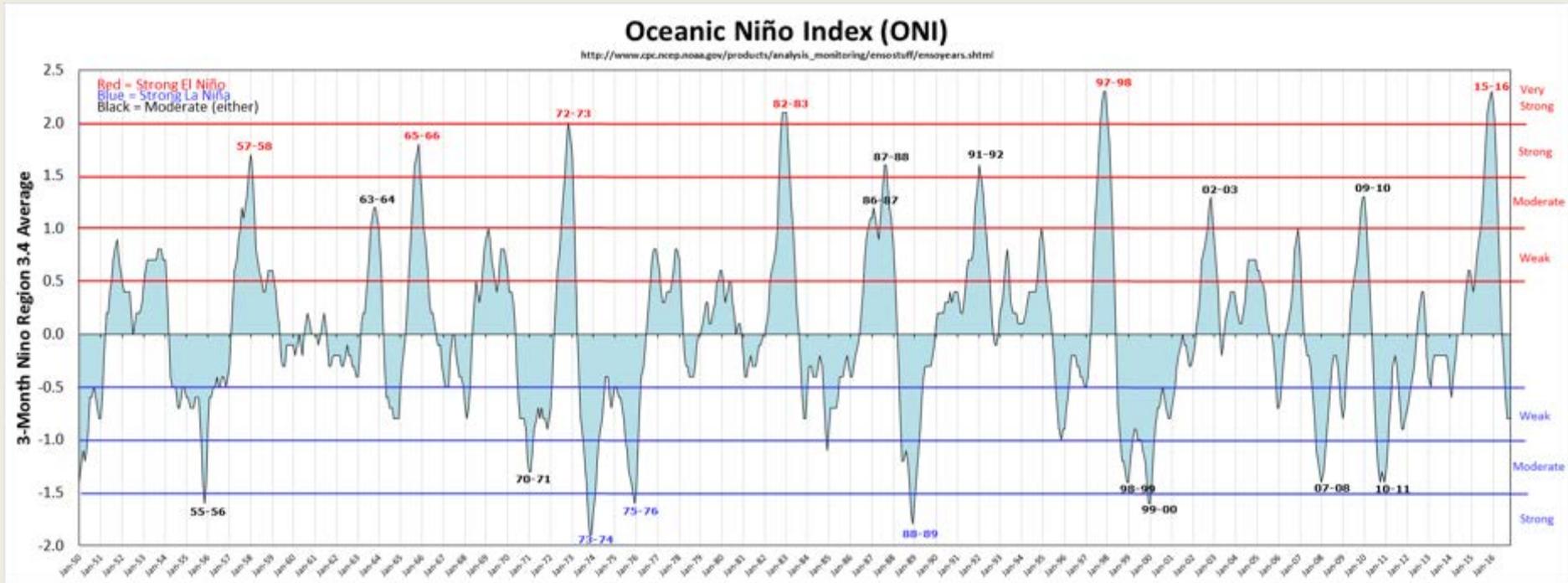


2015/2016 Water Year Recap



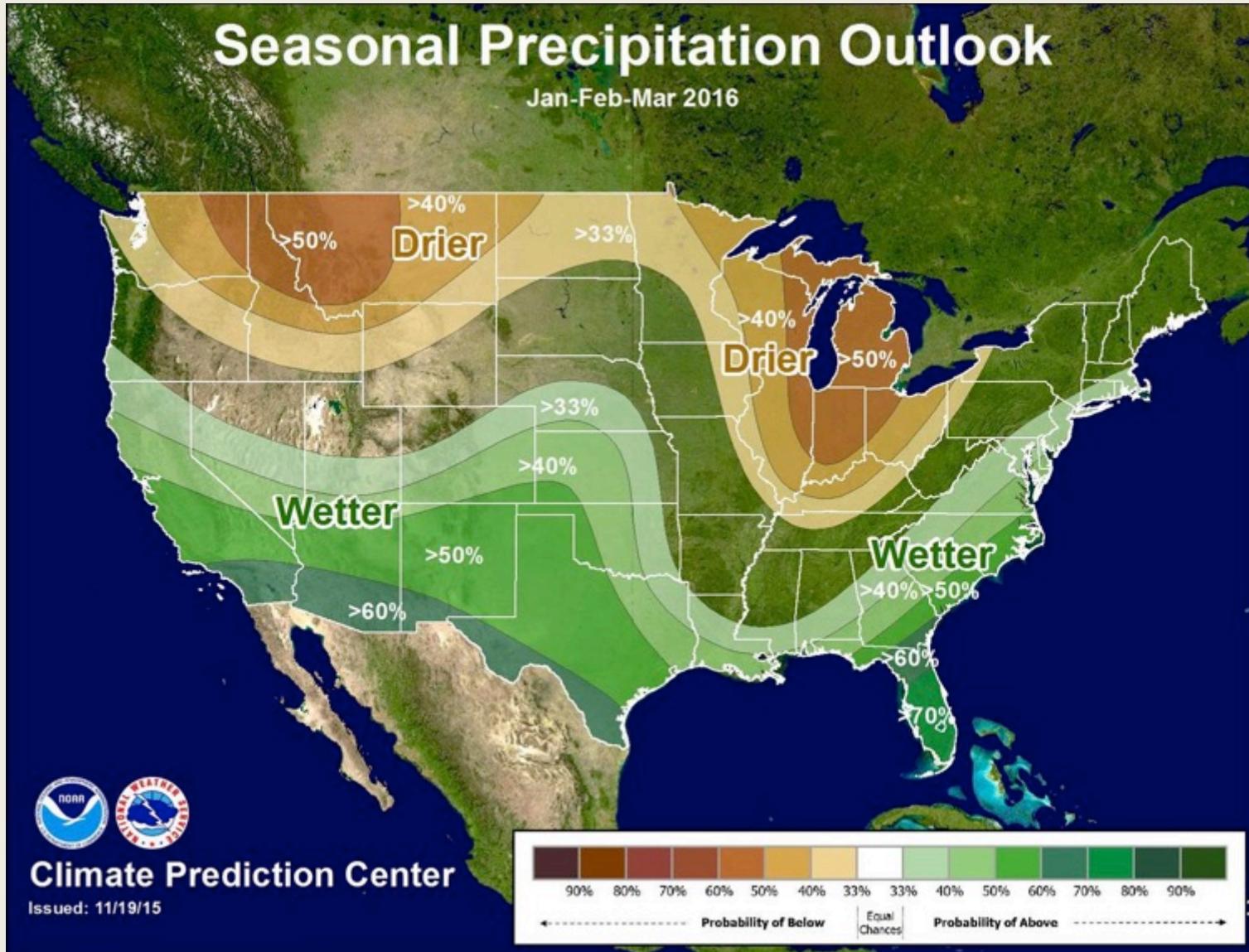
Credit: LA Times, Paul Duginski

2015/2016 Water Year Recap



- 2015/16 was one of the top three strongest El Niño's on record, depending on what index you look at

2015/2016 Water Year Recap

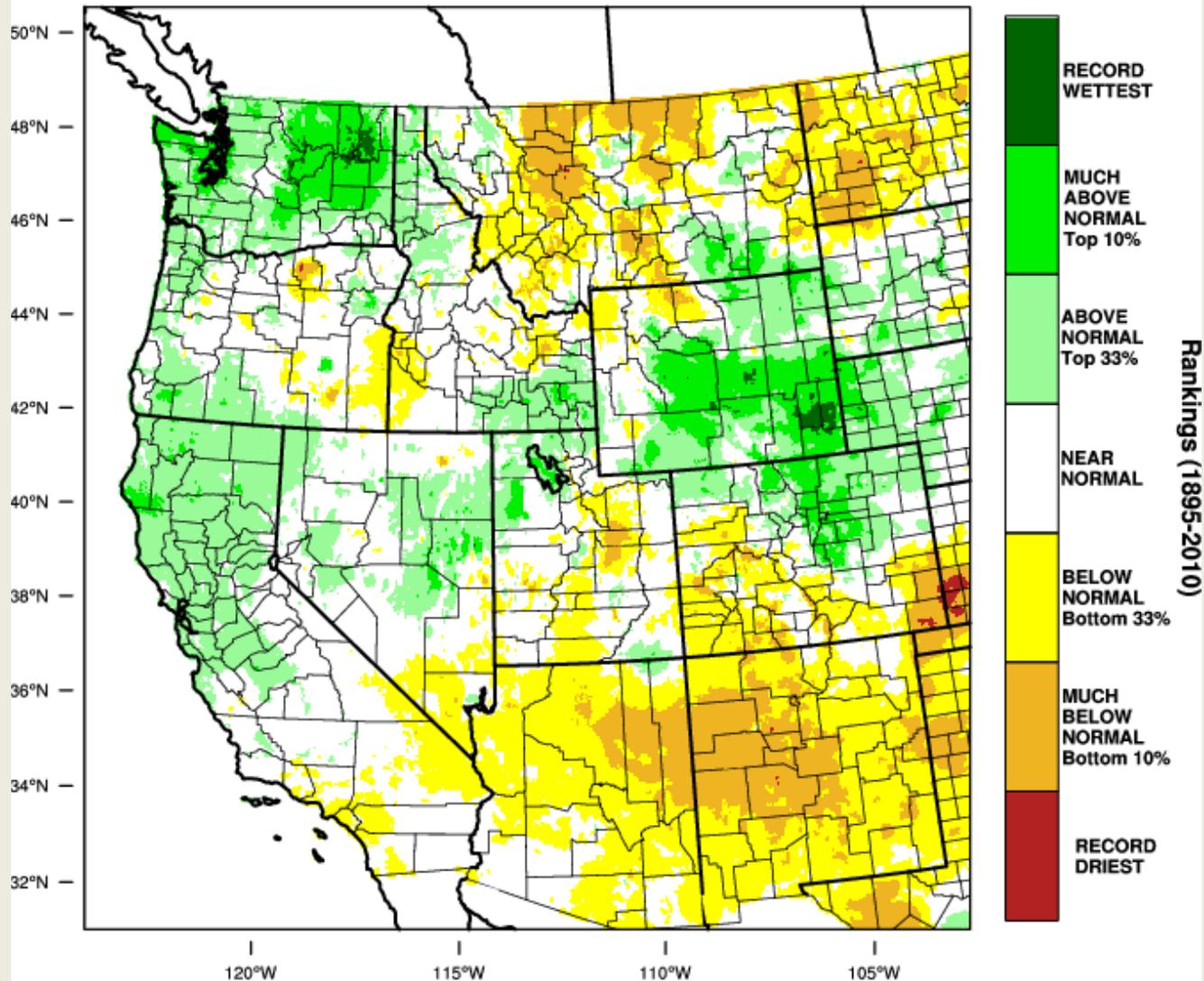


2015/2016 Water Year Recap



Western United States - Precipitation

January-March 2016 Percentile

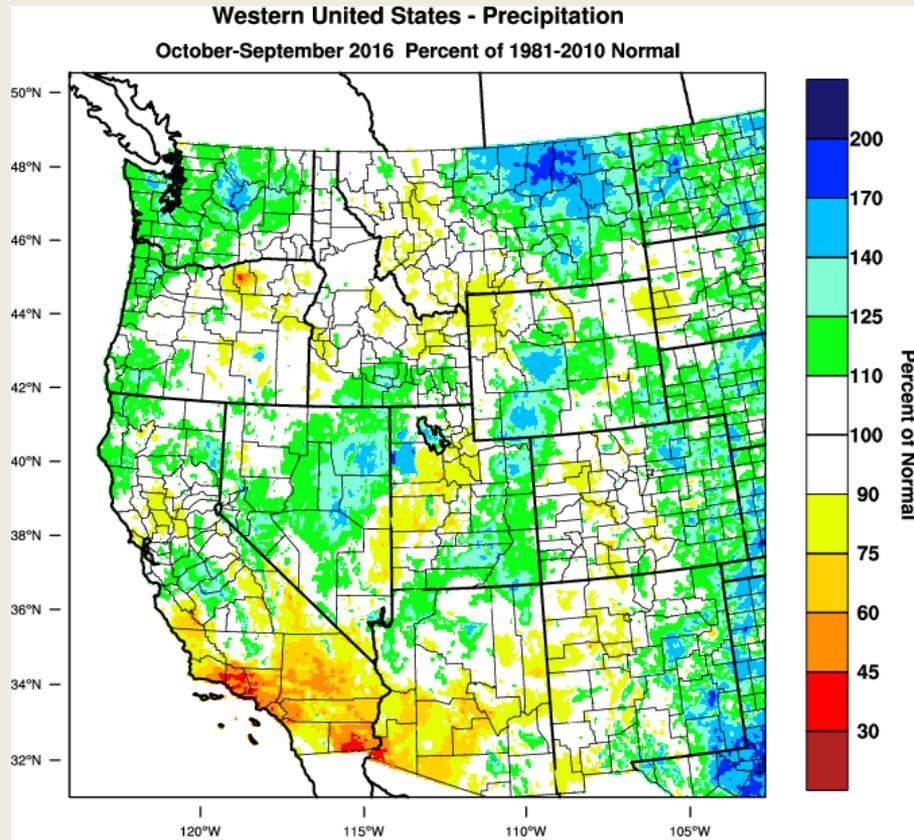


WestWide Drought Tracker, U Idaho/WRCC Data Source: PRISM (Final), created 16 OCT 2016

2015/2016 Water Year Recap

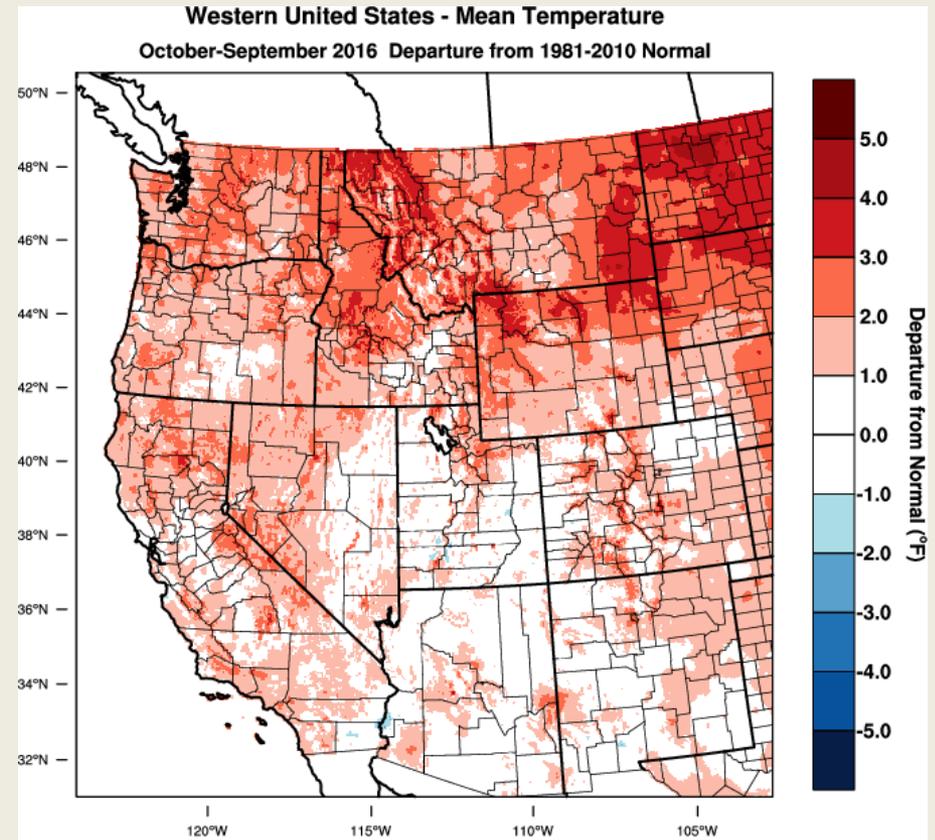


Precipitation % of normal



WestWide Drought Tracker, U Idaho/WRCC Data Source: PRISM (Prelim), created 16 OCT 2016

Temperature Anomaly



WestWide Drought Tracker, U Idaho/WRCC Data Source: PRISM (Prelim), created 16 OCT 2016

