



NOAA West Watch

*Reporting Regional Environmental
Conditions & Impacts in the West*

March 21, 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)
 - 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



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 and NOAA West Congressional Roundtables).

Documentation

- Regionally specific updates and observed changes in the terrestrial and coastal and marine environments (as informally reported) will be summarized at the end of the water year.
 - The summary will informally characterize changing environmental conditions and impacts.
 - 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.

Call Agenda



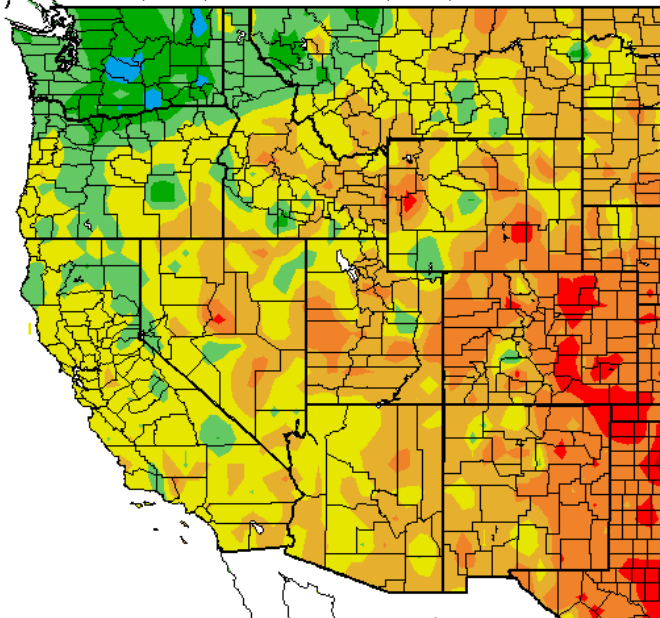
- Project Recap & Updates (Ruth Howell)
- **El Niño and Regional Climate brief (Dan McEvoy)**
- IOOS Nearshore Conditions brief (Jan Newton, Aric Bickel, Clarissa Anderson)
- Environmental conditions and impacts reporting and discussion:
 - Media (Ruth Howell)
 - Others
- Discussion

Climate Brief – Temperature



Temperature Anomaly Last 60 Days 01/18/2017 – 03/18/2017

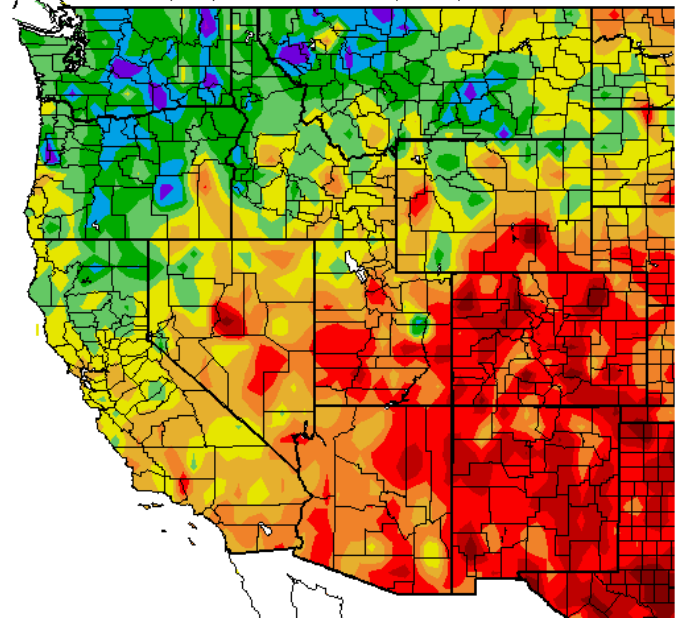
Ave. Temperature dep from Ave (deg F)
1/18/2017 – 3/18/2017



Generated 3/19/2017 at WRCC using provisional data.
NOAA Regional Climate Centers

Temperature Anomaly WY 10/01/2016 – 03/18/2017

Ave. Temperature dep from Ave (deg F)
10/1/2016 – 3/18/2017



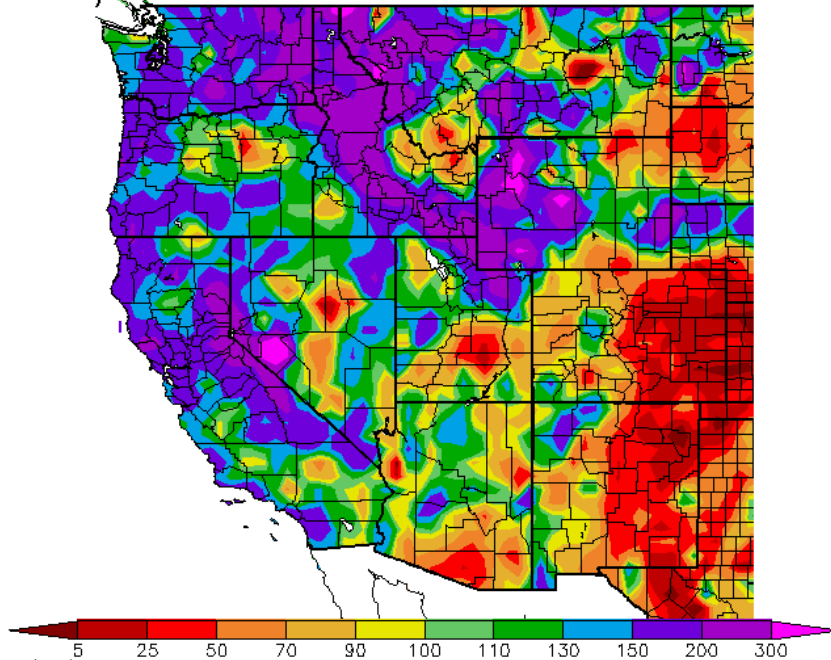
Generated 3/19/2017 at WRCC using provisional data.
NOAA Regional Climate Centers

Precipitation



Precipitation % of Normal Last 60 Days 01/18/2017 – 03/18/2017

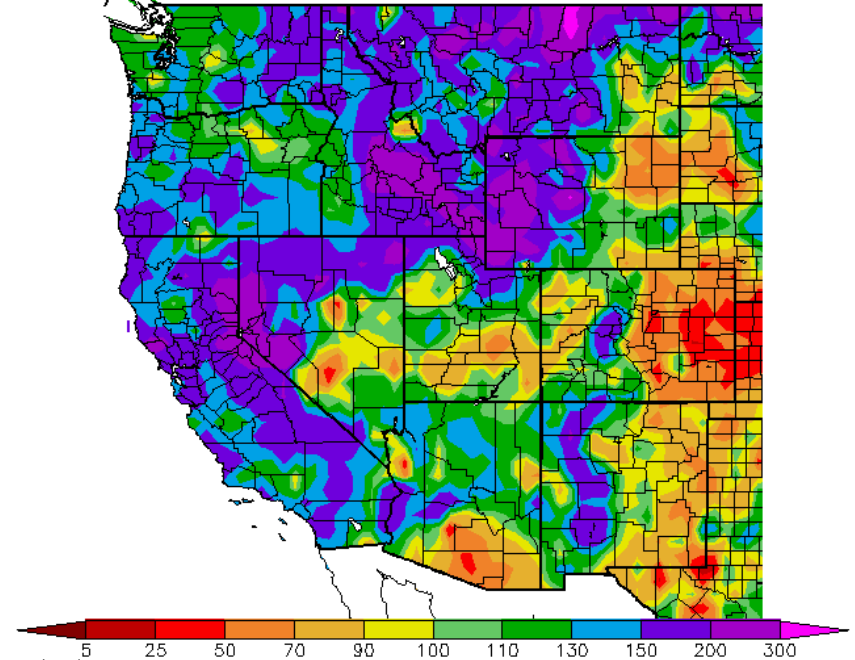
Percent of Average Precipitation (%)
1/18/2017 – 3/18/2017



Generated 3/19/2017 at WRCC using provisional data.
NOAA Regional Climate Centers