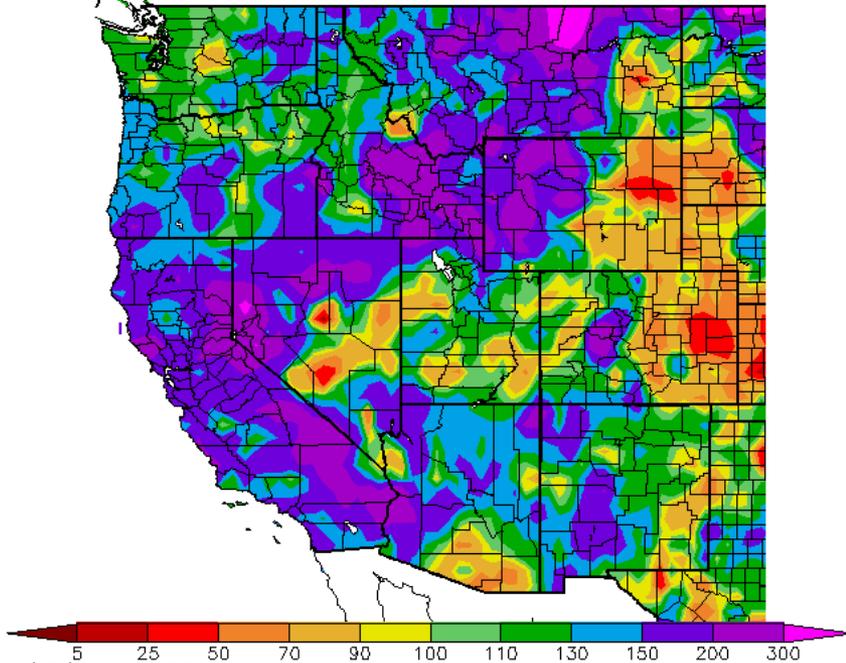
2016/2017 Water Year Update



Oct 1, 2016 – Jan 21, 2017

Precipitation % of Normal

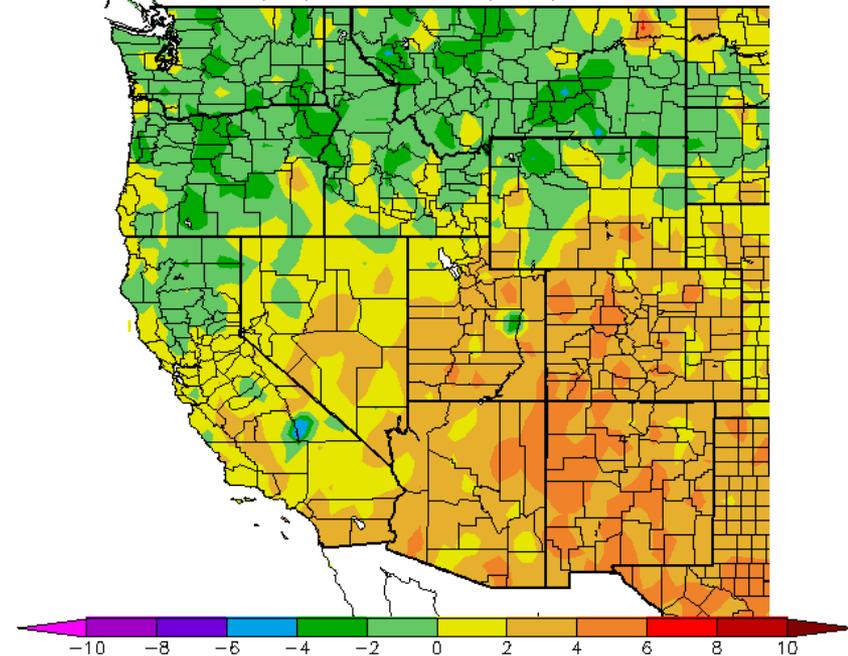
Percent of Average Precipitation (%)
10/1/2016 – 1/21/2017



Generated 1/22/2017 at WRCC using provisional data.
NOAA Regional Climate Centers

Temperature Anomaly

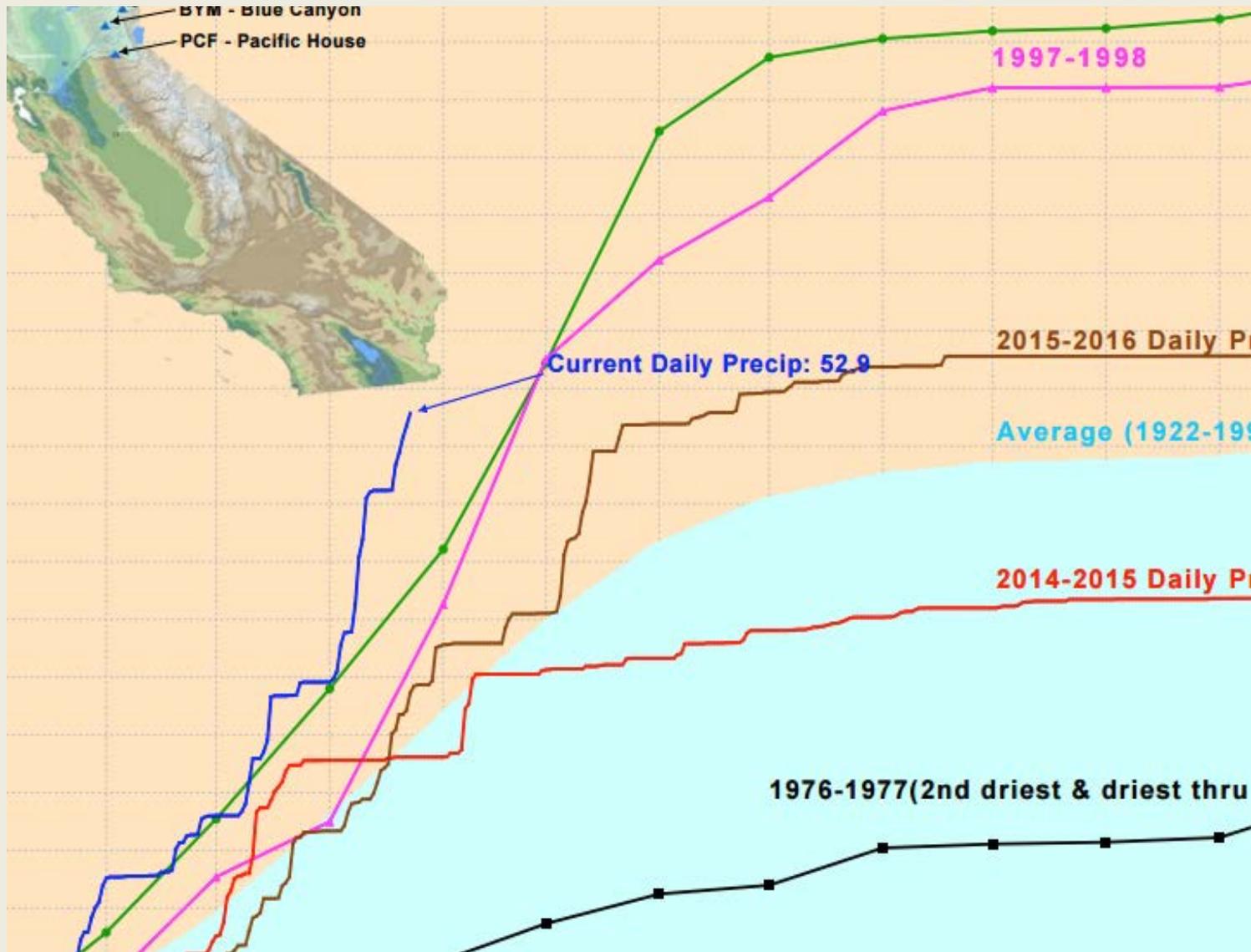
Ave. Temperature dep from Ave (deg F)
10/1/2016 – 1/21/2017



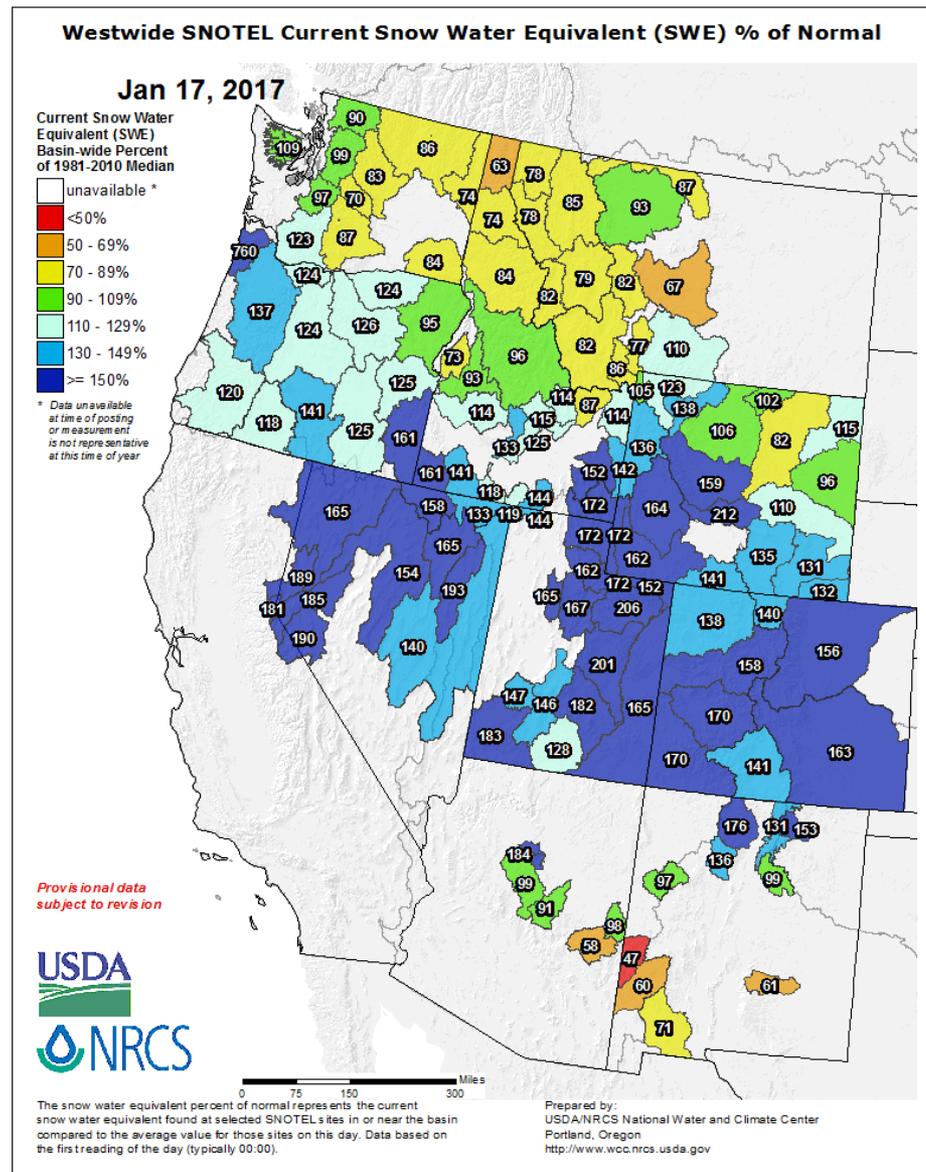
Generated 1/22/2017 at WRCC using provisional data.
NOAA Regional Climate Centers

- Currently ENSO in a weak La Nina state...more later on that

2016/2017 Water Year Update



2016/2017 Water Year Update

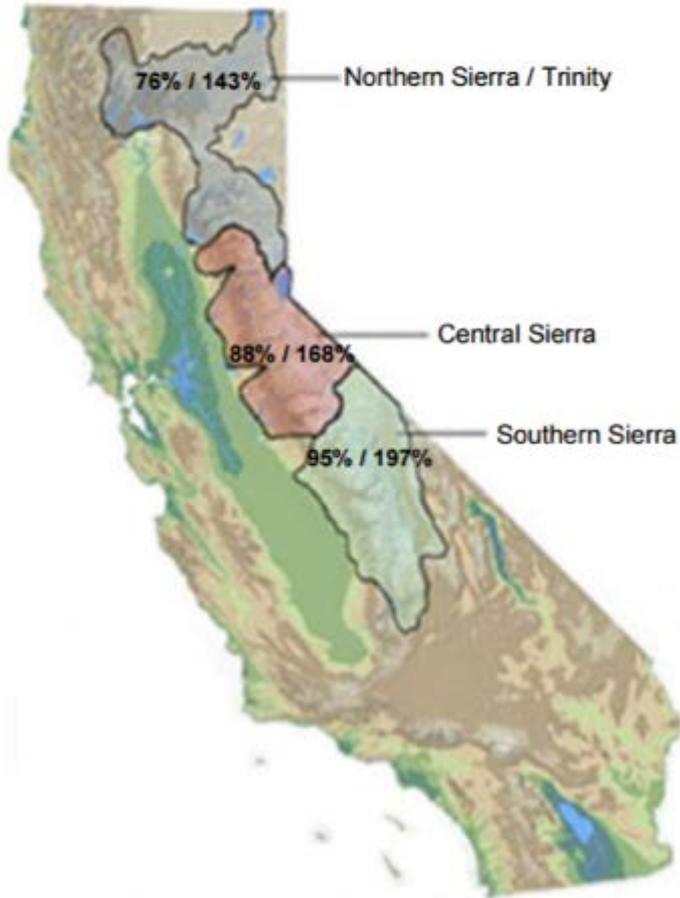


2016/2017 Water Year Update



Current Regional Snowpack from Automated Snow Sensors

% of April 1 Average / % of Normal for This Date



Statewide Average: 86% / 168%

NORTH	
Data as of January 20, 2017	
Number of Stations Reporting	30
Average snow water equivalent (Inches)	21.0
Percent of April 1 Average (%)	76
Percent of normal for this date (%)	143

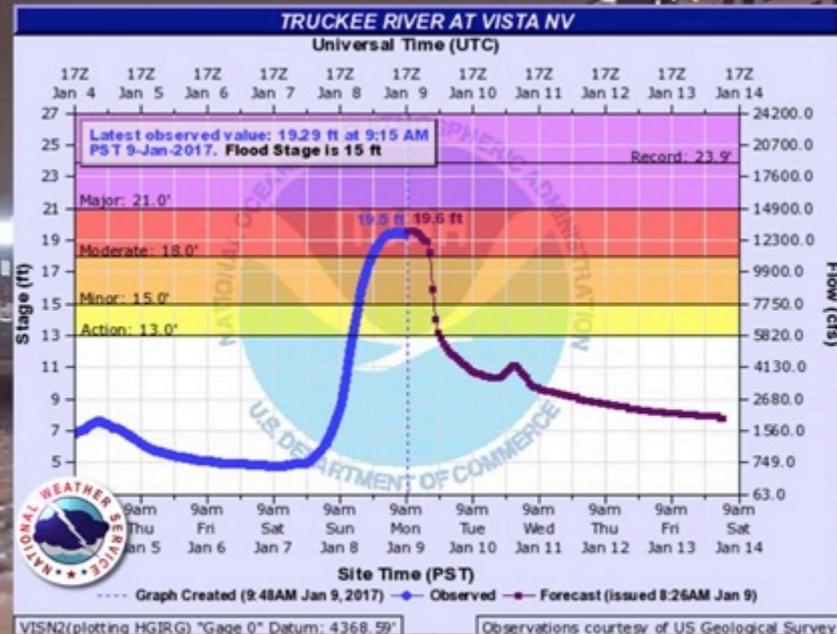
CENTRAL	
Data as of January 20, 2017	
Number of Stations Reporting	43
Average snow water equivalent (Inches)	25.7
Percent of April 1 Average (%)	88
Percent of normal for this date (%)	168

SOUTH	
Data as of January 20, 2017	
Number of Stations Reporting	30
Average snow water equivalent (Inches)	24.8
Percent of April 1 Average (%)	95
Percent of normal for this date (%)	197

STATE	
Data as of January 20, 2017	
Number of Stations Reporting	103
Average snow water equivalent (Inches)	24.1
Percent of April 1 Average (%)	86
Percent of normal for this date (%)	168



Truckee River - Reno has Crested



- **Flows will remain dangerous** in Reno through Tuesday AM:
Stay away from Rivers!
- This wave will continue downstream over next couple of days
- Lockwood, Wadsworth, Nixon will see **another rise and crest!**

2016/2017 Water Year Update



Snowfall Ranges - Jan 2-13

High Sierra	9-15+ feet
Tahoe Basin	2-5 feet (6-8 feet west shore)
Virginia Range	2+ feet
Hwy 395 - Bridgeport to Lee Vining	1-4 feet

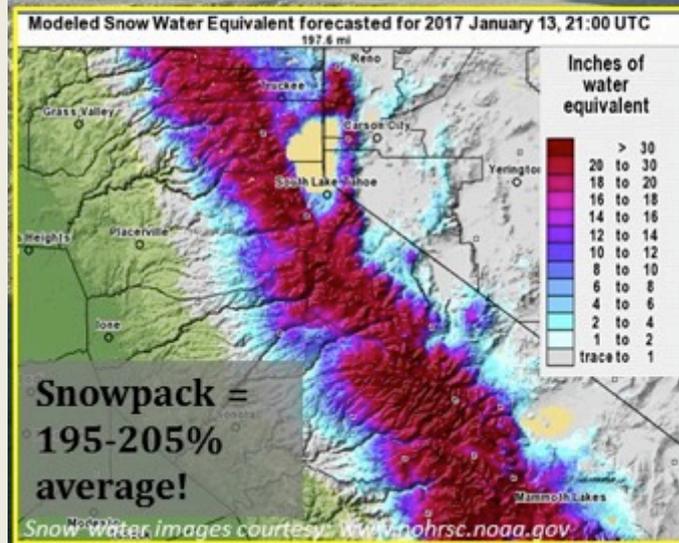
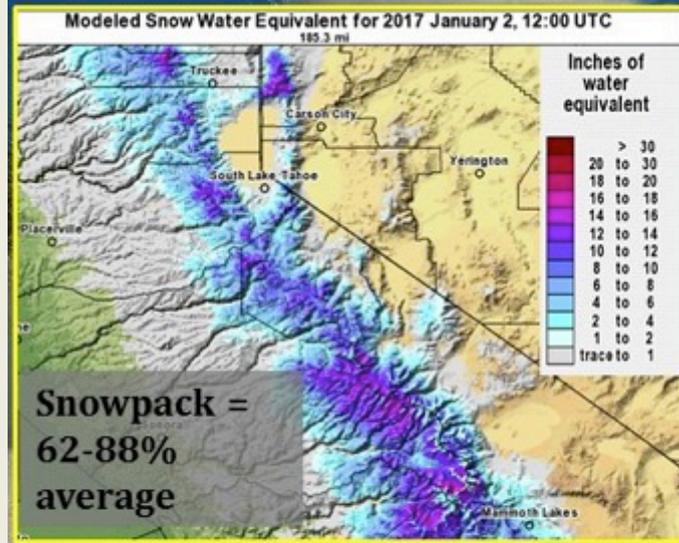