Precipitation % of Normal WY 10/01/2016 – 03/18/2017

Percent of Average Precipitation (%)
10/1/2016 – 3/18/2017

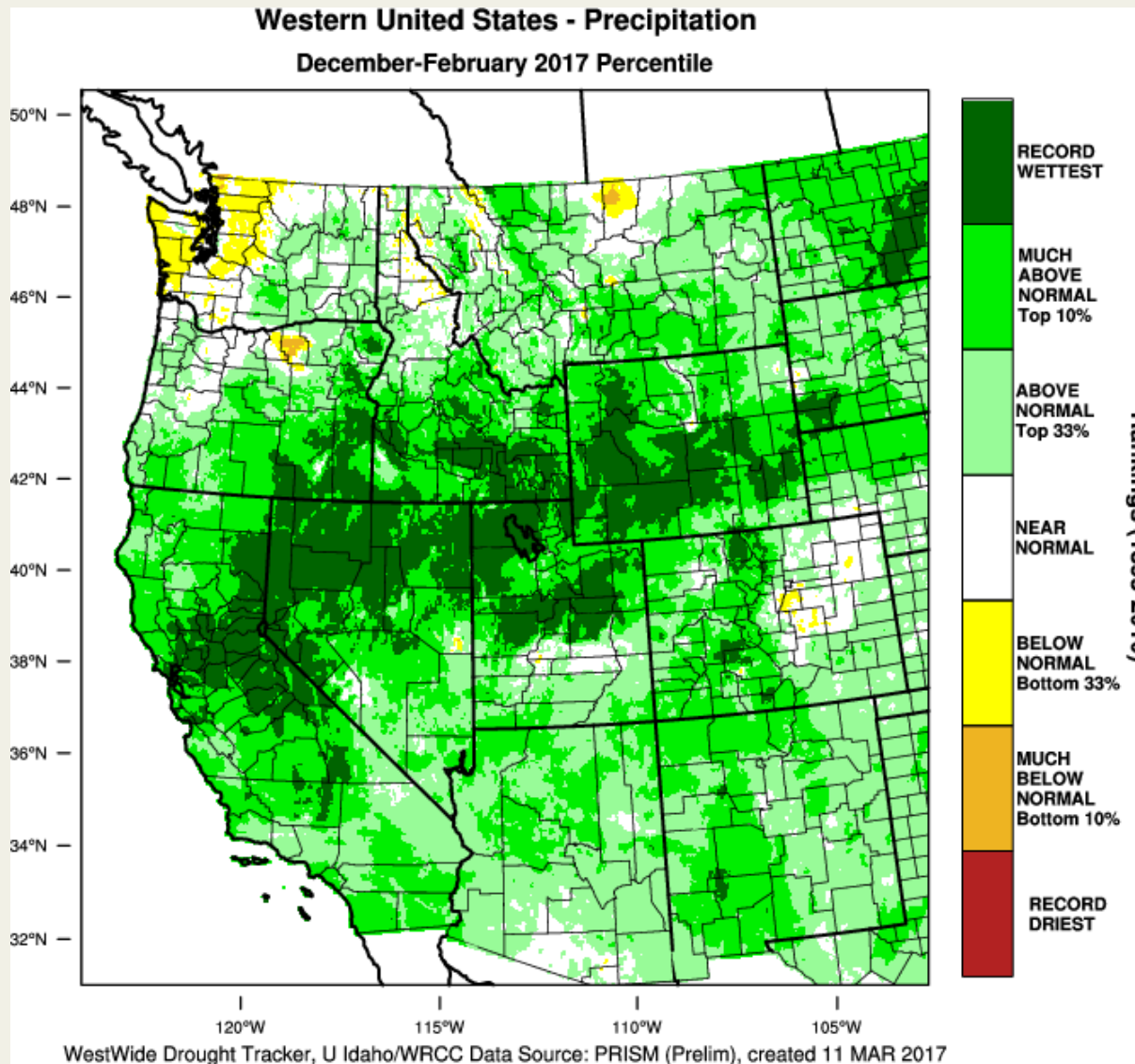


Generated 3/19/2017 at WRCC using provisional data.
NOAA Regional Climate Centers