Photo:
Former NWS
Reno
employee

El Nino Status



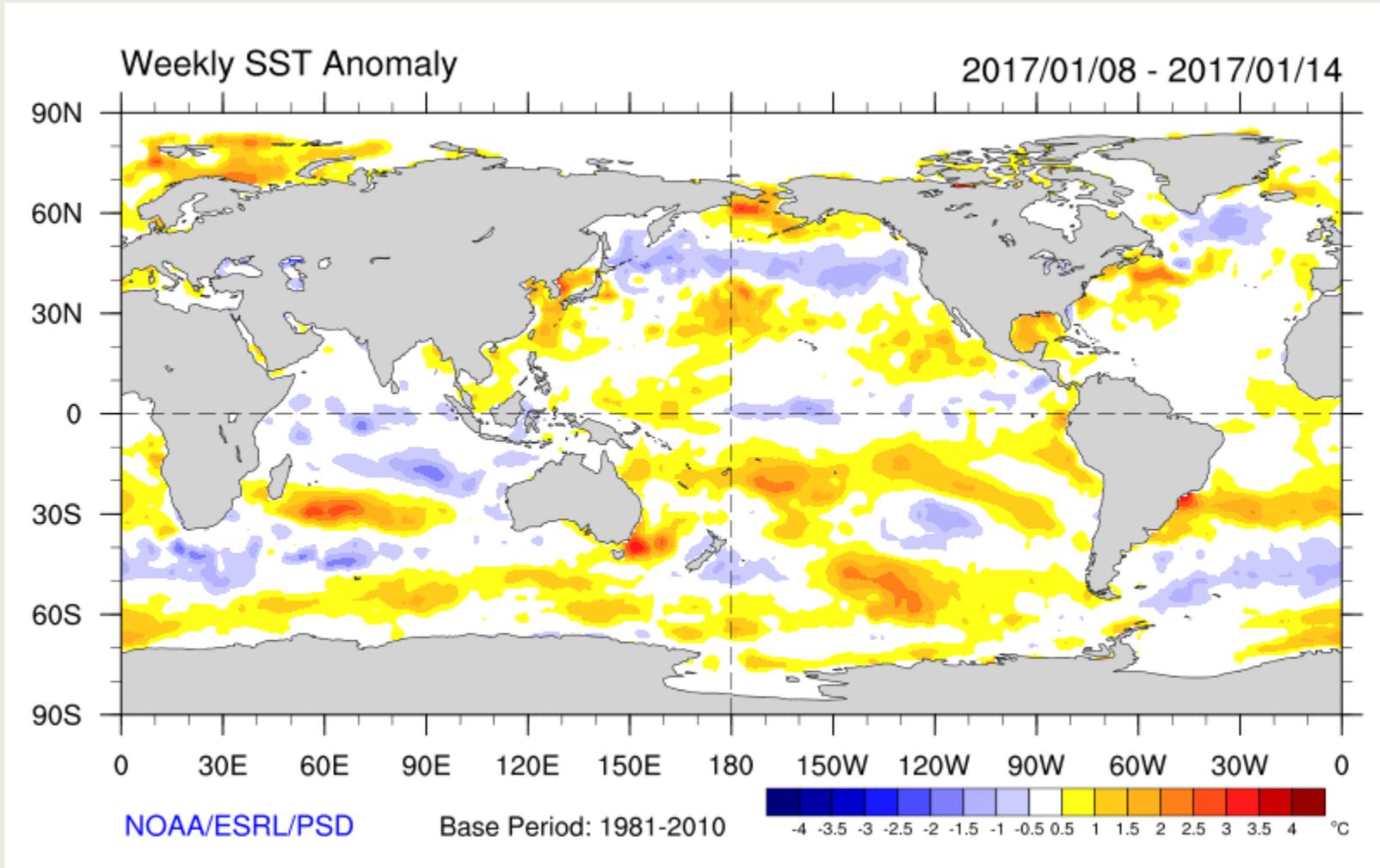
- ENSO Alert System Status: La Niña Advisory
- La Niña conditions are present
- Equatorial sea surface temperatures (SSTs) are near-to-below average in the central and east-central Pacific Ocean. They are above-average in the far eastern Pacific Ocean.
- A transition to ENSO-neutral is expected to occur by February 2017, with ENSO-neutral then continuing through the first half of 2017. *

Credit: CPC

* Note: These statements are updated once a month (2nd Thursday) in association with the ENSO Diagnostics Discussion, which can be found here:

http://www.cpc.ncep.noaa.gov/products/analysis_monitoring/enso_advisory/.

Current Sea Surface Temperatures

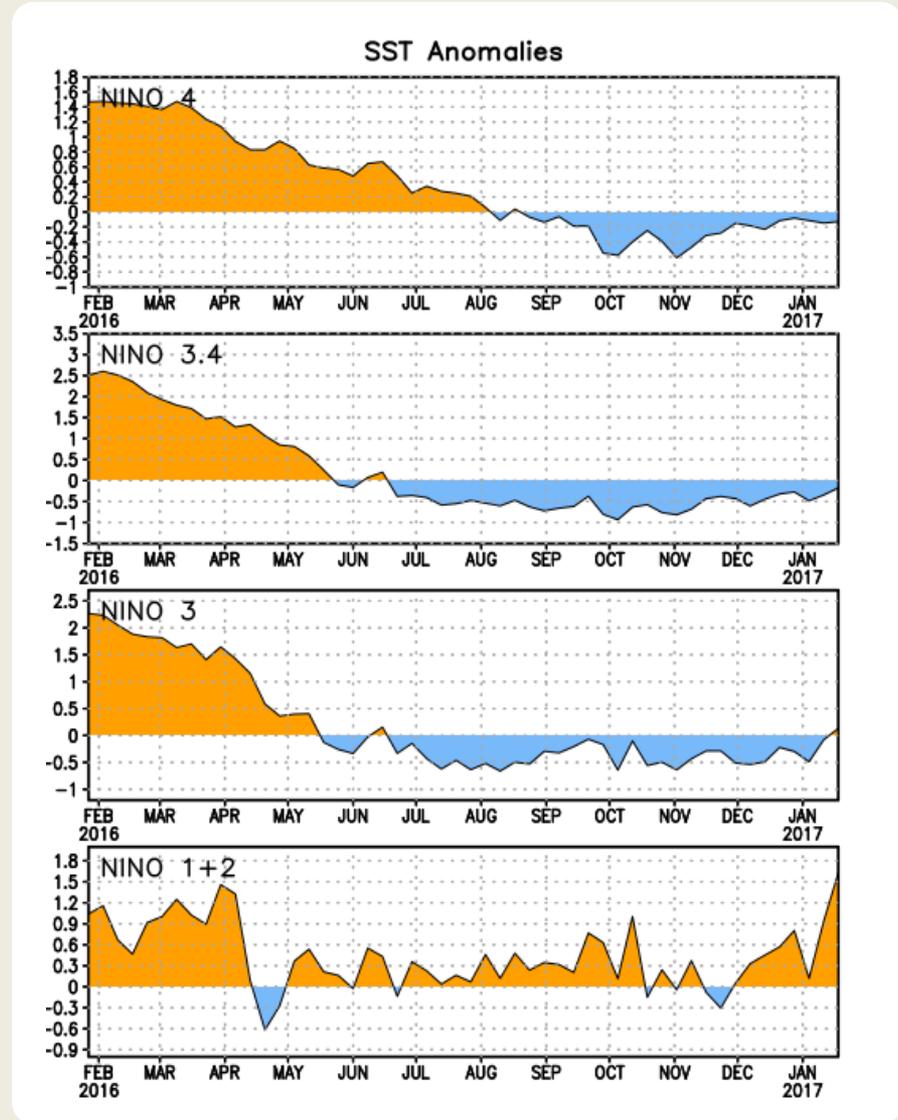
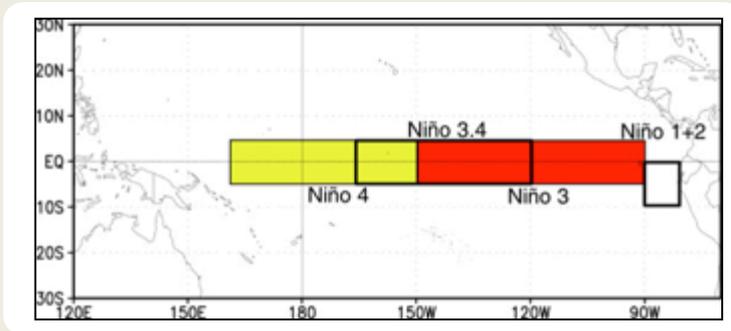


Niño Region SST Departures (°C) Recent Evolution



The latest weekly SST departures are:

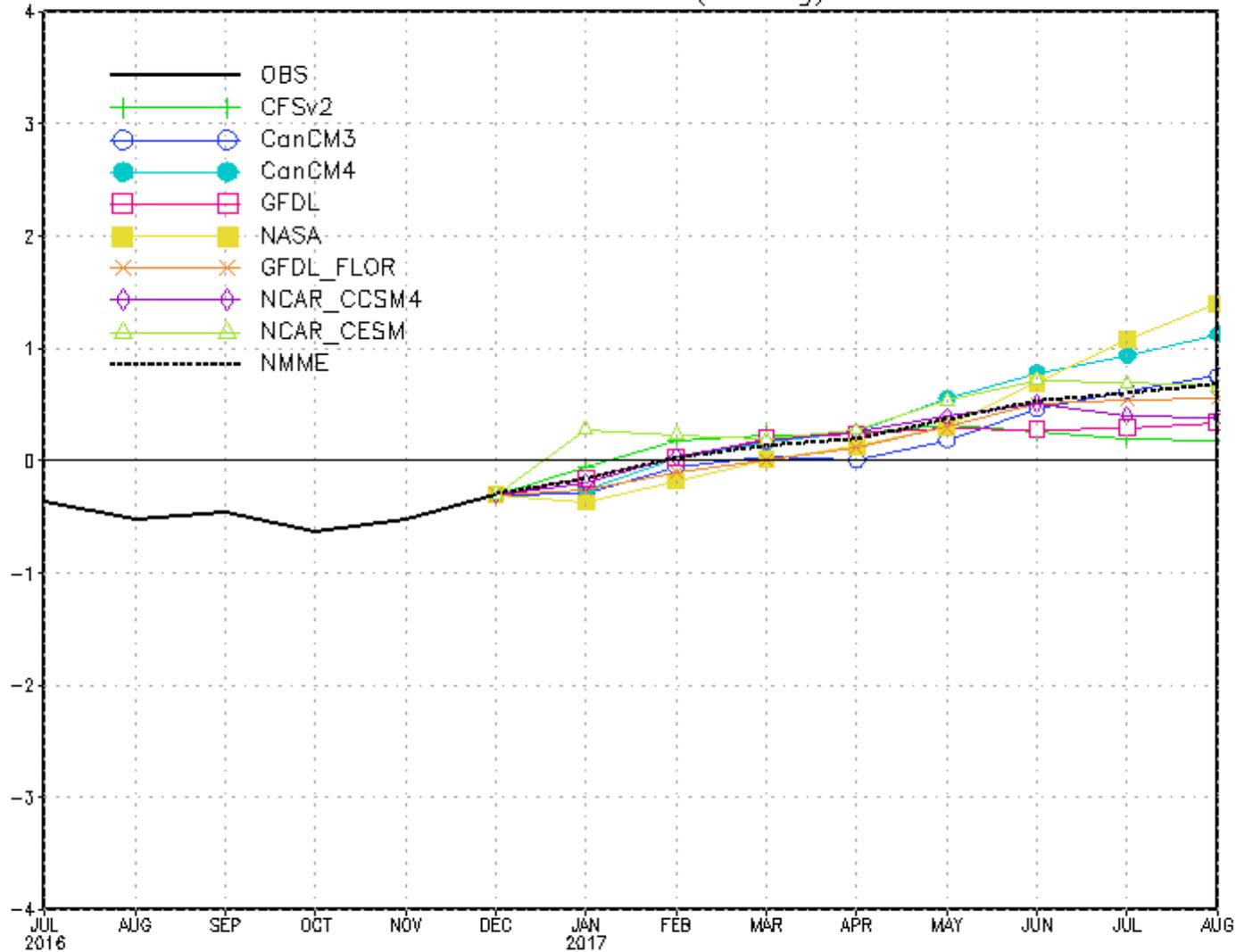
Niño 4	-0.1°C
Niño 3.4	-0.2°C
Niño 3	0.1°C
Niño 1+2	1.6°C



ENSO Forecasts



NMME Forecast for Nino 3.4 (scaling) IC= 201701

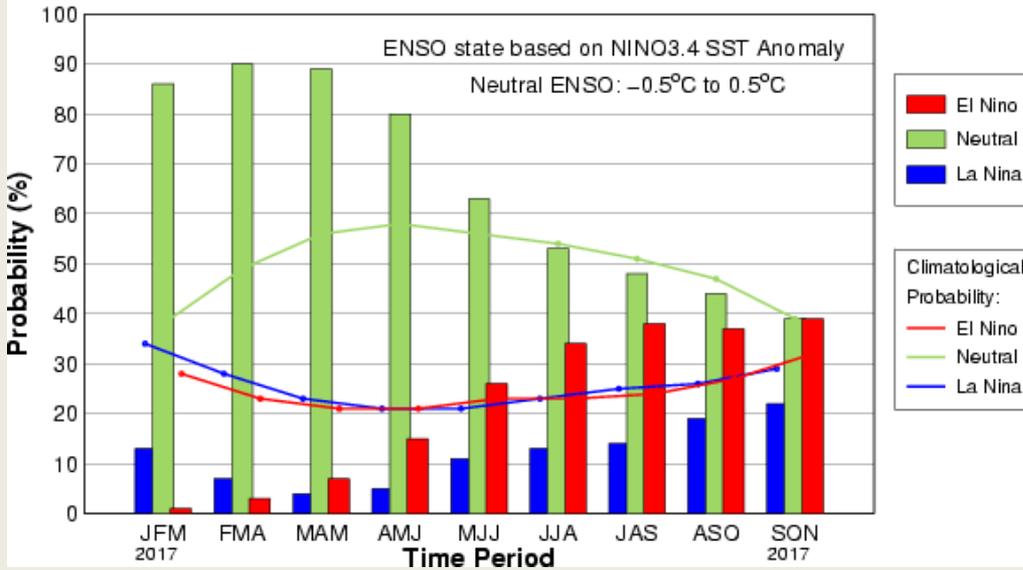


Source: NOAA/CPC

ENSO Forecasts



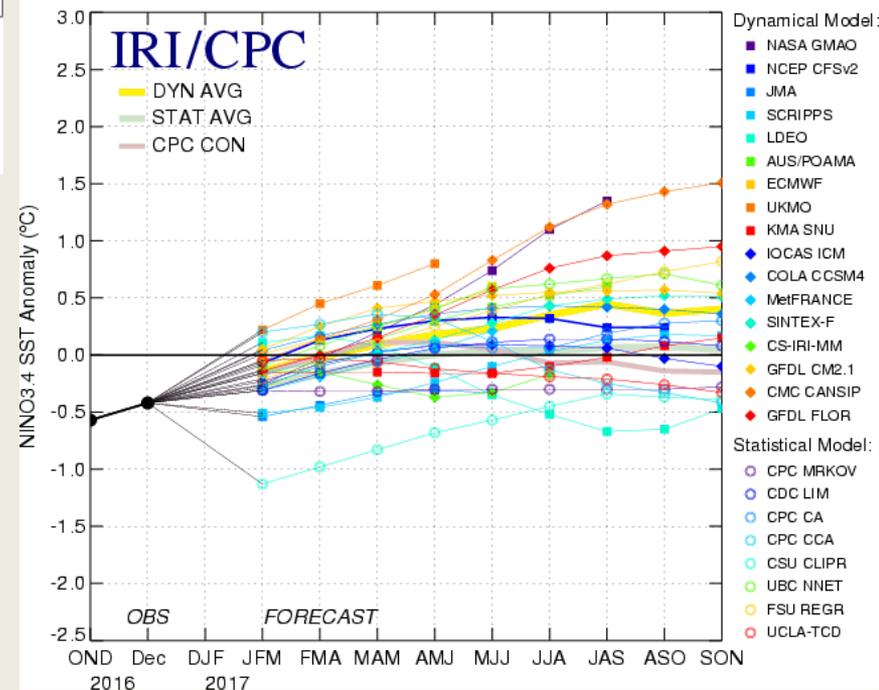
Mid-Jan IRI/CPC Model-Based Probabilistic ENSO Forecast



CPC/IRI El Nino forecast:

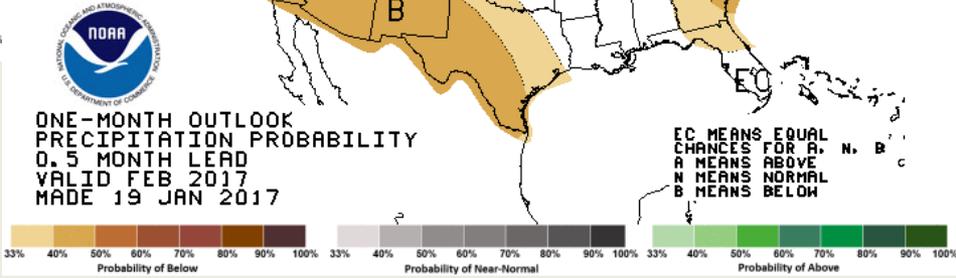
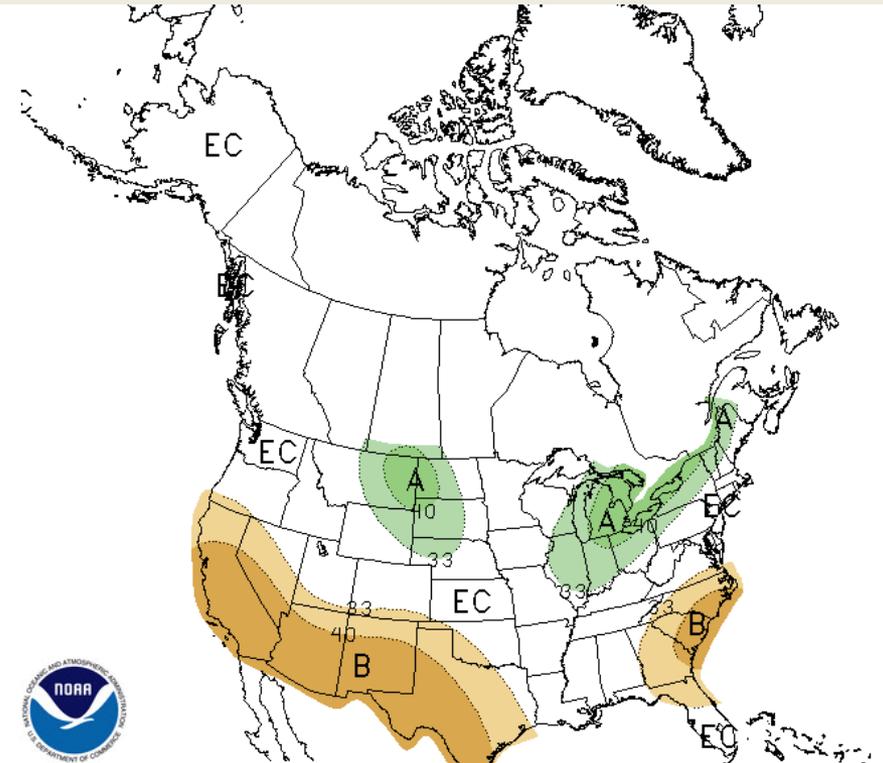
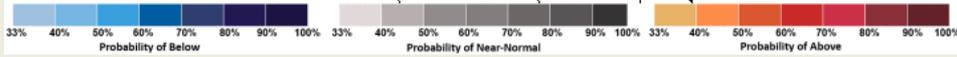
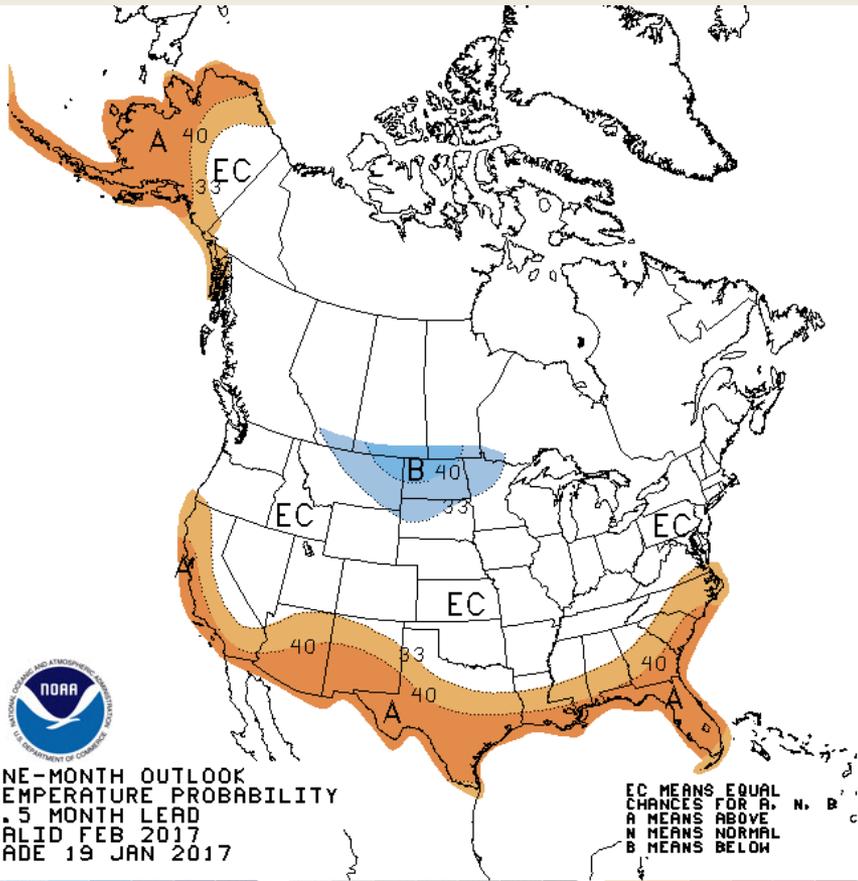
NMME models + other dynamical models + statistical models

Mid-Jan 2017 Plume of Model ENSO Predictions

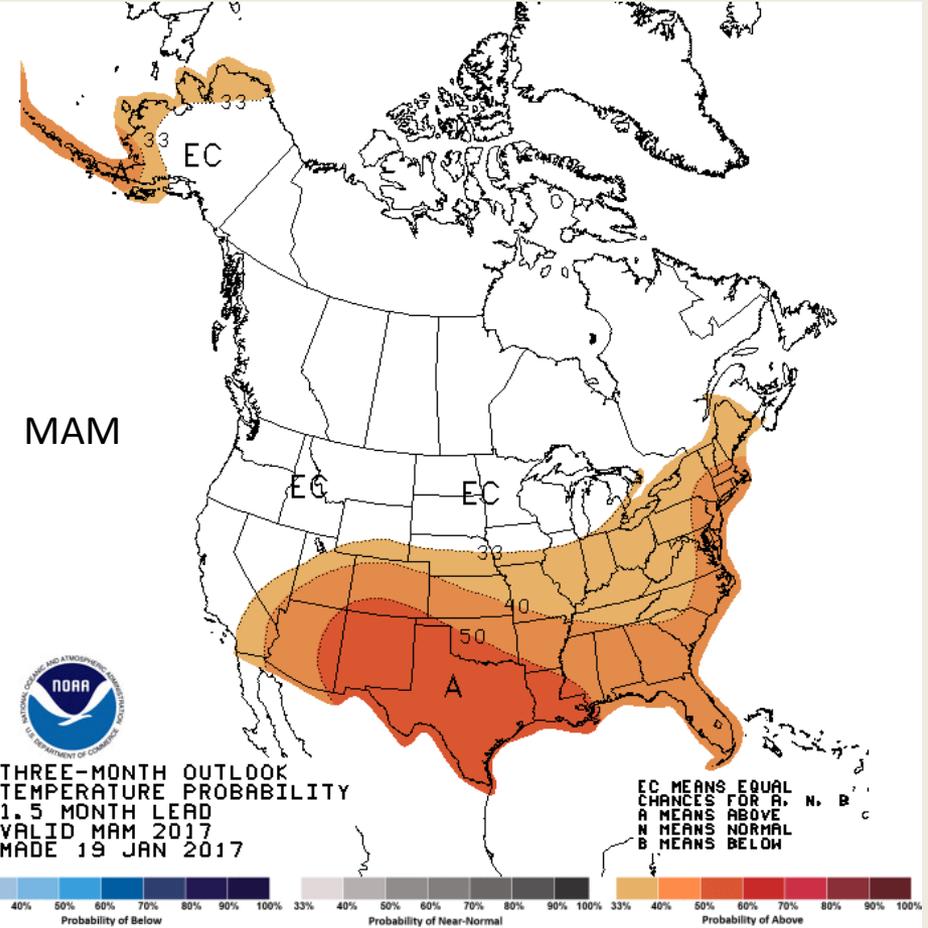
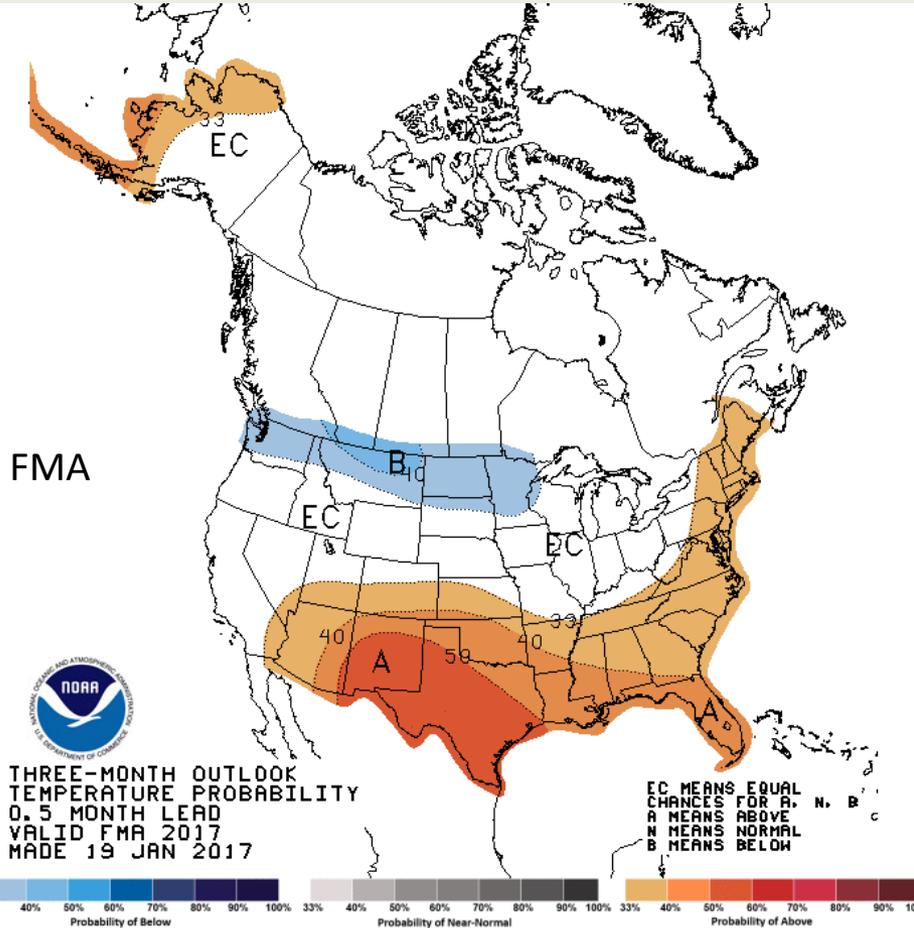


Source: CPC/IRI

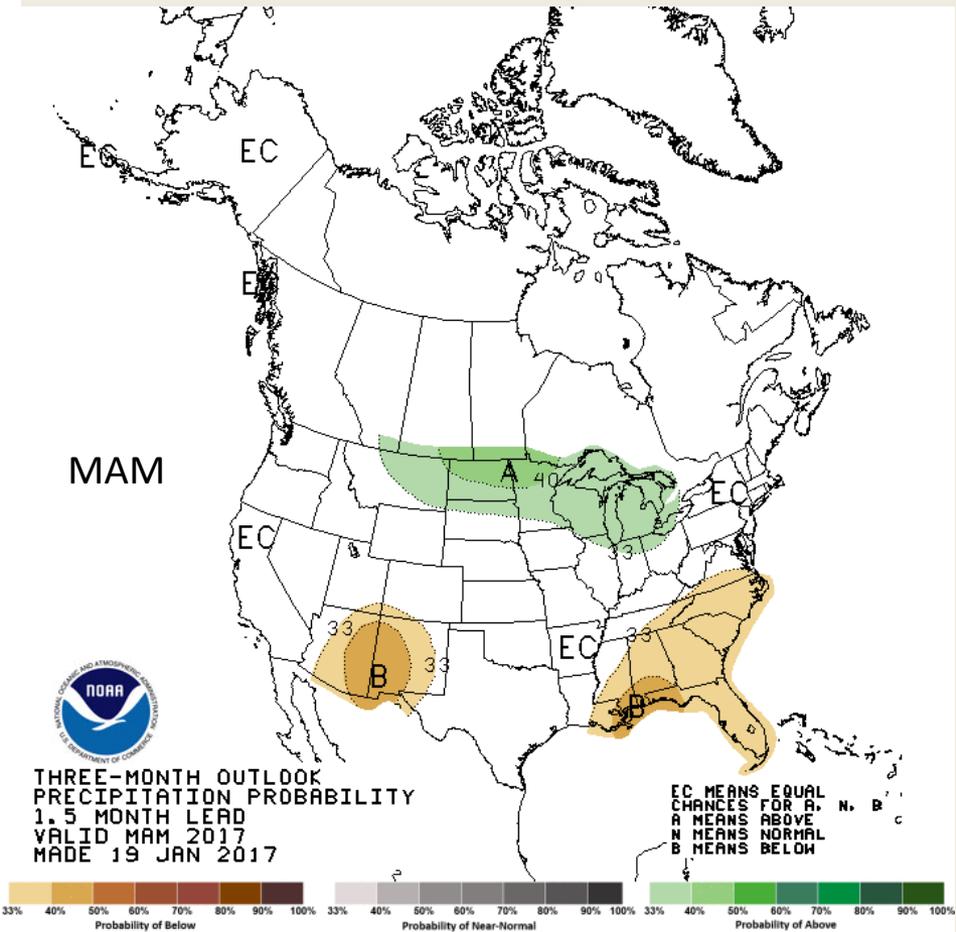
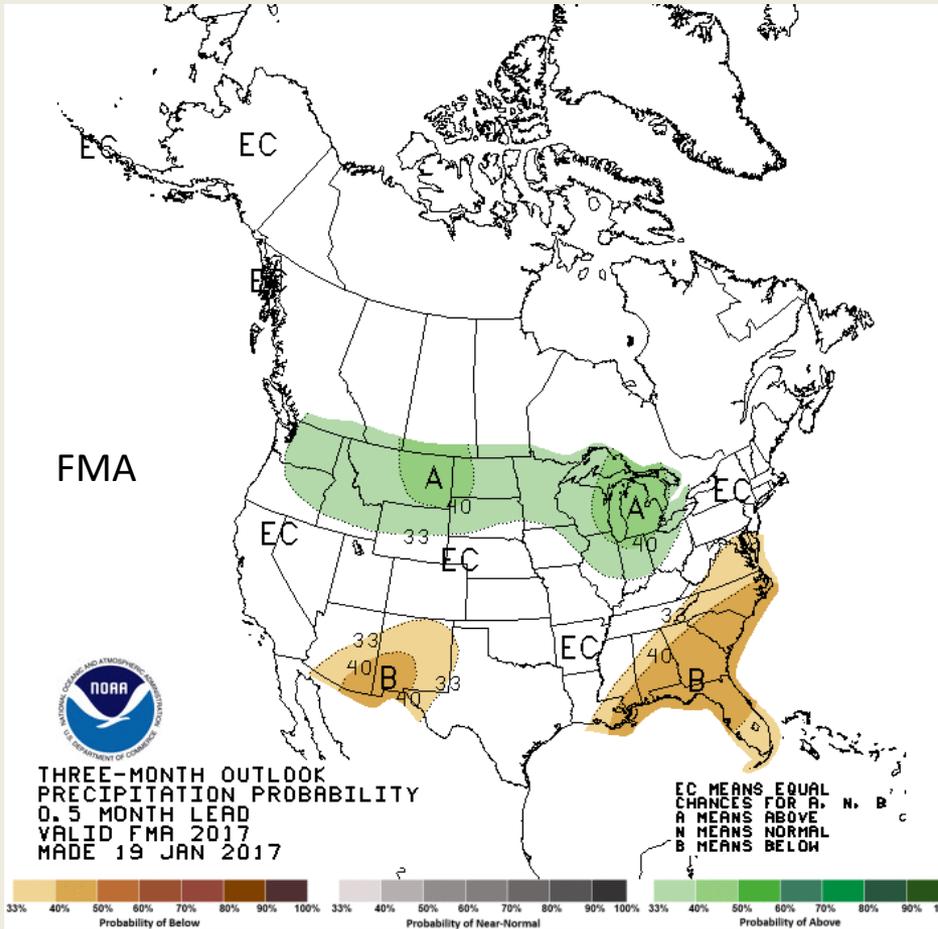
February U.S. Forecasts