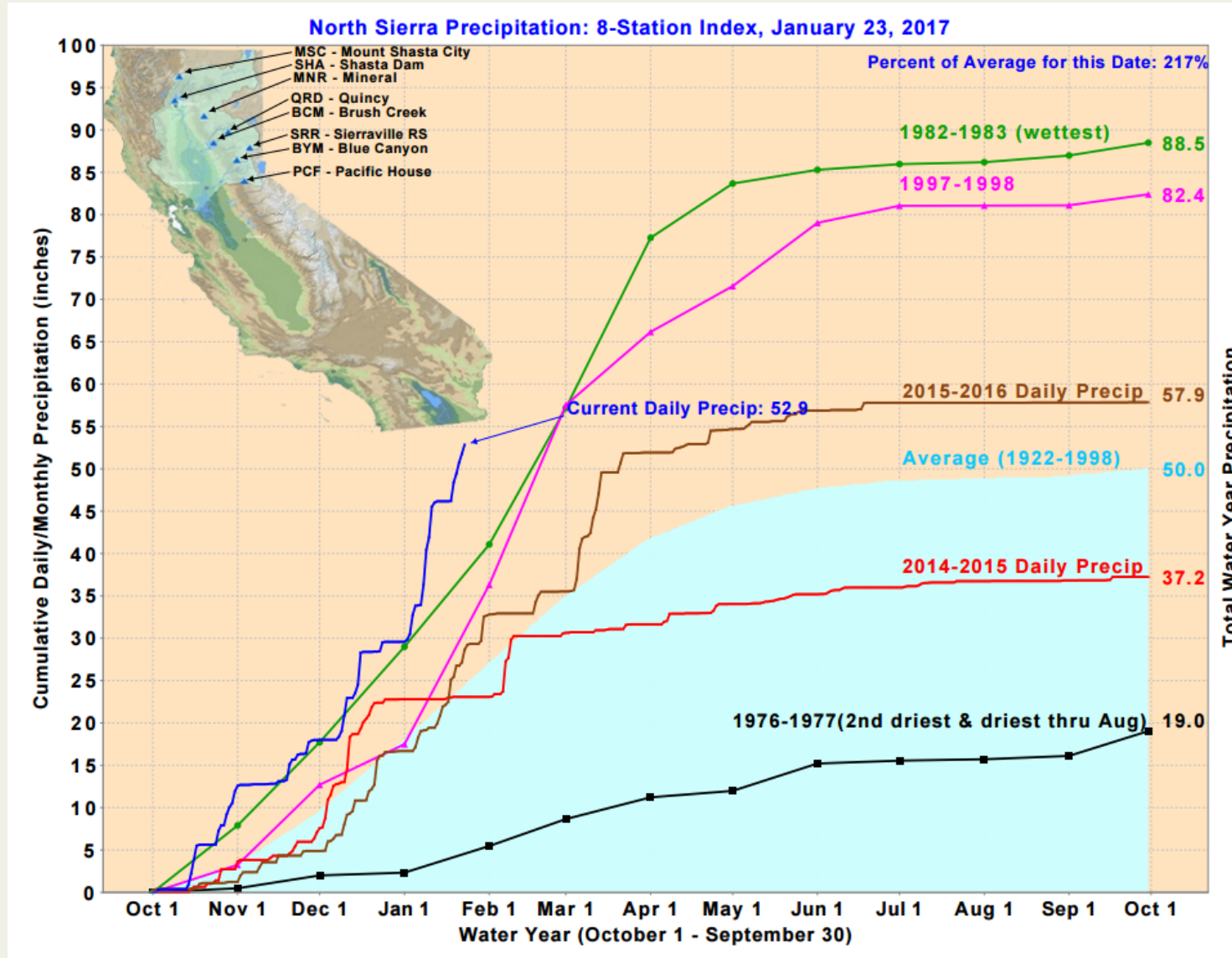
Precipitation



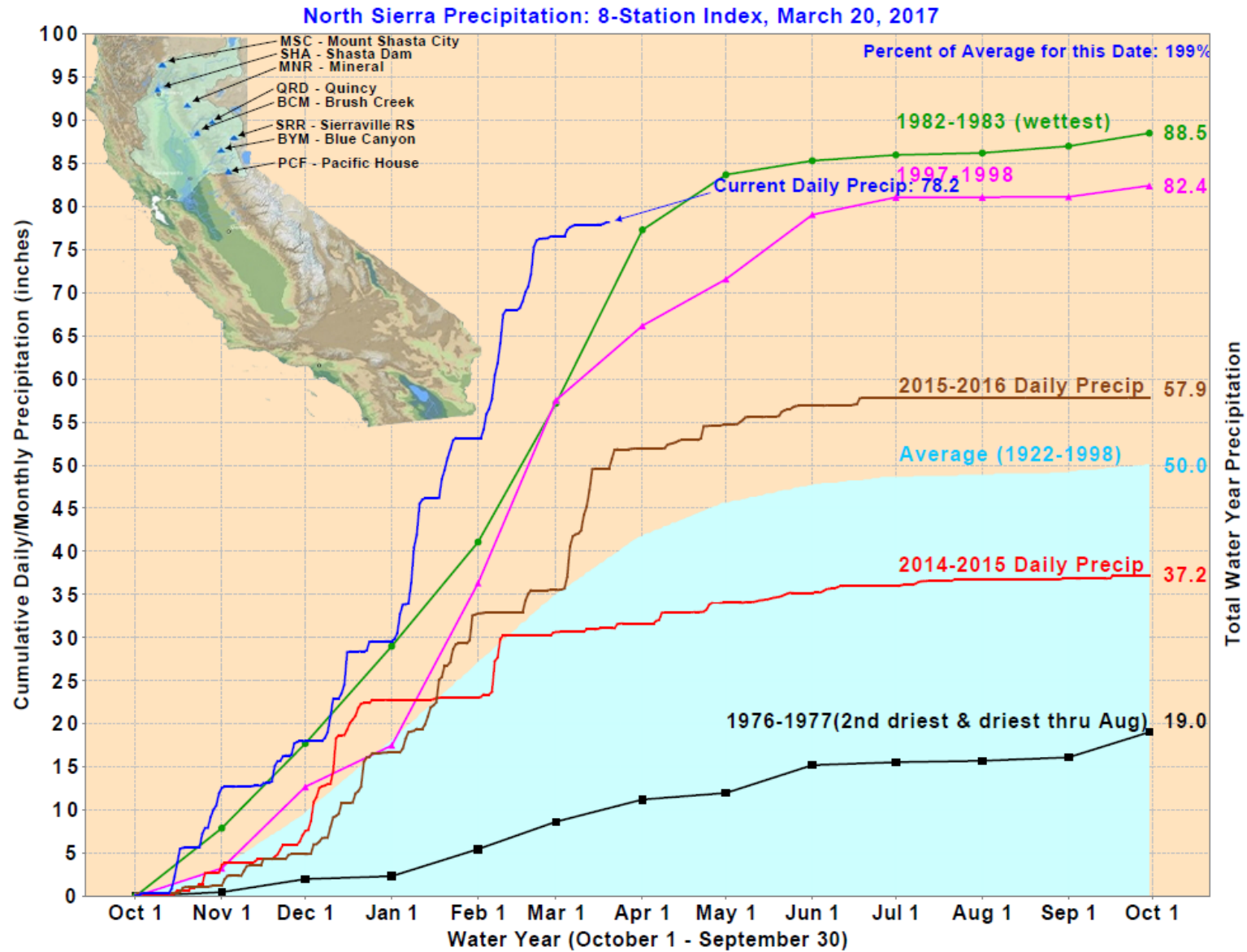
DJF Precipitation Percentile Rankings



Precipitation

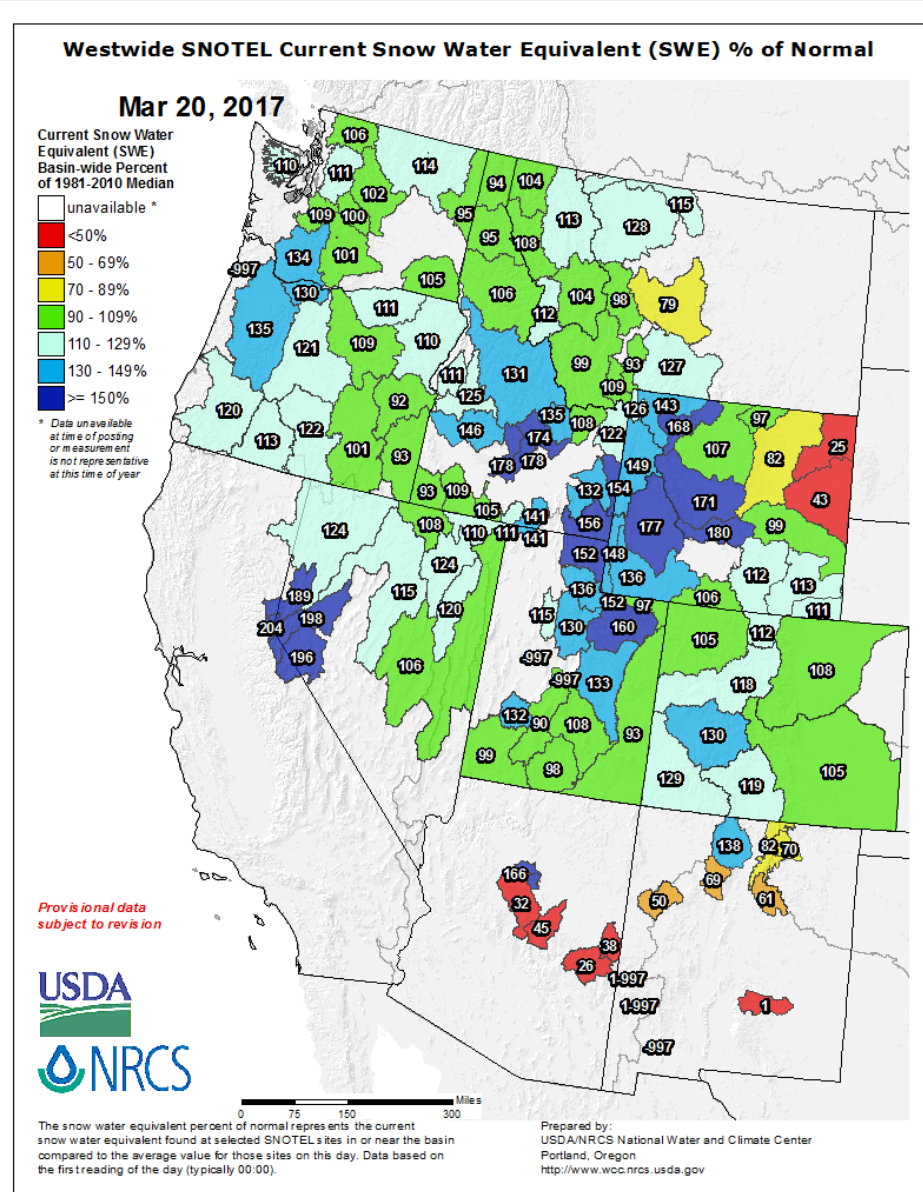


Precipitation



Source: CDEC/CA DWR

Snow Water Equivalent



Snow Water Equivalent



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



NORTH	
Data as of March 20, 2017	
Number of Stations Reporting	29
Average snow water equivalent (Inches)	38.8
Percent of April 1 Average (%)	140
Percent of normal for this date (%)	140

CENTRAL	
Data as of March 20, 2017	
Number of Stations Reporting	42
Average snow water equivalent (Inches)	48.5
Percent of April 1 Average (%)	166
Percent of normal for this date (%)	169

SOUTH	
Data as of March 20, 2017	
Number of Stations Reporting	26
Average snow water equivalent (Inches)	43.2
Percent of April 1 Average (%)	162
Percent of normal for this date (%)	165

STATE	
Data as of March 20, 2017	
Number of Stations Reporting	97
Average snow water equivalent (Inches)	44.2
Percent of April 1 Average (%)	157
Percent of normal for this date (%)	159

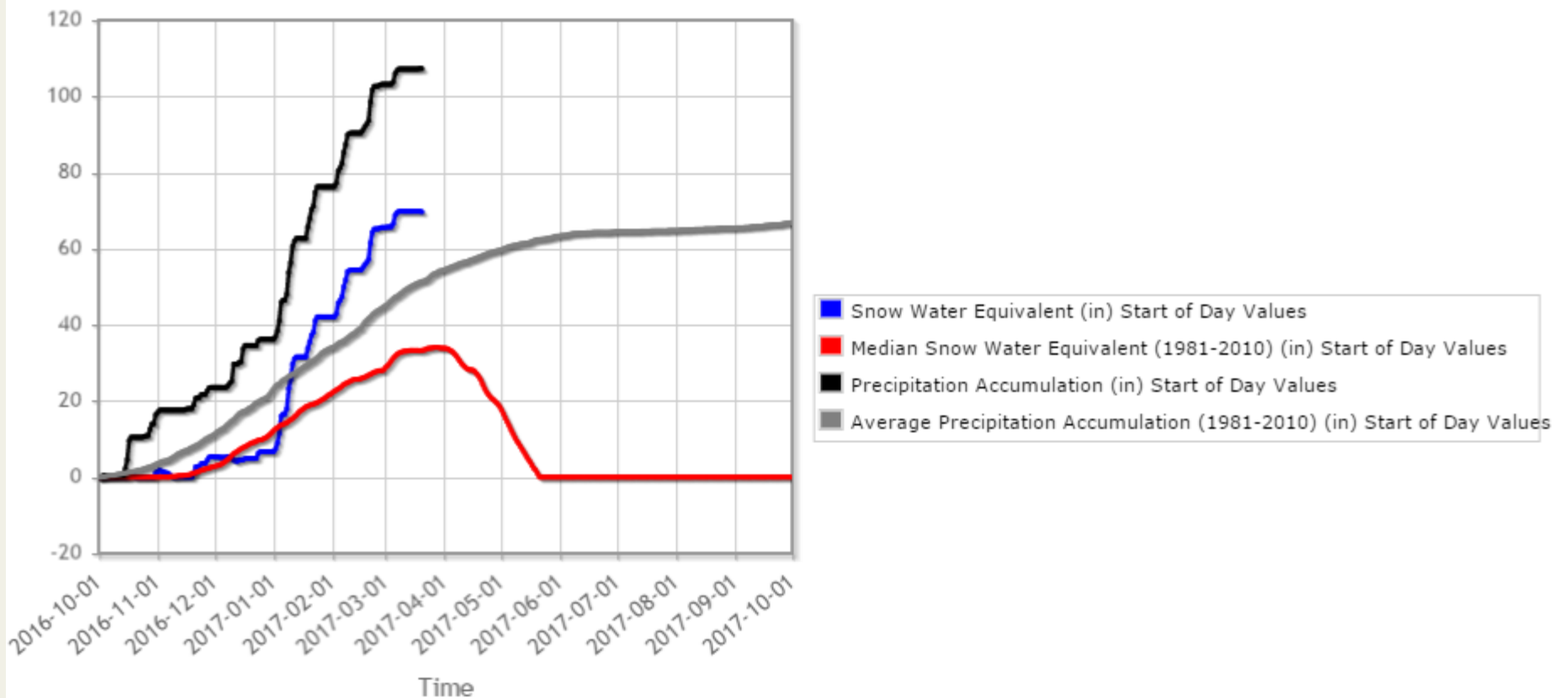
Statewide Average: 157% / 159%

Snow Water Equivalent



- Donner Summit SNOTEL
- Currently at record value for ***SNOTEL PERIOD OF RECORD***
- Good data begins water year 1983/1984, so missing 1982/1983 values

Css Lab (428) California SNOTEL Site - 6894 ft Reporting Frequency: Daily; Date Range: 2016-10-01 to 2017-09-30

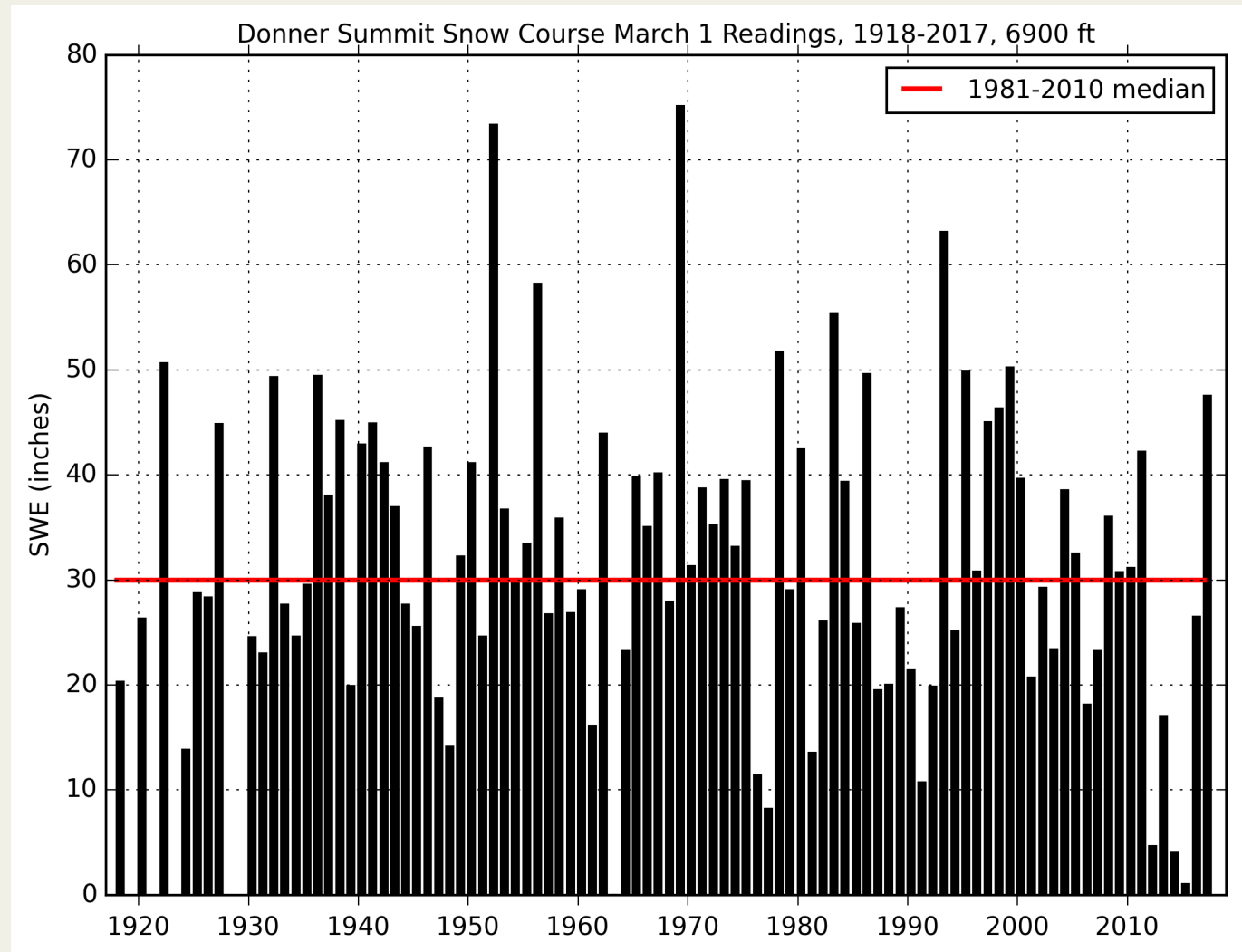


Snow Water Equivalent



- Donner Summit March 1 Snow Course, **1918-2017**
- Several manual measurements taken over large area and averaged

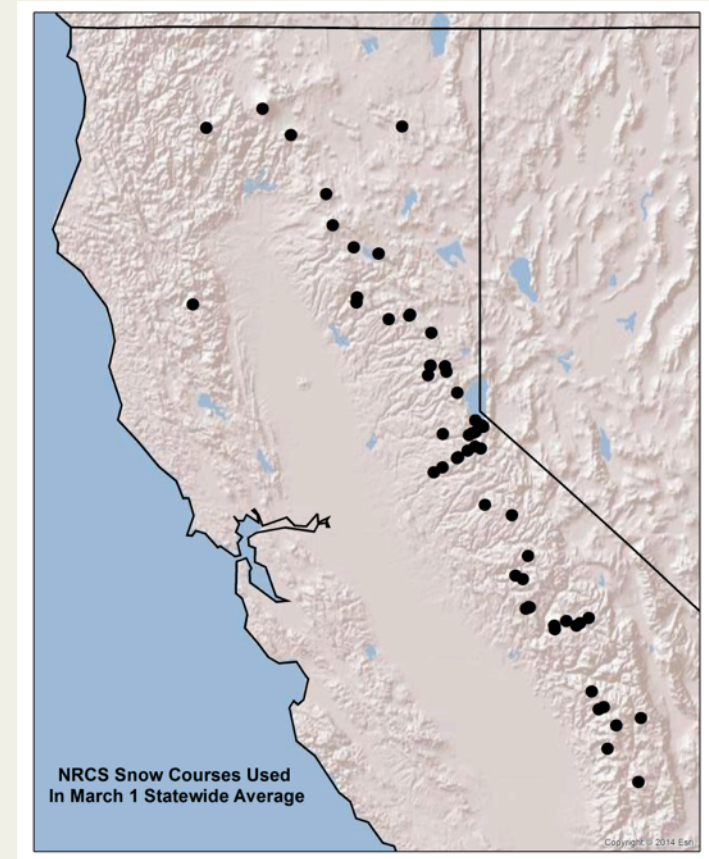
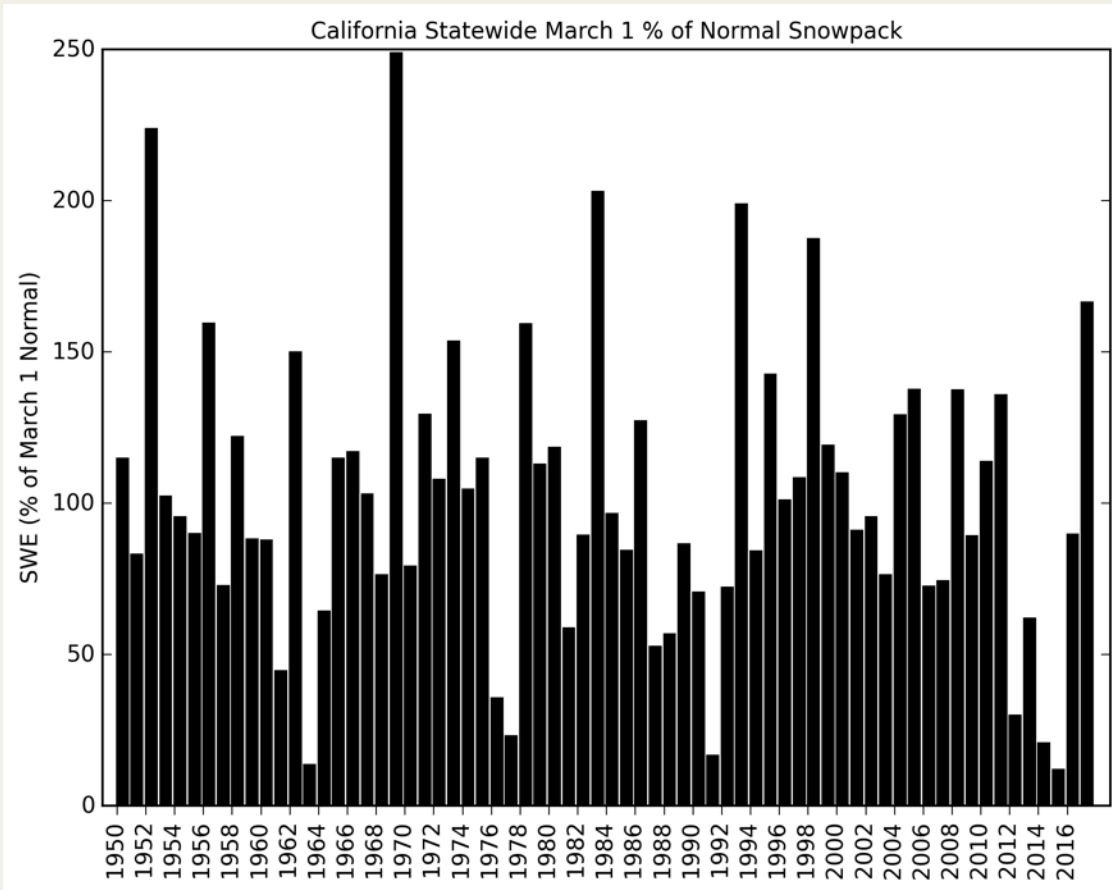
- 13th greatest March 1 value on record
- Substantial differences found between SNOTEL and Snow Course readings
- Manual/spatial measurements vs. point/automated



Snow Water Equivalent



- California statewide March 1 SWE based on 58 snow courses, 1950-2017
- 2017 ranks 6th





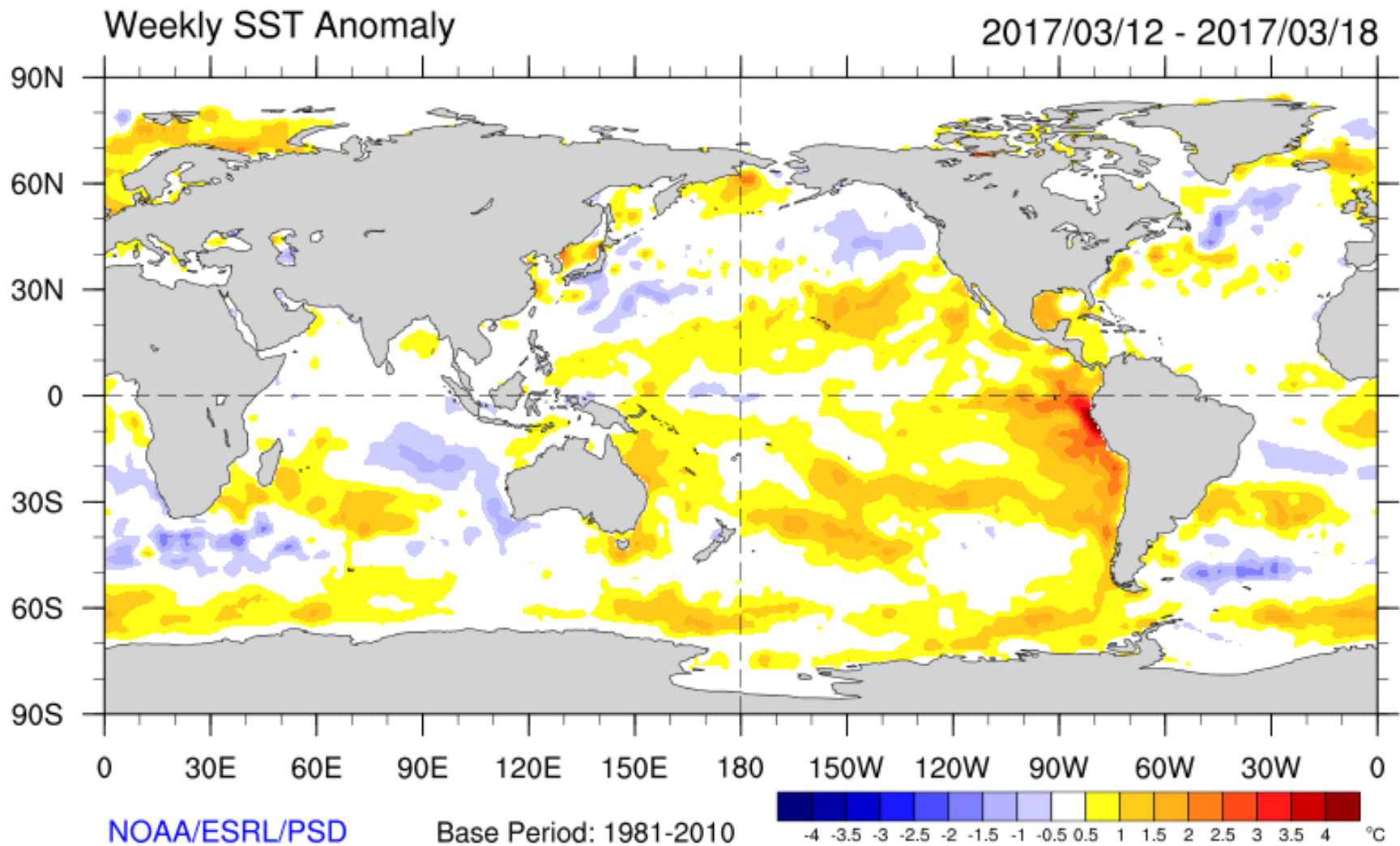
El Nino Status

- ENSO Alert System Status: Not Active
- ENSO-neutral conditions are present
- Equatorial sea surface temperatures (SSTs) are near-average across the central and east-central Pacific. They are above-average in the eastern Pacific Ocean.
- ENSO-neutral conditions are favored to continue through at least the Northern Hemisphere spring 2017, with increasing chances for El Niño development into the fall.*