U.S. Temperature Forecasts



U.S. Precipitation Forecasts

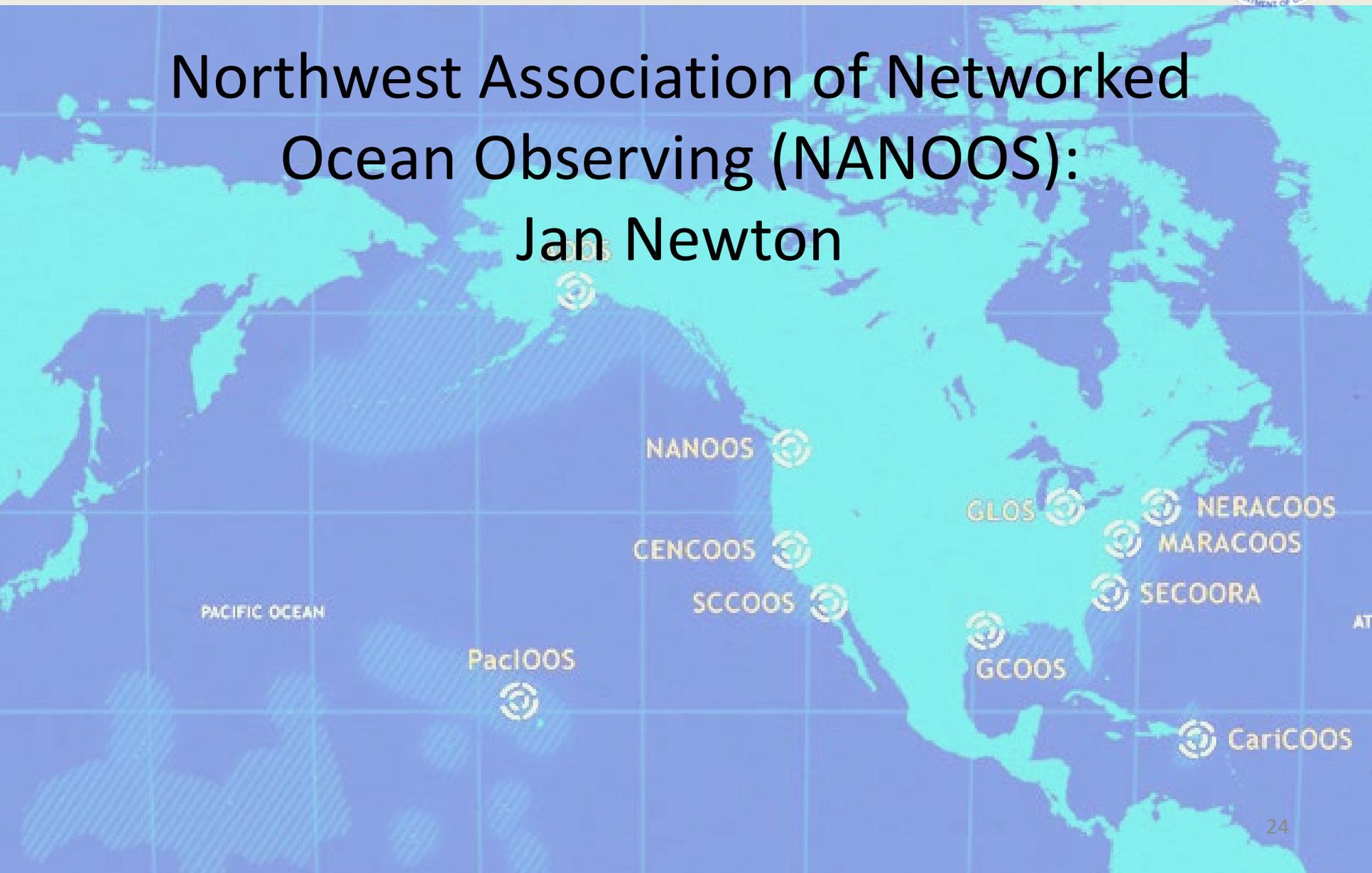


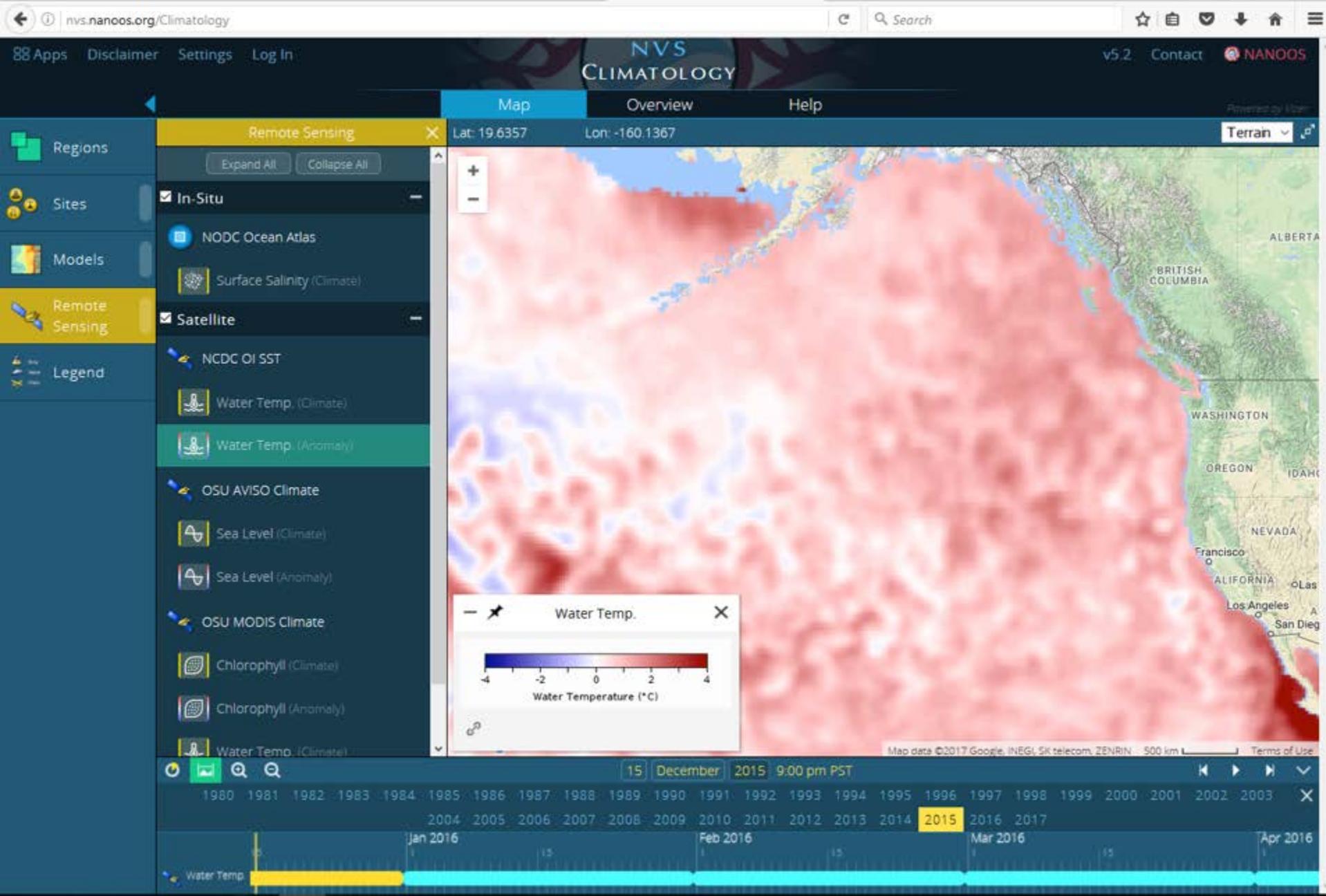
Source: NOAA/CPC

IOOS Nearshore Condition Updates



Northwest Association of Networked Ocean Observing (NANOOS): Jan Newton







nv5.nanoos.org/Climatology

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Regions Sites Models Remote Sensing Legend

In-Situ Satellite

Help

Terran

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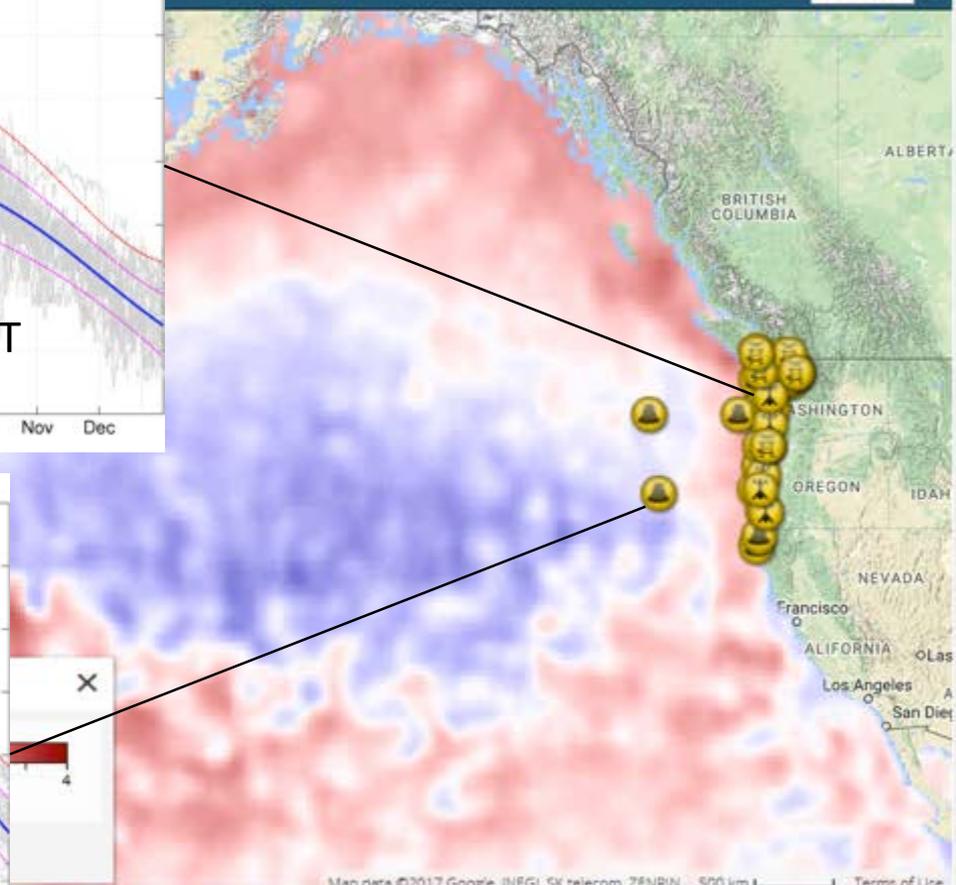
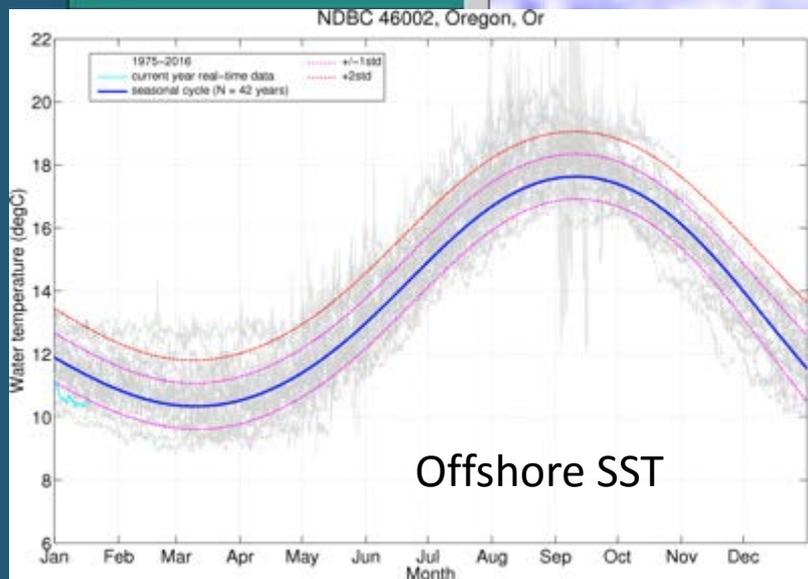
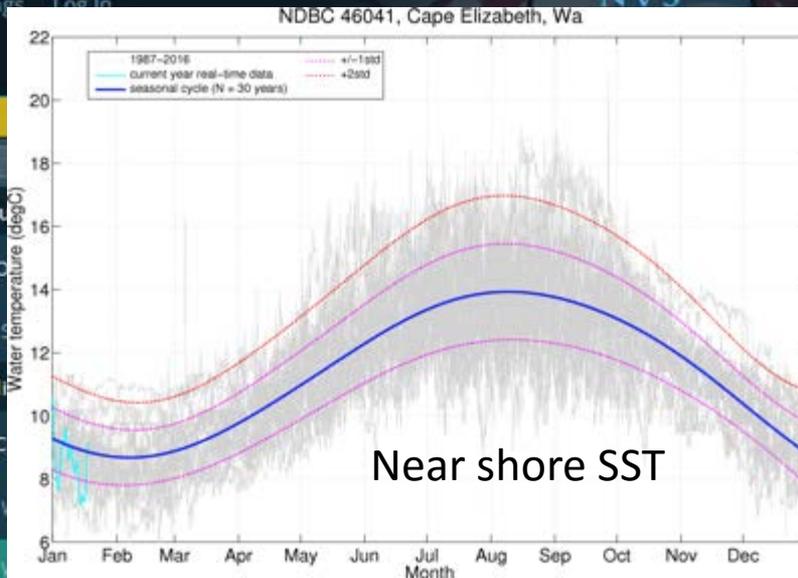
December 2016 1:00 pm PST

1990 1991 1992 1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003

2009 2010 2011 2012 2013 2014 2015 2016 2017

2015 2016 2017

Water Temp.





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Terran

Regions Remote Sensing

Expand All Collapse All

Sites In-Situ

Models NODC Ocean Atlas

Remote Sensing Surface Salinity (Climate)

Legend Satellite

NCDC OI SST

Water Temp. (Climate)

Water Temp. (Anomaly)

ORCA Point Wells @ 3 meters

Water temperature (degC)

Month

Puget Sound surface T

ORCA Trawl @ 25 meters

Water temperature (degC)

Month

Hood Canal deep T

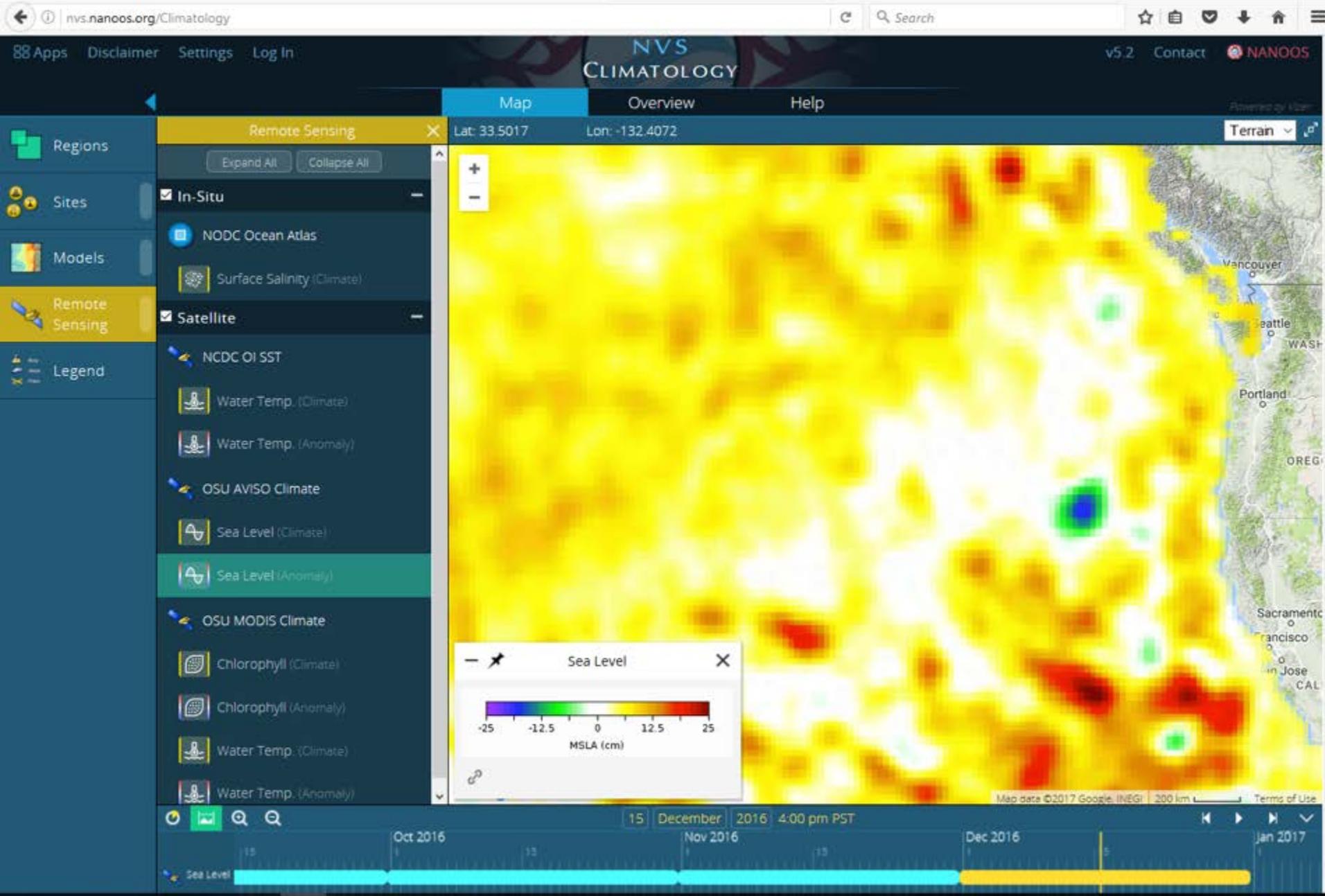
1:00 pm PST

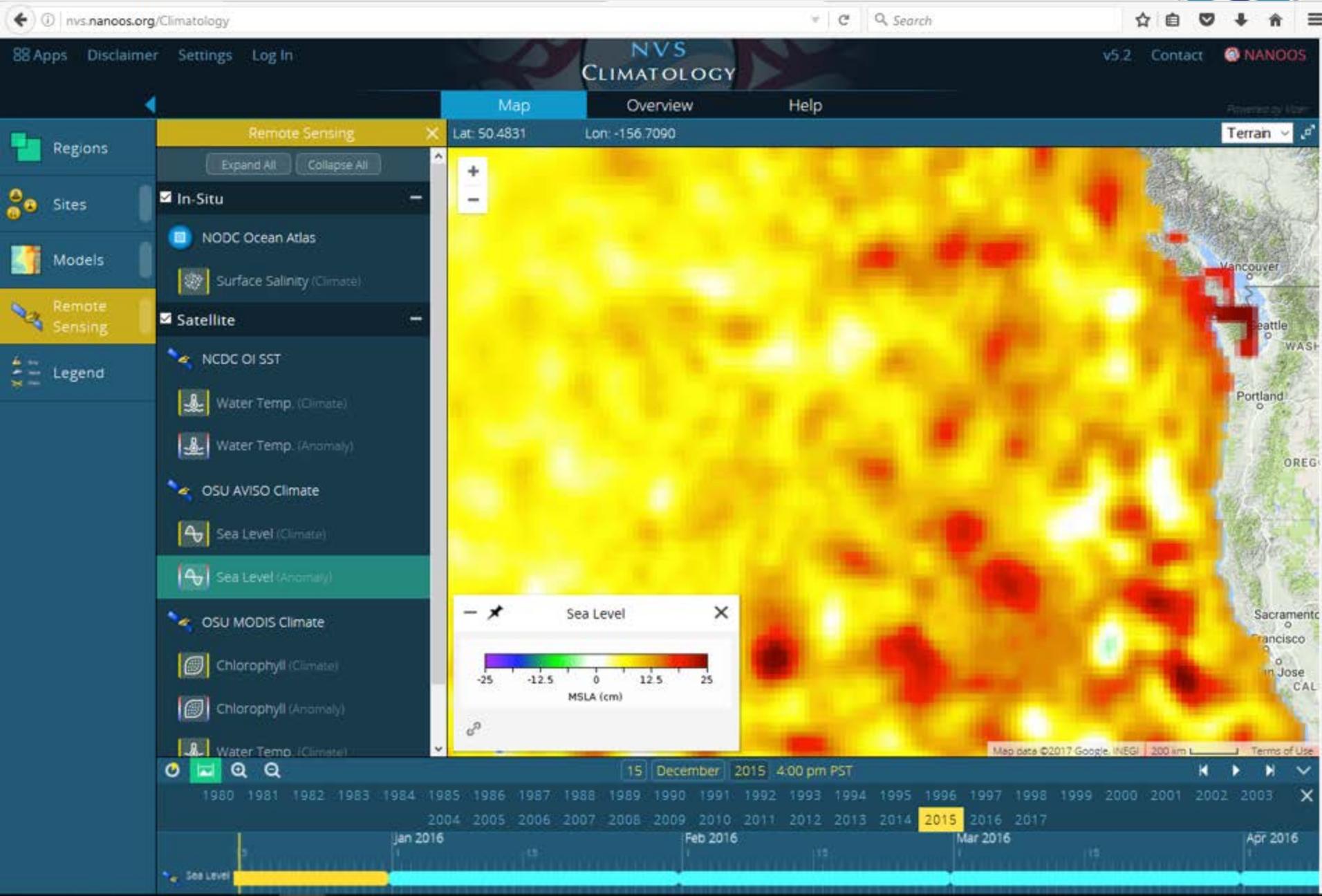
2016

2015 2016 2017

2015 2016 2017

Water Temp.