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

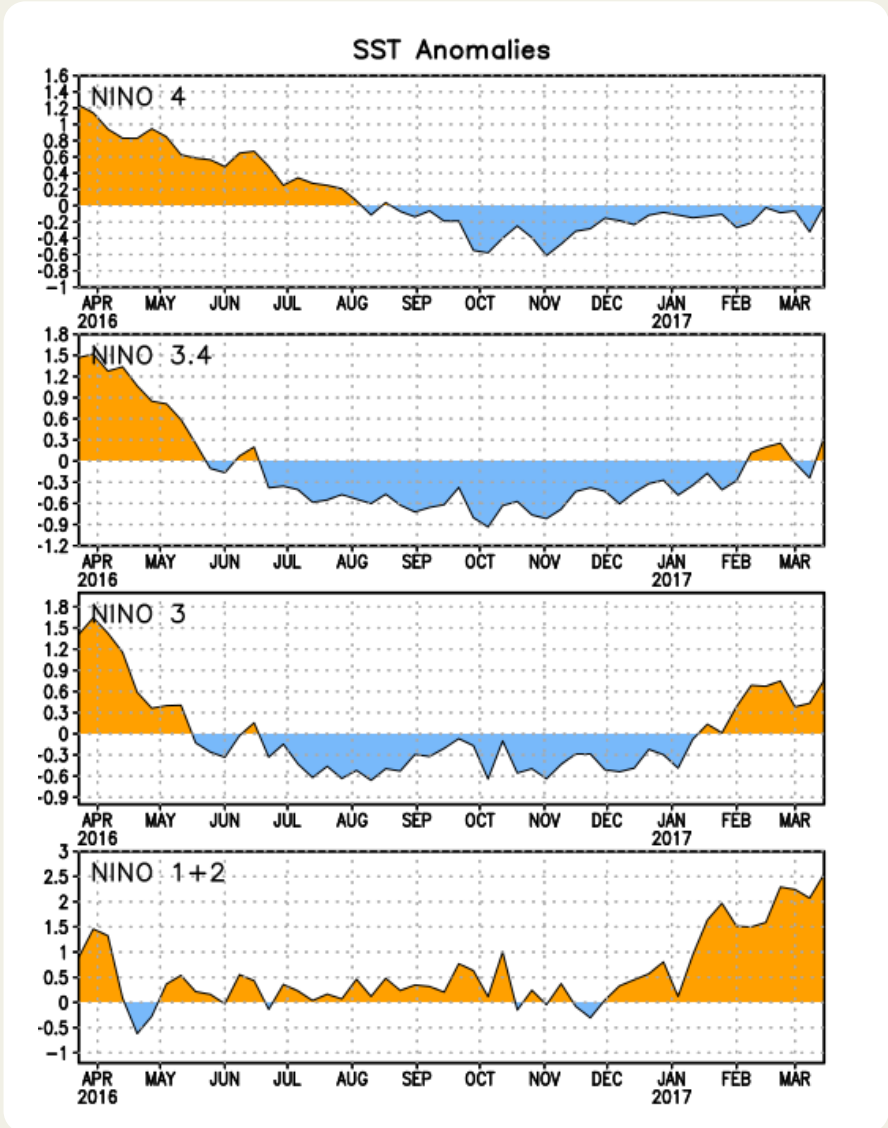
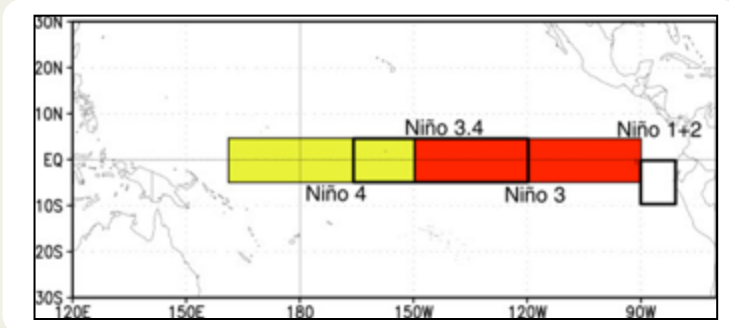


Niño Region SST Departures (°C) Recent Evolution

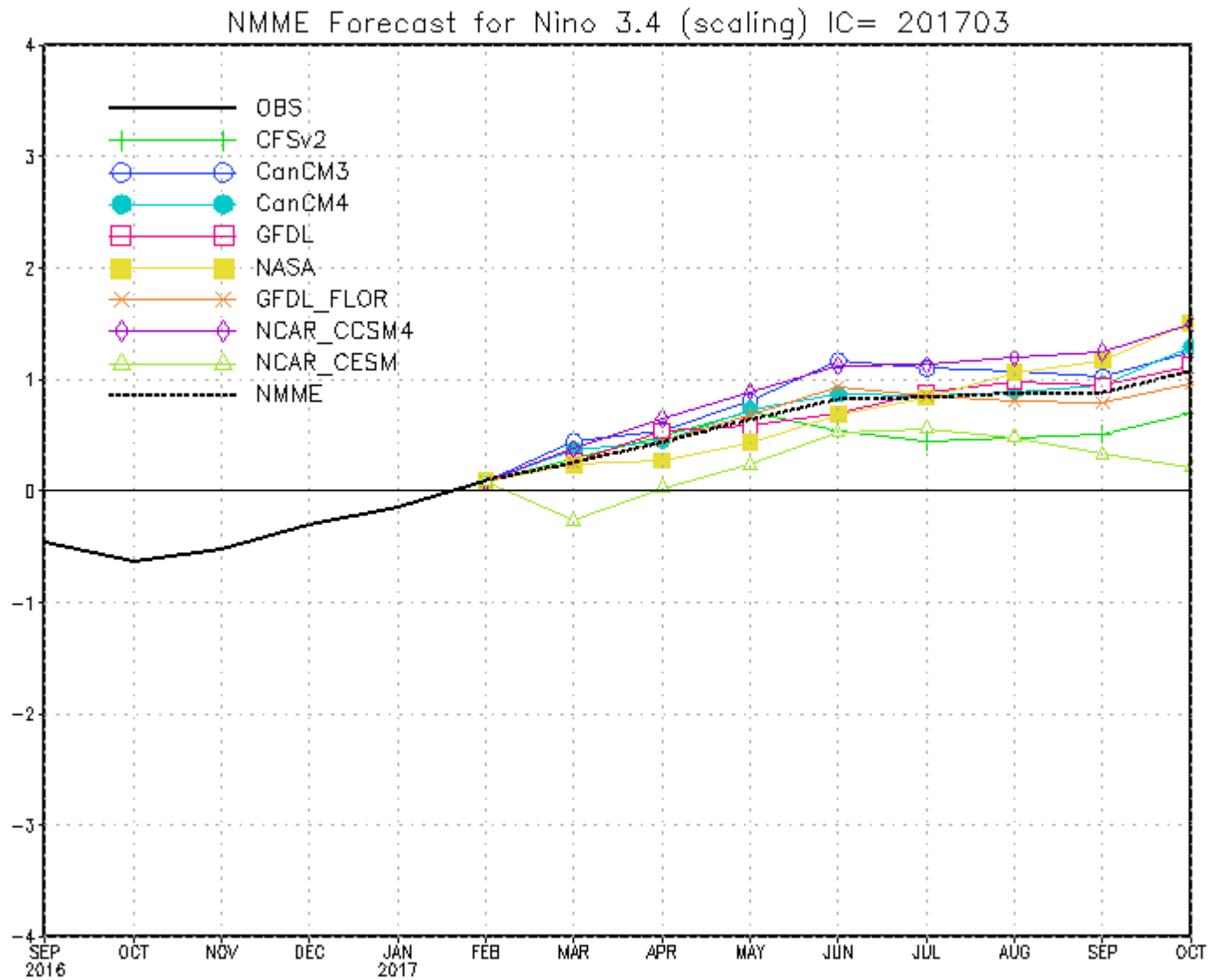


The latest weekly SST departures are:

Niño 4	0.0°C
Niño 3.4	0.3°C
Niño 3	0.8°C
Niño 1+2	2.6°C

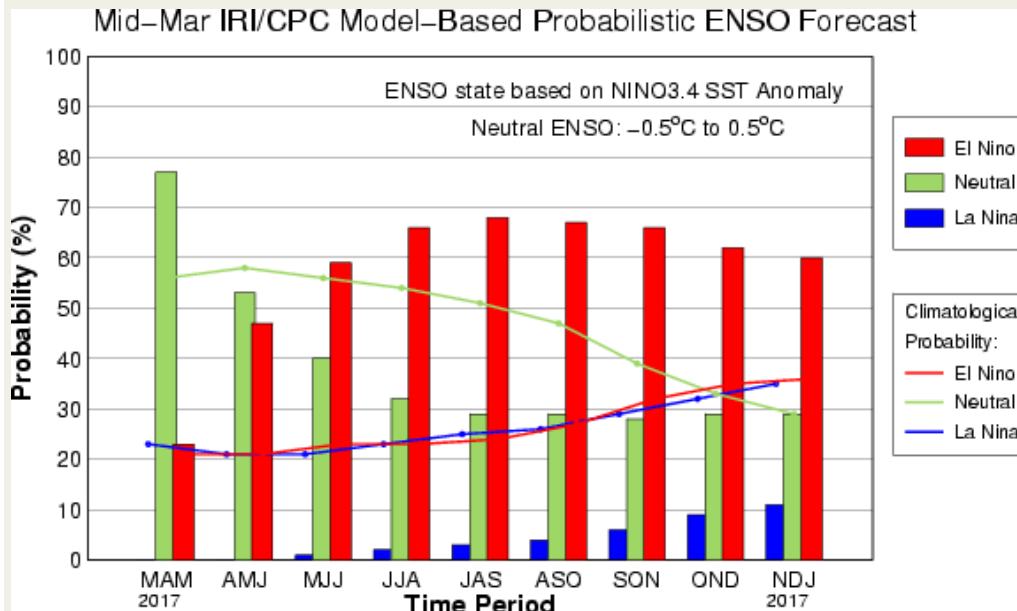


ENSO Forecasts



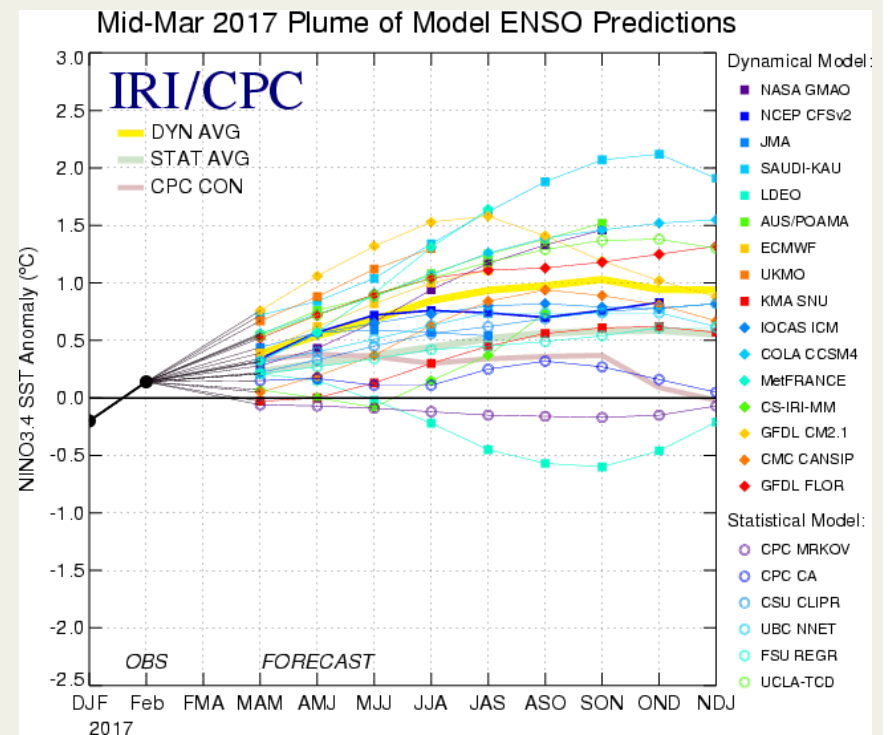
Source: NOAA/CPC

ENSO Forecasts



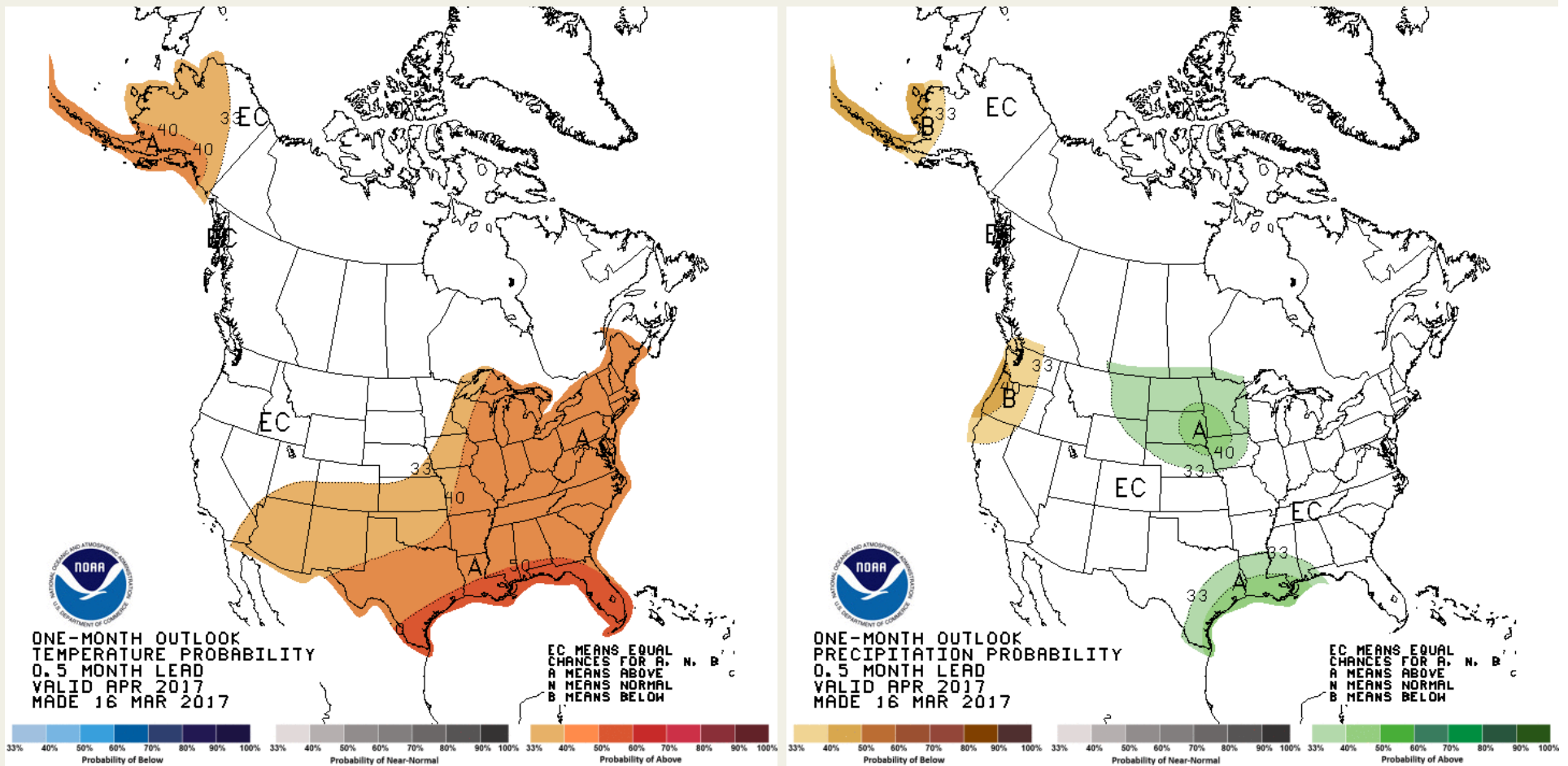
CPC/IRI El Niño forecast:

NMME models + other dynamical models + statistical models



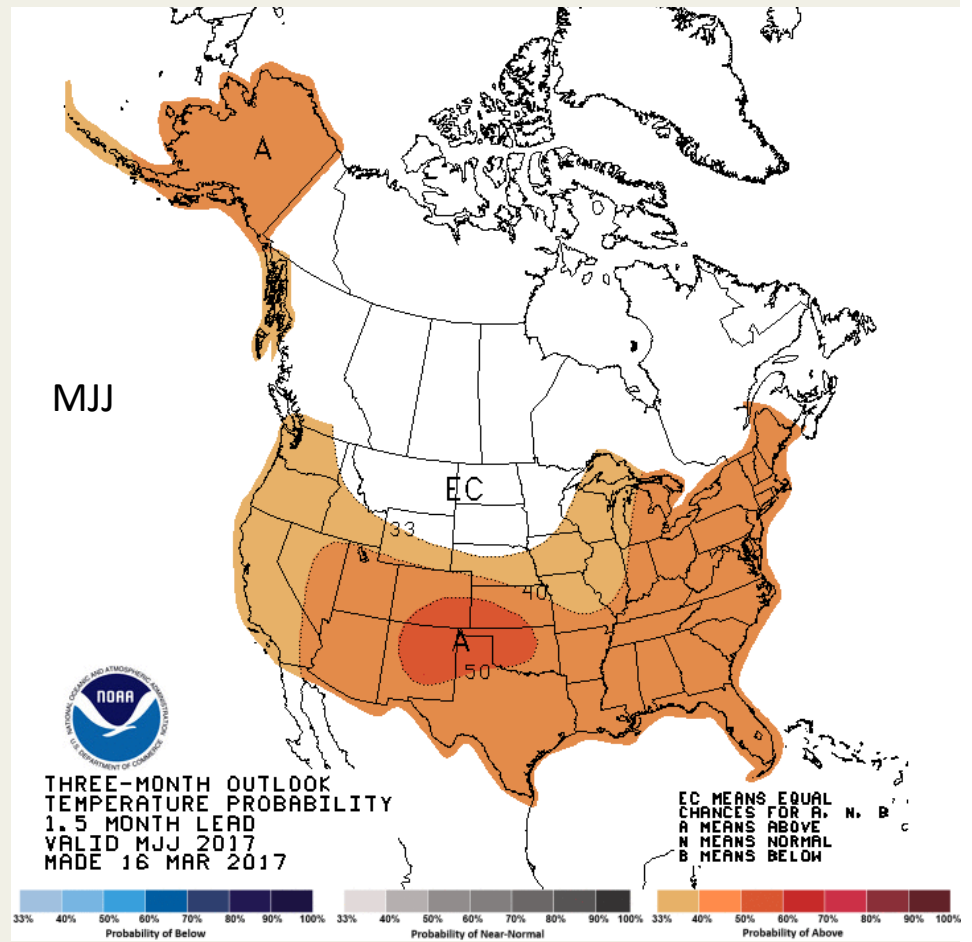
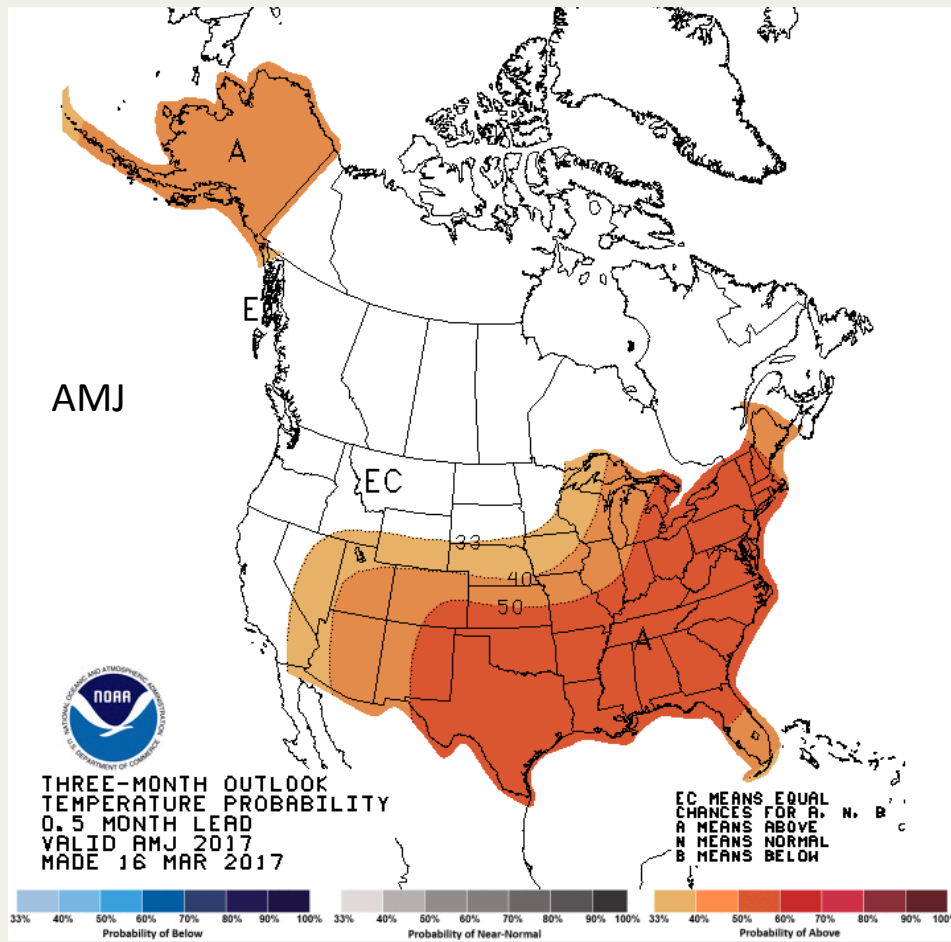
Source: CPC/IRI