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NVS CLIMATOLOGY v5.2 Contact NANOOS

Map Overview

Lat: 33.5750 Lon: -130.9131

Remote Sensing

- Expand All Collapse All
- In-Situ
 - NODC Ocean Atlas
 - Surface Salinity (Climate)
- Satellite
 - NCDC OI SST
 - Water Temp. (Climate)
 - Water Temp. (Anomaly)
 - OSU AVISO Climate
 - Sea Level (Climate)
 - Sea Level (Anomaly)
 - OSU MODIS Climate
 - Chlorophyll (Climate)
 - Chlorophyll (Anomaly)
 - Water Temp. (Climate)
 - Water Temp. (Anomaly)

Regions Sites Models Remote Sensing Legend

Near shore Wave Height

Offshore OR Wave Height

Map data ©2017 Google, INEGI 200 km Terms of Use

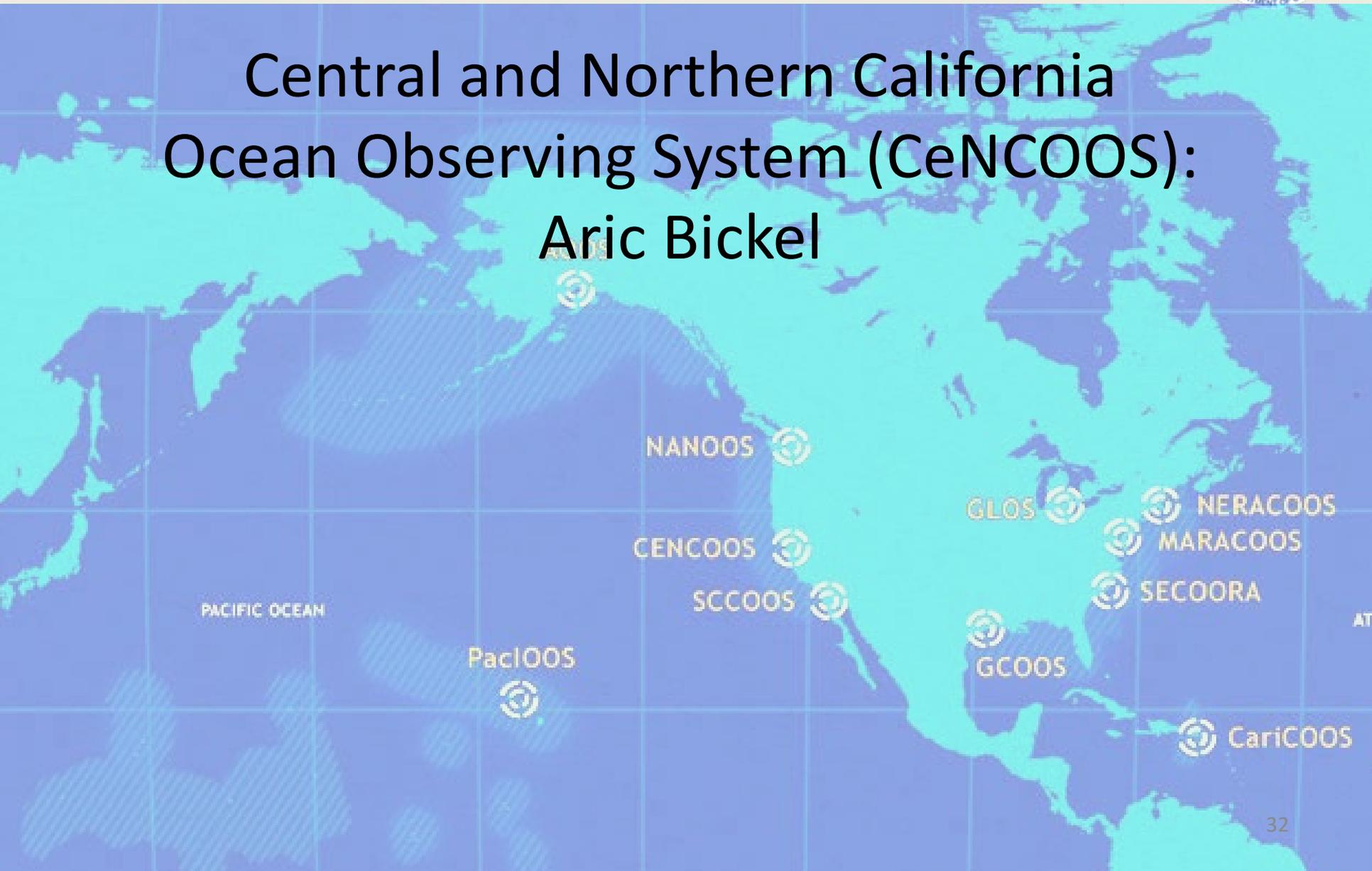
Jul 2016 Dec 2016 Jan 2017

Sea Level

IOOS Nearshore Condition Updates



Central and Northern California Ocean Observing System (CeNCOOS): Aric Bickel



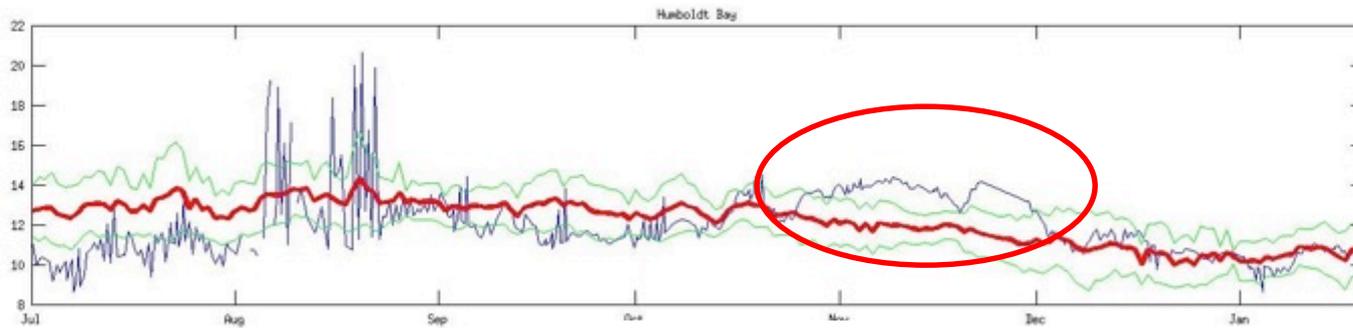
Central and Northern California Ocean Observing System (CeNCOOS)



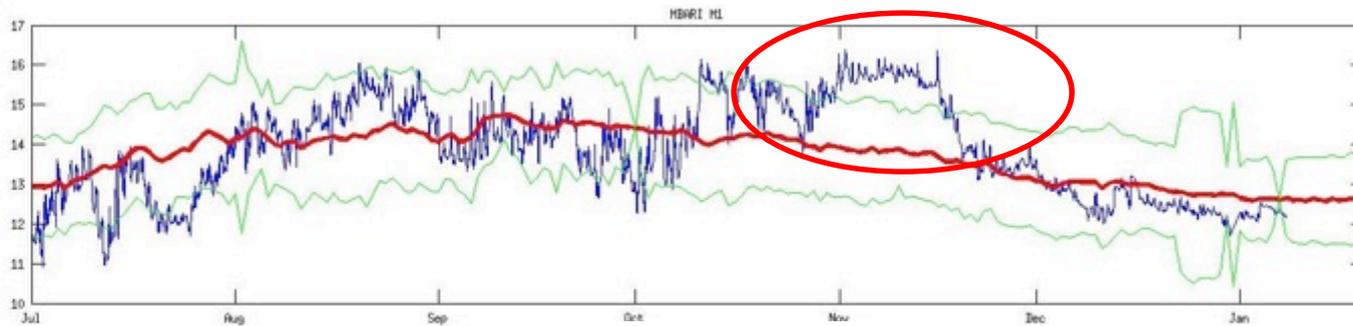
Recent Nearshore Temperature Observations



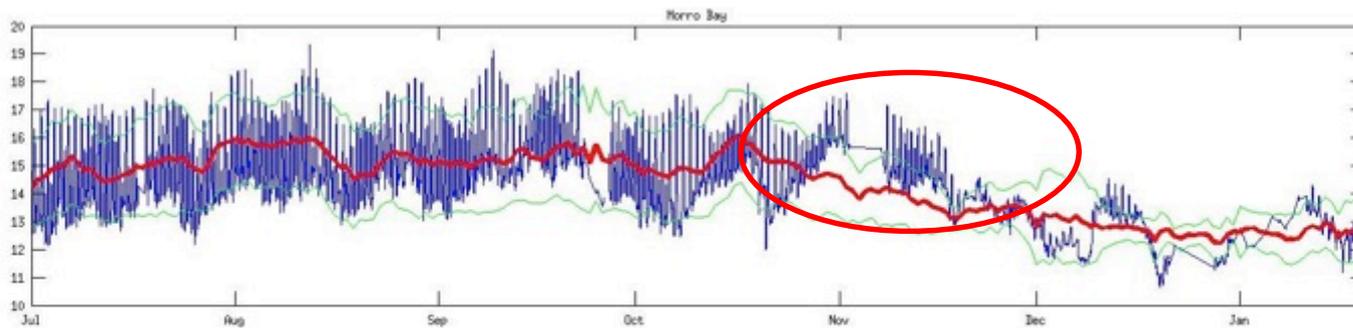
Humboldt Bay



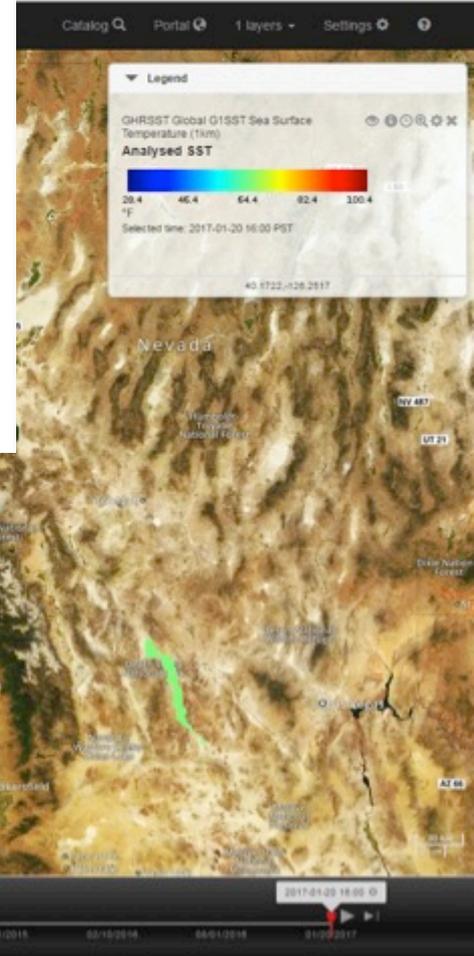
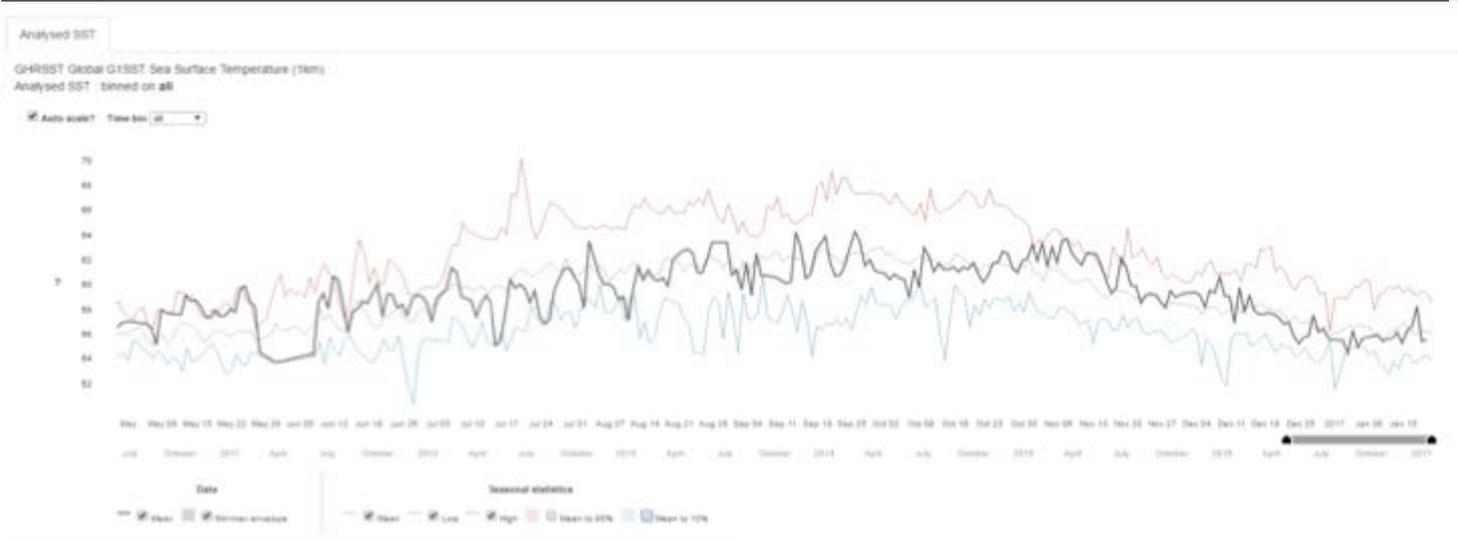
Monterey Bay (M1)



Morro Bay



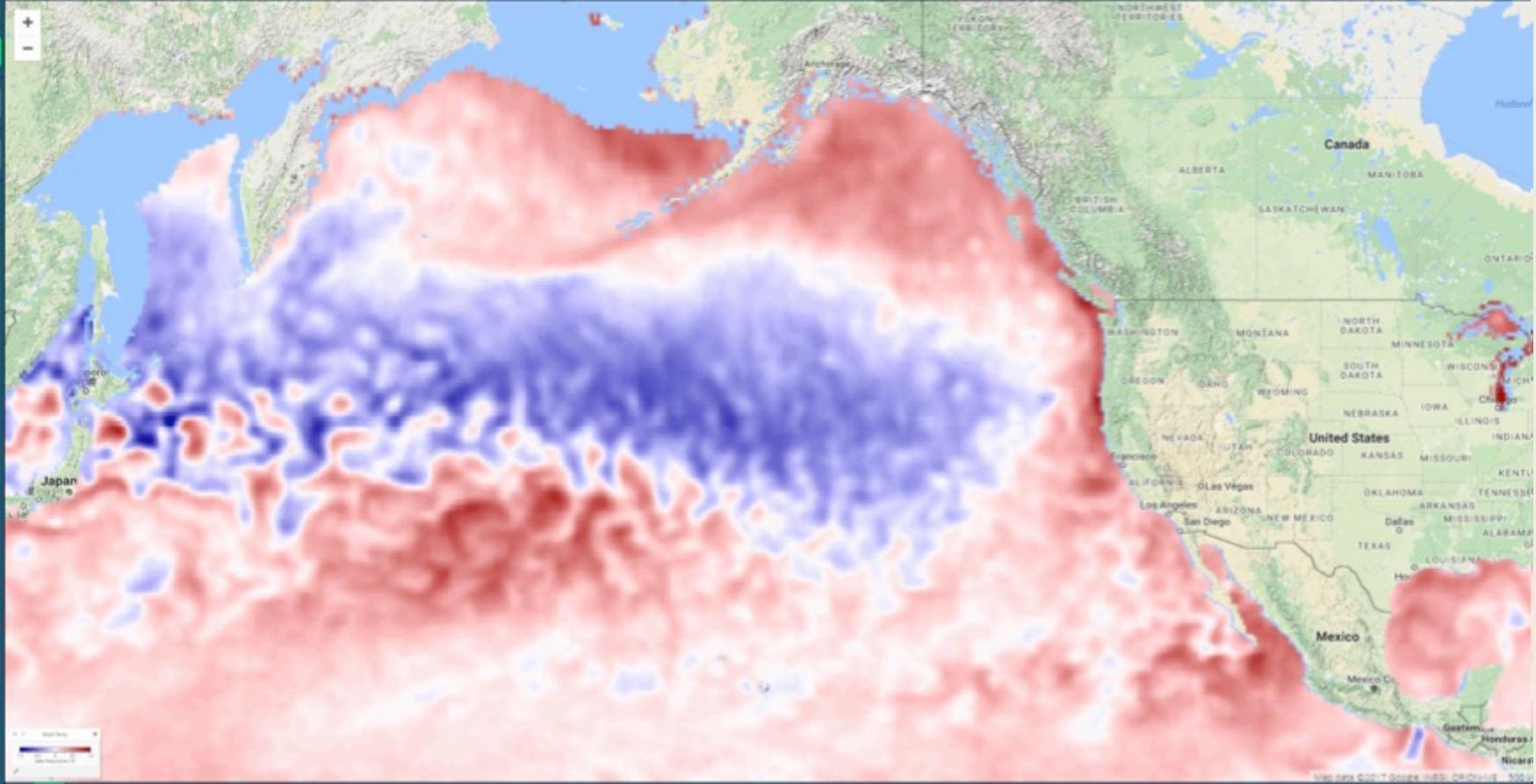
Satellite SST observations (GHRSSST daily analyzed)



data.cencoos.org

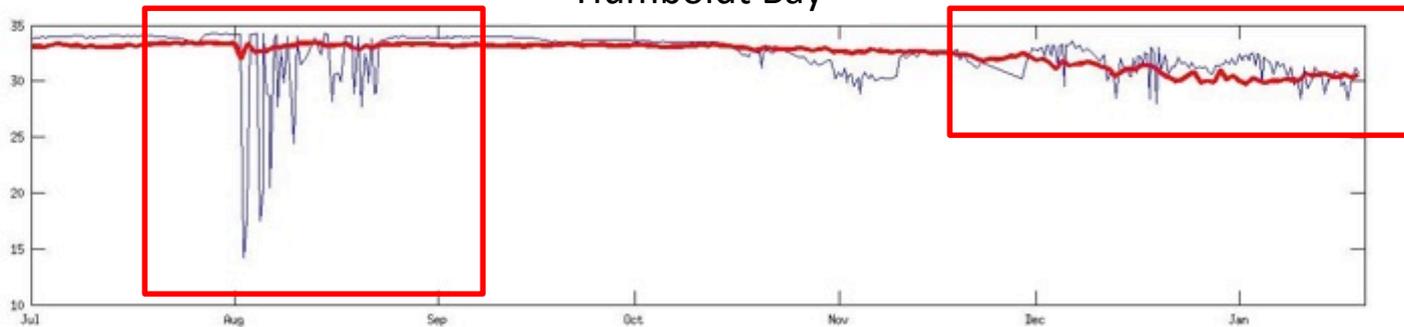
- Regions
- Sites
- Models
- Remote Sensing
- Legend