April U.S. Forecasts



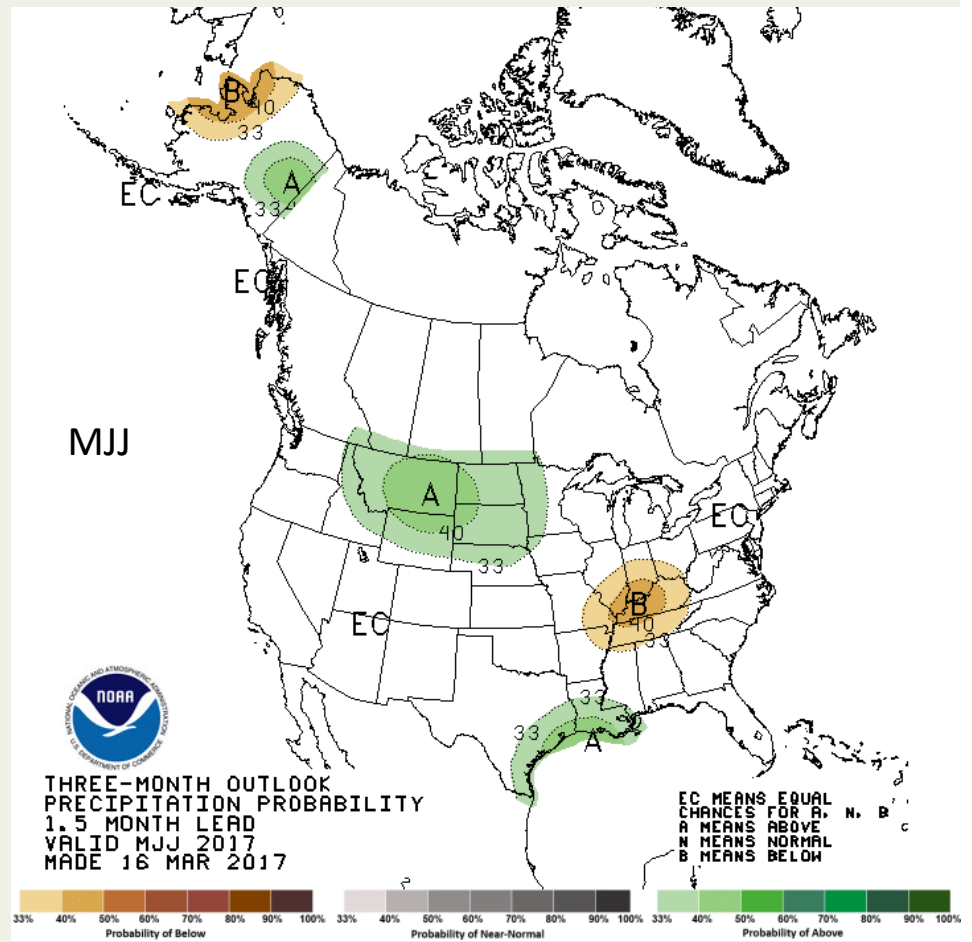
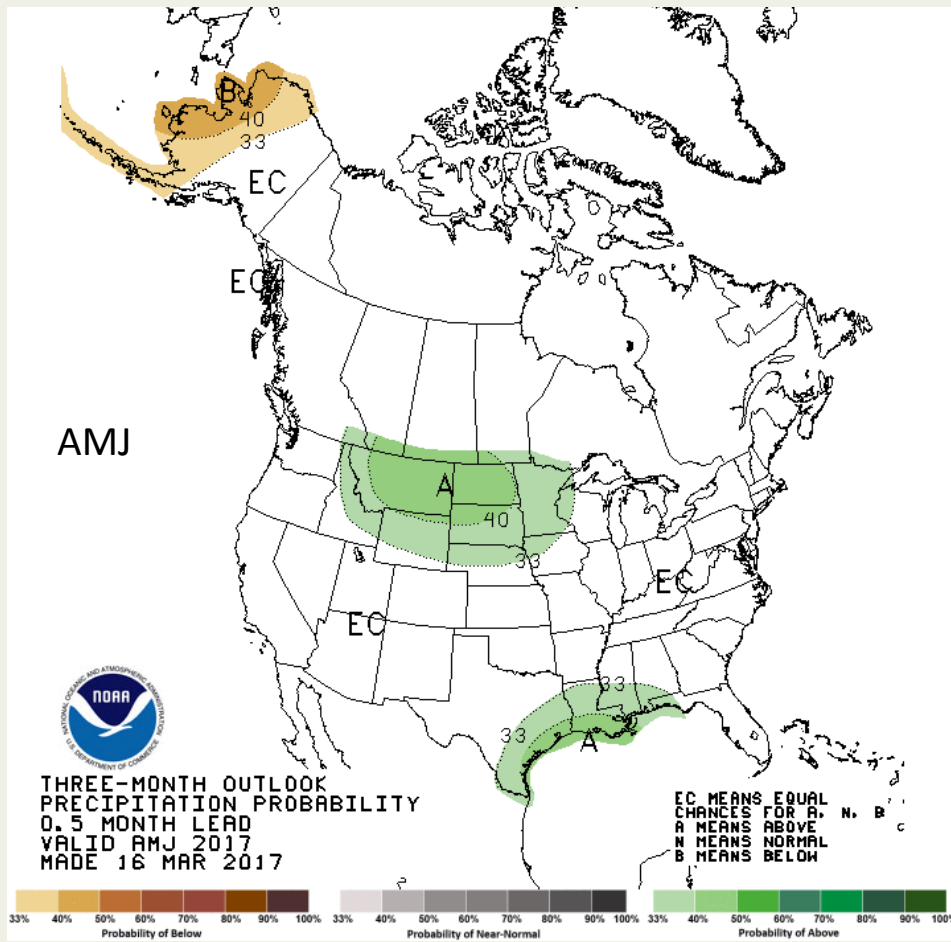
Source: NOAA/CPC

U.S. Temperature Forecasts



Source: NOAA/CPC

U.S. Precipitation Forecasts



Source: NOAA/CPC

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)
 - Others
- Discussion



Sea Surface Temperature: February 2017

88 Apps Disclaimer Settings Log Out Newton v5.3 Contact NANOOS

NVS CLIMATOLOGY

Map Overview Help Powered by Vizer

Lat: 50.8753 Lon: -131.7041 Terrain

Remote Sensing [X] 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)

Water Temp. [X]

Water Temperature (°C)

Map data ©2017 Google, INEGI 100 km Terms of Use

24 February 2017 12:00 am PST



Sea Surface Chlorophyll: February 2017

Apps Disclaimer Settings Log Out

NANOOS CLIMATOLOGY

Newton v5.3 Contact NANOOS

Map Overview Help

Lat: 40.4804 Lon: -124.3433 Terrain

Regions

Sites

Models

Remote Sensing

Legend

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)