Lat: 59.5789 Lon: -140.8008

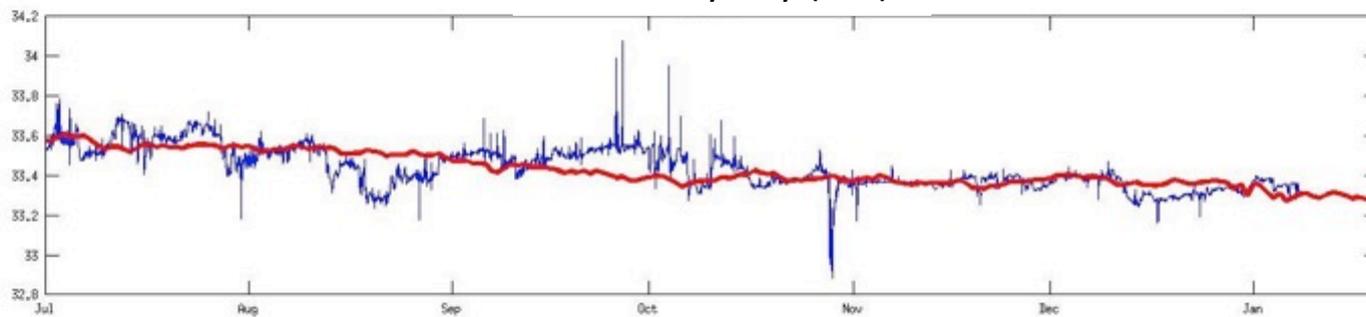


Recent Nearshore Salinity Observations

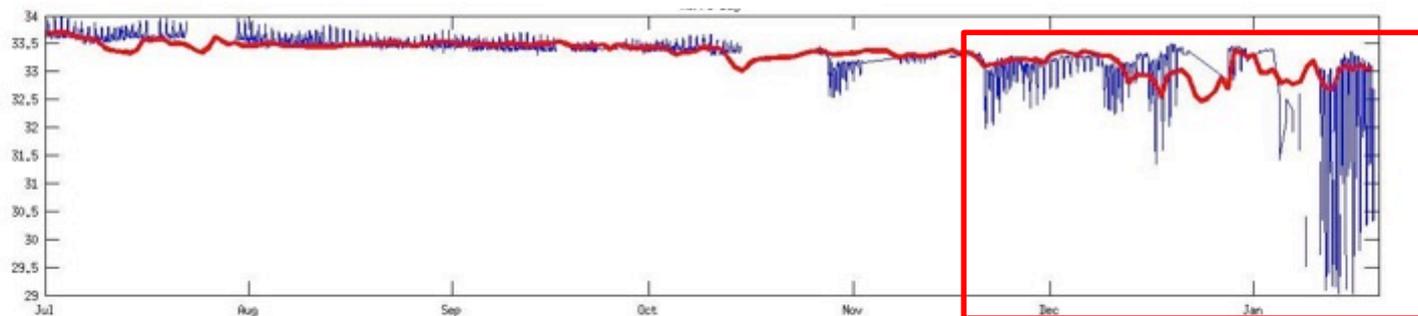
Humboldt Bay



Monterey Bay (M1)



Morro Bay



IOOS Nearshore Condition Updates



Southern California Coastal Ocean Observing System (SCCOOS): Clarissa Anderson

PACIFIC OCEAN

PacIOOS

NANOOS

CENCOOS

SCCOOS

GLOS

GCOOS

NERACOOS

MARACOOS

SECOORA

CariCOOS

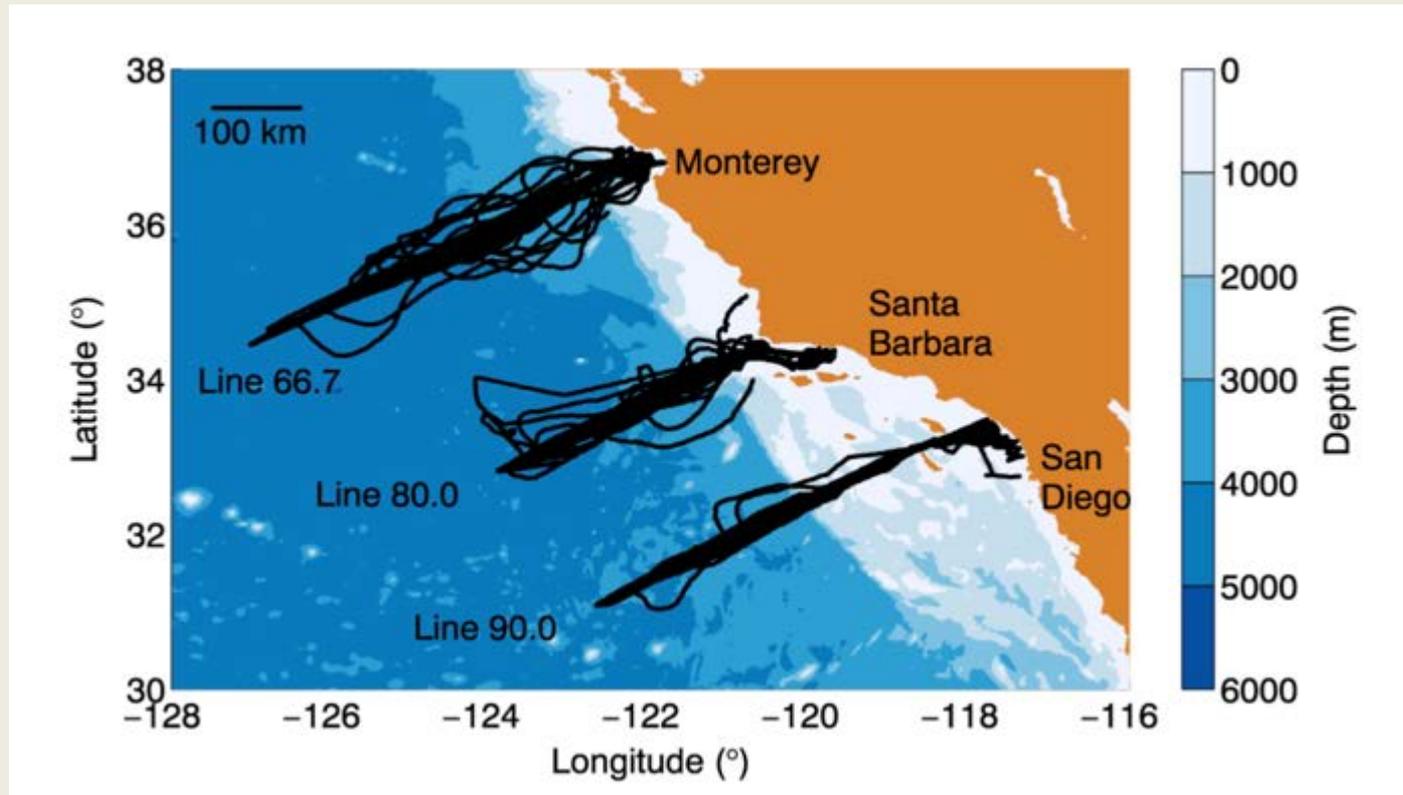
SCCOOS REGION: The Pacific Warm Anomaly/Marine Heat Wave



Spray Gliders

<http://www.sccoos.org/data/spray/>

Zaba and Rudnick, *GRL* (2016) analyzed glider transects from **Oct 2006 – June 2015**



SCCOOS REGION: The Pacific Warm Anomaly/Marine Heat Wave

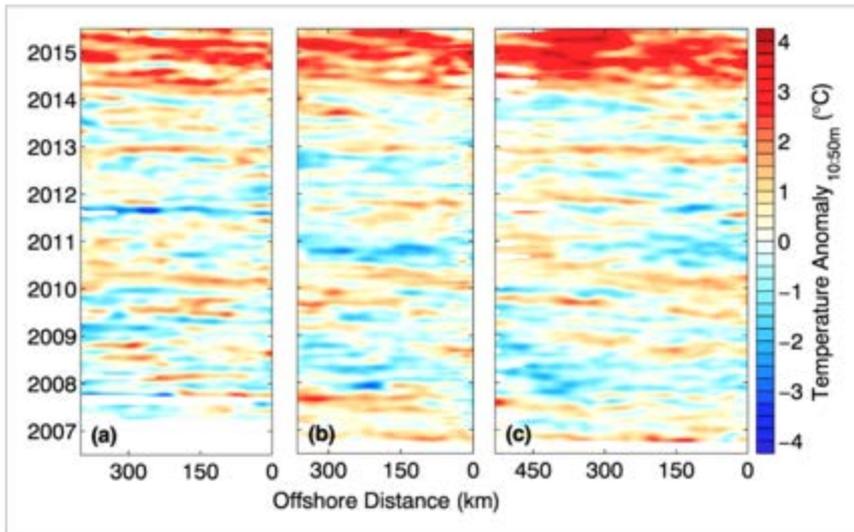


Figure 2.

[Open in figure viewer](#) | [Download Powerpoint slide](#)

Hovmöller plots of temperature anomalies depth averaged over 10–50 m along (a) line 66.7, (b) line 80, and (c) line 90. A striking upper ocean temperature anomaly began in early 2014 and remained through mid-2015.

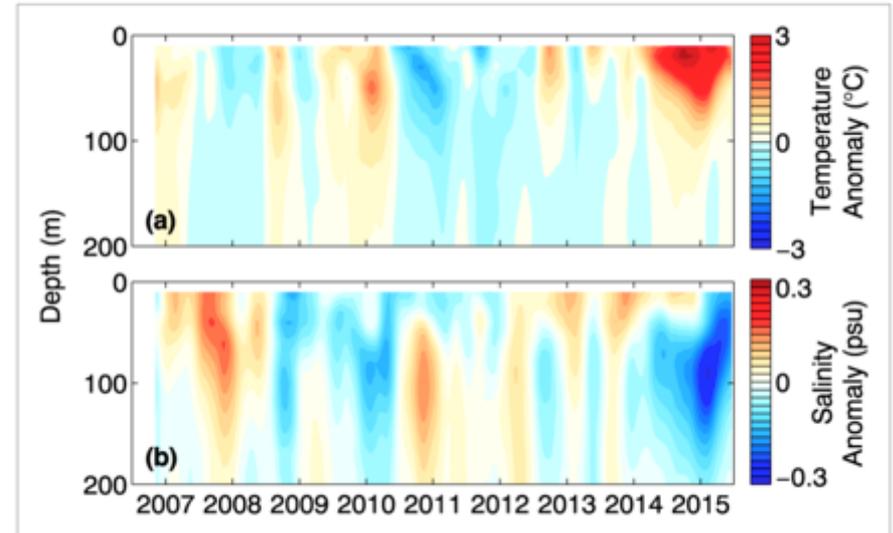
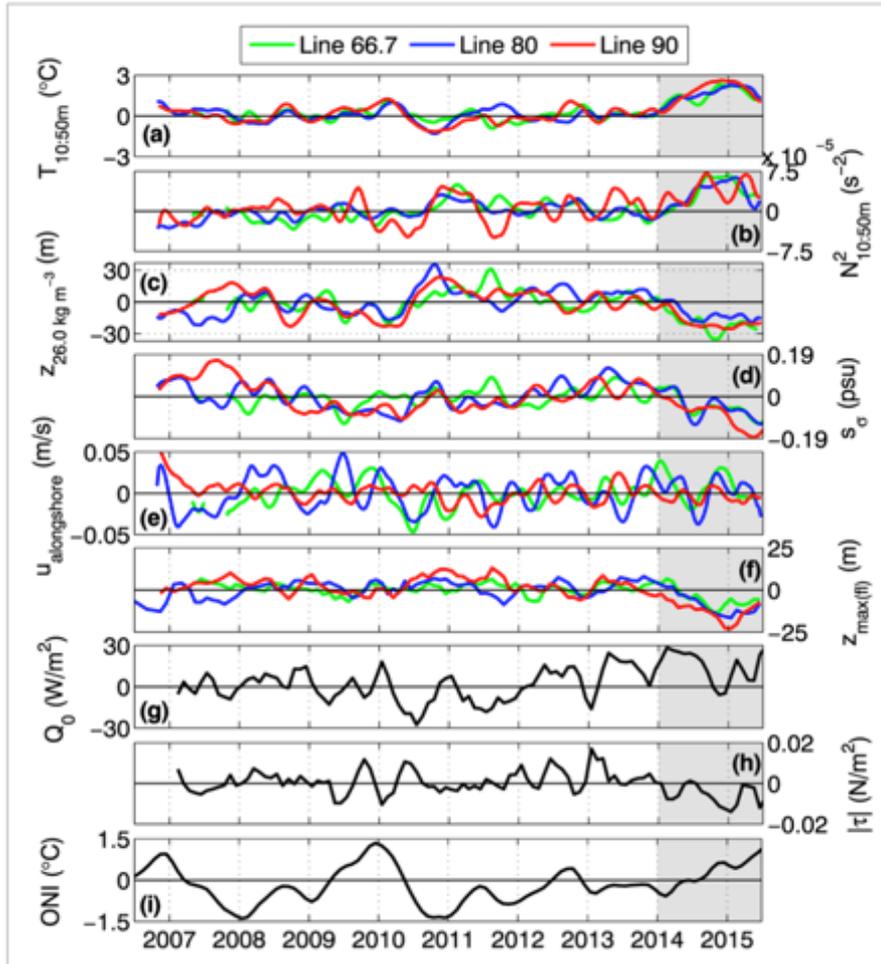


Figure 3.

[Open in figure viewer](#) | [Download Powerpoint slide](#)

Depth-dependent (a) temperature and (b) salinity anomalies averaged over the inshore 200 km along line 90 and filtered with a 3 month running mean. A surface-intensified warming and a subsurface freshening persisted during 2014–2015.

SCCOOS REGION: The Pacific Warm Anomaly/Marine Heat Wave



Time series of oceanic and atmospheric property anomalies. Glider-measured (a) temperature in the upper 50 m, (b) buoyancy frequency squared in the upper 50 m, (c) depth of the 26.0 kg/m^3 isopycnal (negative indicates deep), (d) salinity along isopycnals (the 25.75, 25.50, and 25.25 kg/m^3 isopycnals for lines 66.7, 80, and 90, respectively), (e) alongshore velocity depth averaged over the upper 500 m, and (f) depth of the subsurface fluorescence maximum (negative indicates deep). The glider-measured anomalies (Figures 4a-4f) are averaged along the inshore 200 km of lines 66.7 (green), 80 (blue), and 90 (red). NAM model (g) net surface heat flux (positive indicates downward) and (h) wind stress magnitude are averaged over the oceanic domain of Figure 1 ($[-128^\circ, -116^\circ W] \times [30^\circ, 38^\circ N]$), i.e., data above land are excluded from the spatial average. In Figure 4i Oceanic Niño Index, ONI, shows equatorial SST anomalies averaged over the Niño 3.4 region. All spatially averaged anomalies are filtered with a 3 month running mean. The temporal range of the recent anomalous period is shaded in grey.

Cyclonic circulation weakened the climatological upwelling favorable winds

- ↓ winds
- ↓ upper-ocean mixing
- ↓ seasonal upwelling

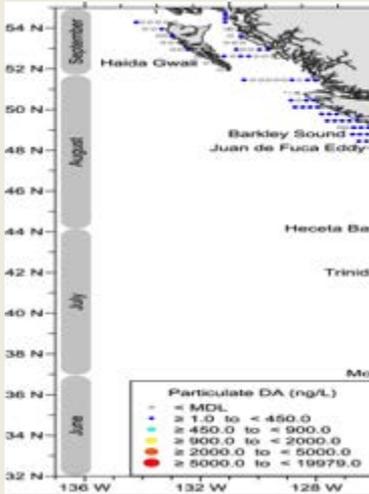
- ↓ low-level cloud cover
- ↑ downward short-wave radiation at surface
- ↑ SST + feedbacks

Zaba and Rudnick (2016)

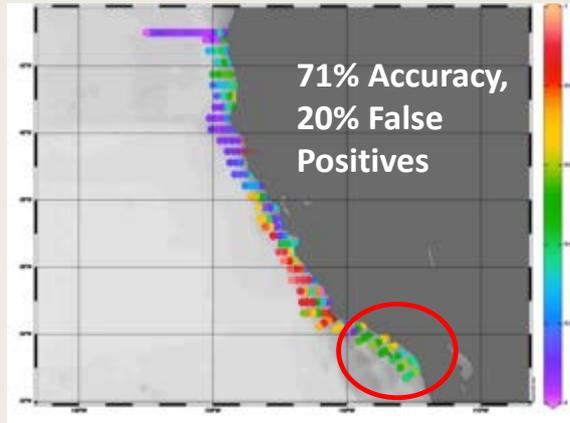
SCCOOS REGION: Marine Heat Wave + Massive HAB of 2015



The pre-operational C-HARM system provides a nowcast, 3-day forecast and hindcast of *Pseudo-nitzscha* blooms, Particulate Domoic Acid, and Cellular Domoic Acid

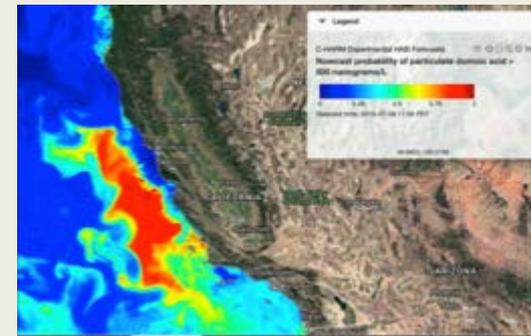
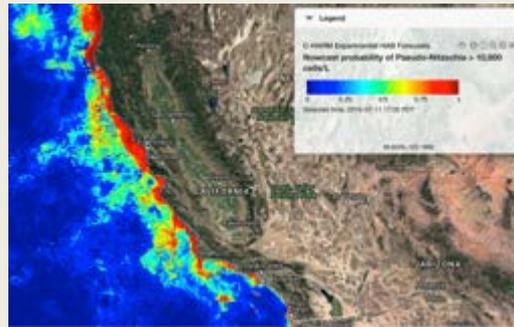


C-HARM ESTIMATES AT CRUISE STATIONS



NWFS cruise, June-Sept 2015

Why no toxic event in Southern California?



Dungeness Crab Closure!

Recreational and Commercial Harvester (Nov-May)

Santa Cruz Sentinel NEWS

News * Sports * Business * Entertainment * Lifestyle * Opinion * Obituaries * Place

Home News

California's crab-season delay claims Christmas

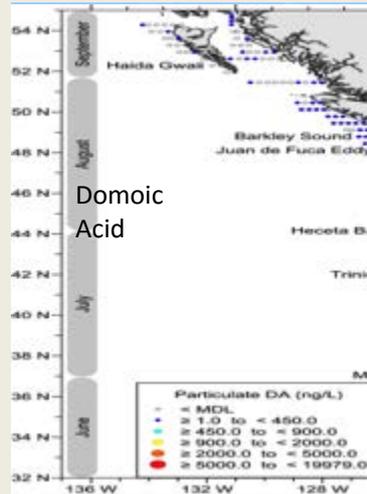
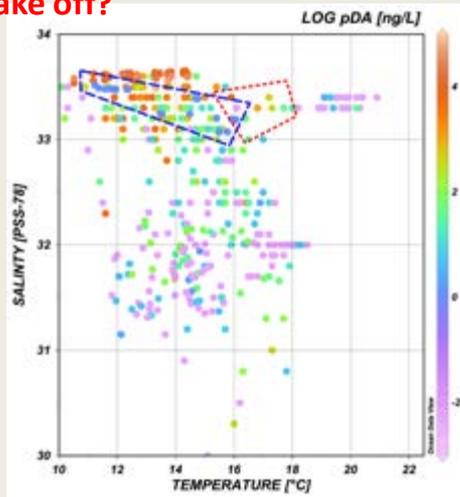
By Aaron Kinney akinney@bayareanews.com



SCCOOS REGION: Marine Heat Wave + Massive HAB of 2015



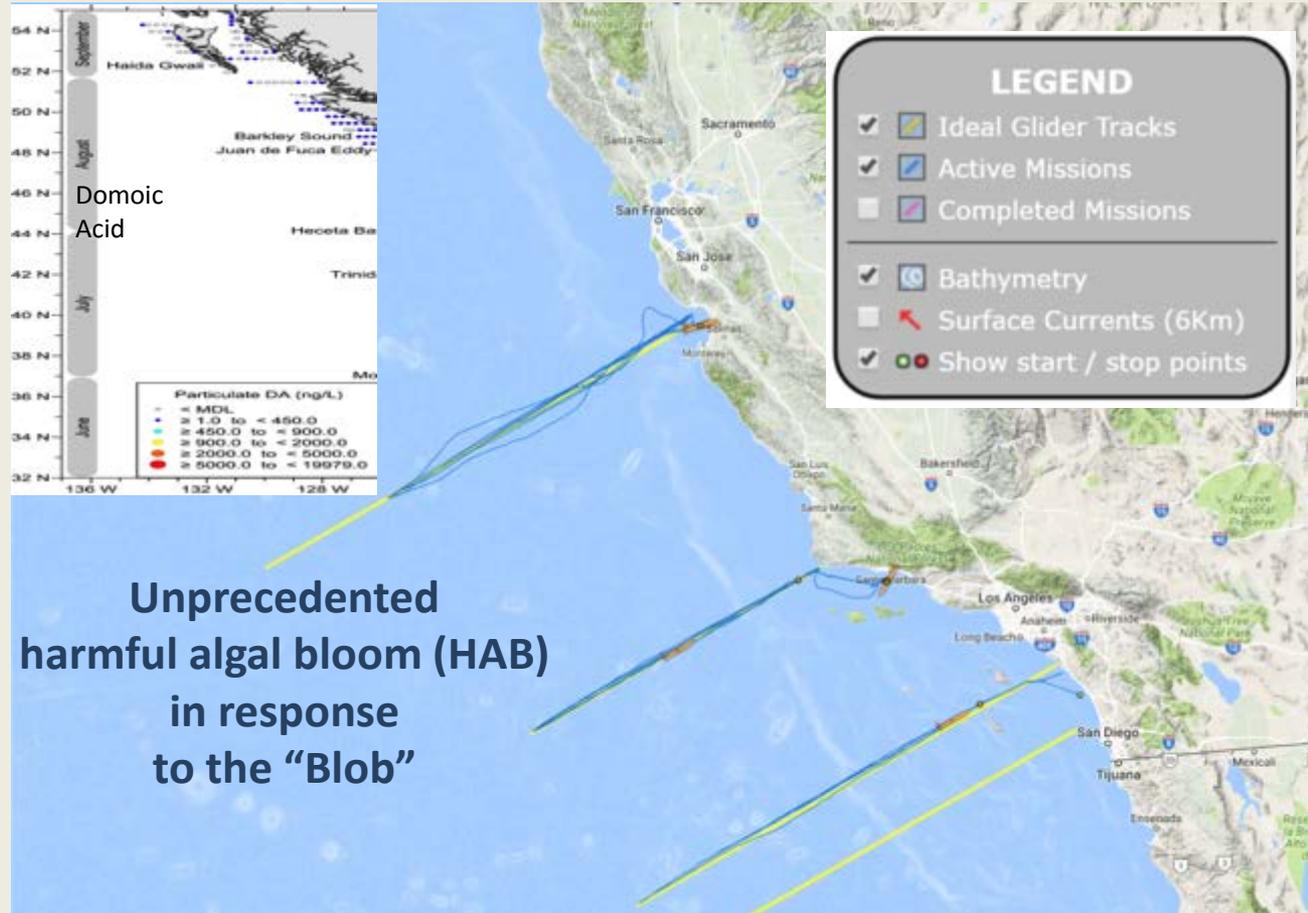
Was it too hot in Southern California for the massive HAB to take off?



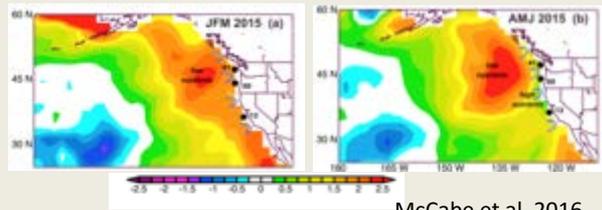
Unprecedented harmful algal bloom (HAB) in response to the "Blob"

CalCOFI & SCCOOS Stations

The blue dashed polygon shows the T-S space (0-10 m) for CalCOFI Line 80 (Santa Barbara) immediately after the Spring Transition, while the red polygon shows the T-S space for Line 90 (SoCal). As the season progressed those regions warmed. **No cells, no bloom.**

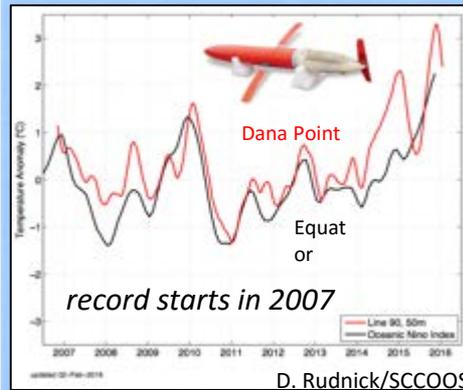


SCCOOS REGION: Marine Heat Wave & transition to El Niño



McCabe et al. 2016

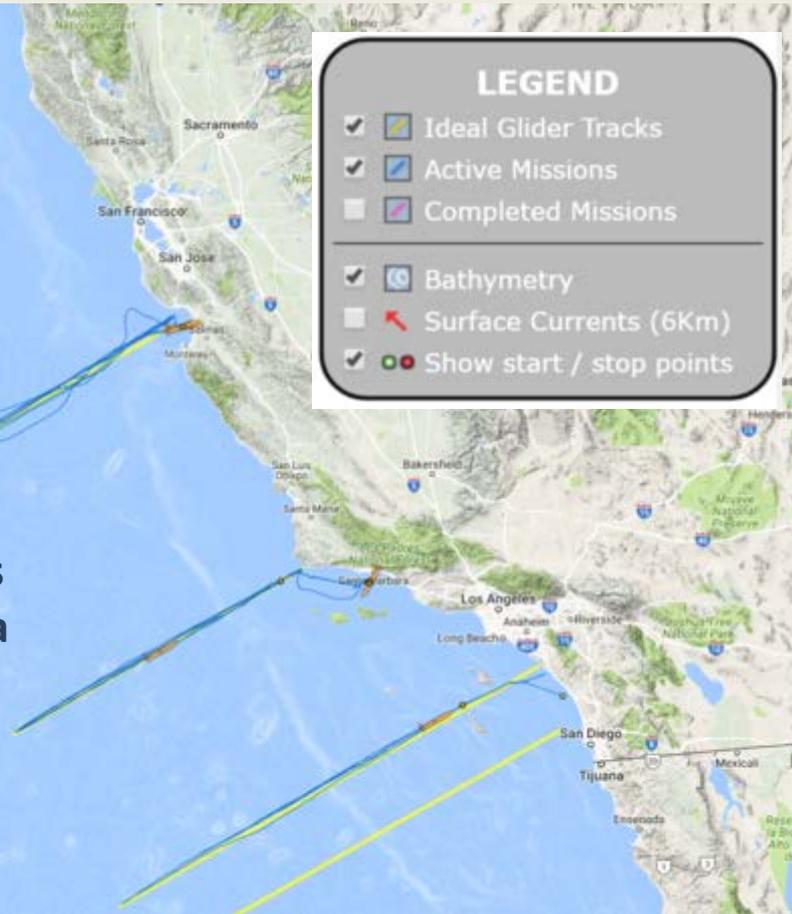
Pacific Warm Anomaly Workshop
 Scripps Institution of Oceanography
 May 2015, hosted with NANOOS



D. Rudnick/SCCOOS

**Gliders measured
 anomalous temperatures
 in the Southern California
 Bight during 2014-2016**

***captured ENSO signal in
 early 2016**



Regional Impacts Summary



Reporting Status:

- Restarted collection
- 43 entries since June 1, 2016

Environmental Conditions

- Wildfire
- Floods
- Drought
- Atmospheric river storms
- Widespread dead trees
- Domoic acid
- Anomalously warm oceanic waters

Human & Environmental Impacts

- Property damage/Loss of property
- Loss of life
- Nine fishery disasters declared
- Delayed fishery openings
- Reduced fishery quotas
- Impacts to recreational access
- School & business closures
- Evacuations
- Forest industry profit
- Increased human health risks
- Increased risk of wildfire
- Endangered species population decline
- Increased cost of emergency response

Impacts in Pictures



Erskine Fire, one of 33 California fire complexes in 2017, destroyed 285 homes and killed 2. Fires raged in at least 7 Western States in August 2016.





Impacts in Pictures



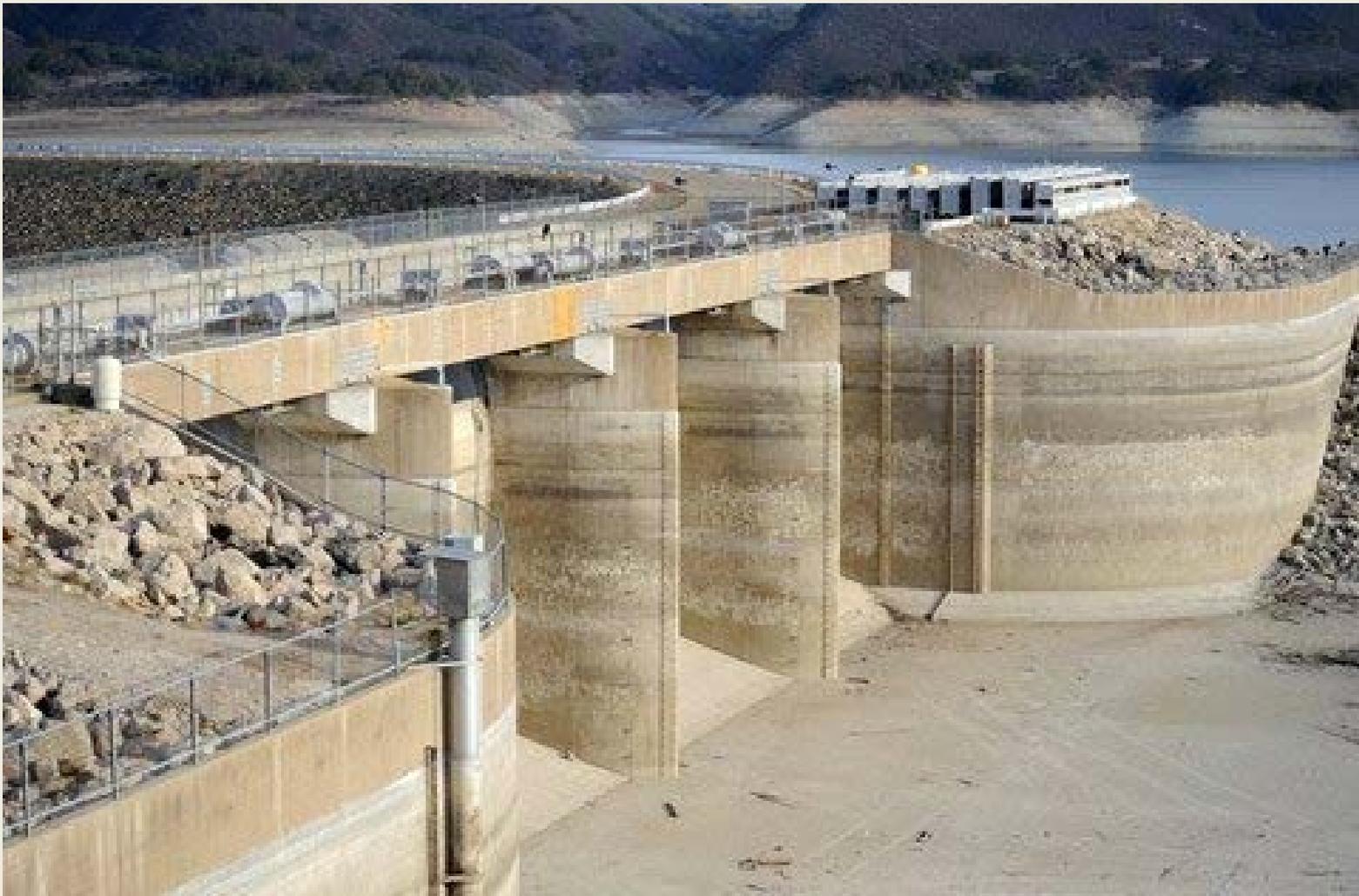
More than 102 million dead trees now litter California's forests, in large part due to the state's ongoing drought conditions.



Impacts in Pictures



Lake Cachuma in Santa Barbara California, was down to an all-time-low of 7% capacity in summer 2016. Recent rains have increase capacity to 9% as of January 21, 2017 but it remains the driest in the state.



Impacts in Pictures



The Great Salt Lake, key to the Utah's economy and identity, is skirting record low levels after years of below-average participation and record heat.



Impacts in Pictures



“Pioneer Camp Tree” – beloved drive-through tree – was toppled in January 2017 storm.



2014



2017

Impacts in Pictures



An atmospheric river storm in early Jan 2017 brought high water and mudslides to much of California and Nevada. This Hollywood Hills home lost part of its foundation to the slides.



Impacts in Pictures



Recession of California's largest lake, the Salton Sea, is exposing thousands of acres of toxic salt flats. Dust created by high winds threaten to increase already high rates of asthma and other respiratory diseases in this economically impoverished area.



Impacts in Pictures



The recreational season for red abalone fishing in N. coast of California has been shortened and the take limit reduced for 2017. Surveys show that deeper populations have declined due to declining kelp forests and competition from purple sea urchins.



Impacts in Pictures



The opening of the 2016-2017 Washington and Oregon Dungeness crab fishery in Washington was delayed several weeks due to high levels of domoic acid measured in several locations.



Announcements & Open Discussion



1. Next NOAA West call: Monday March 20, 1pm PT
2. Open Discussion