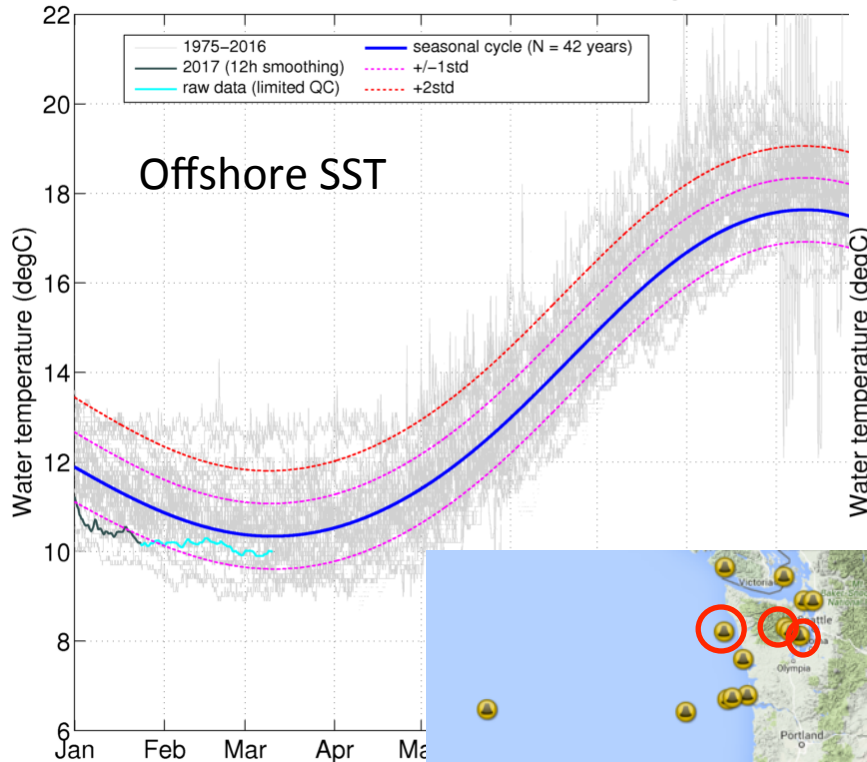
Chlorophyll

Chlorophyll a (mg/m³)

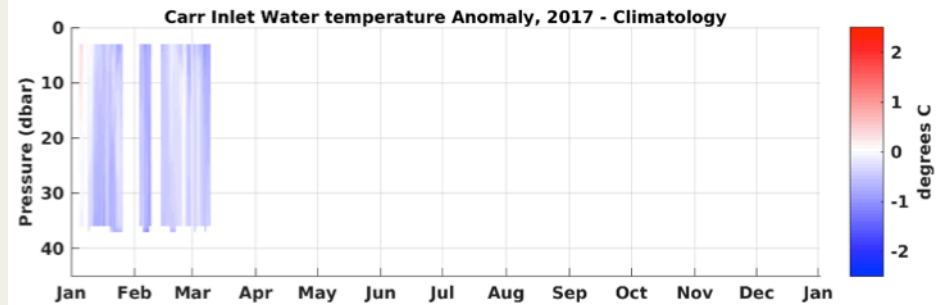
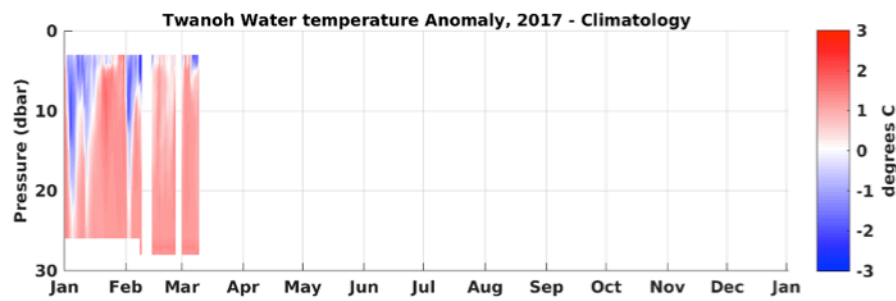
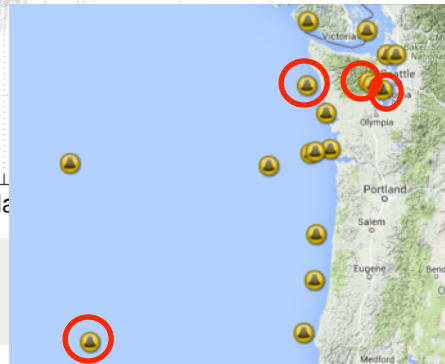
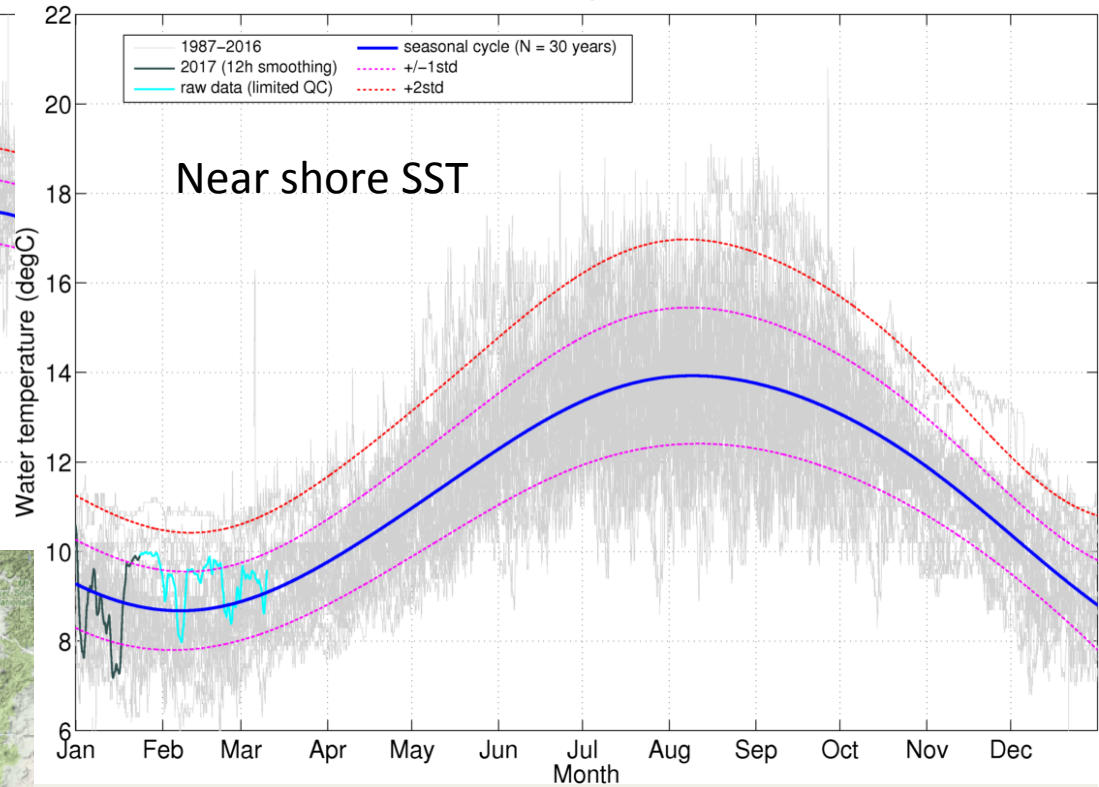
Map data ©2017 Google, INEGI | 100 km Terms of Use

24 February 2017 12:00 am PST

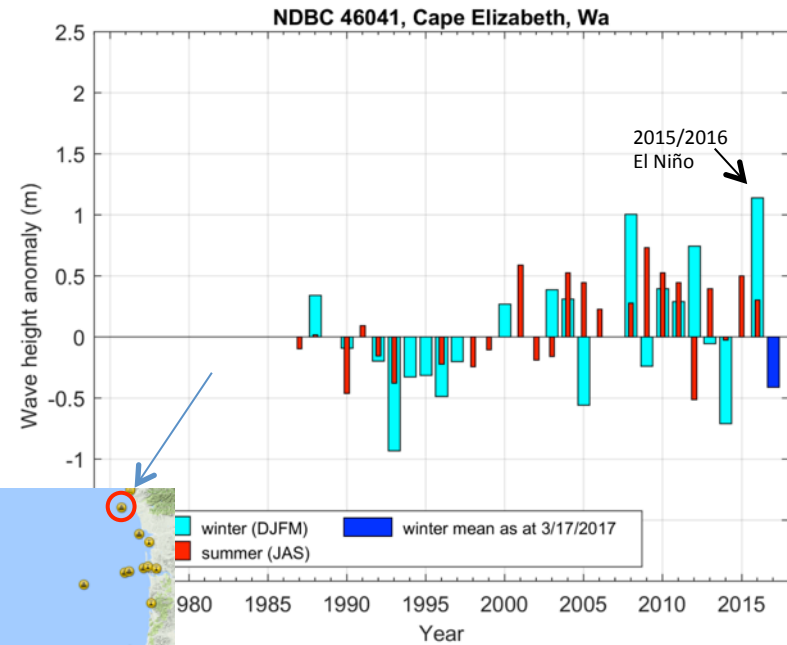
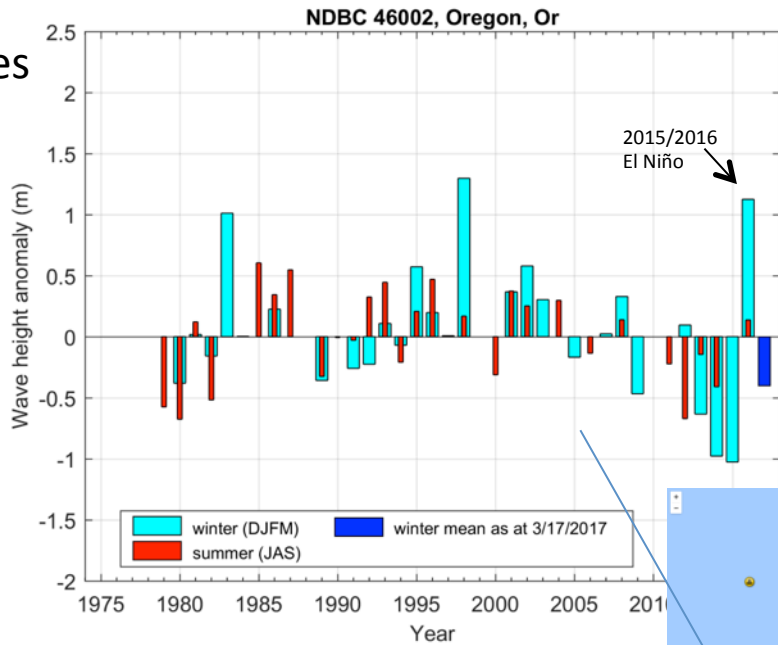
NDBC 46002, Oregon, Or



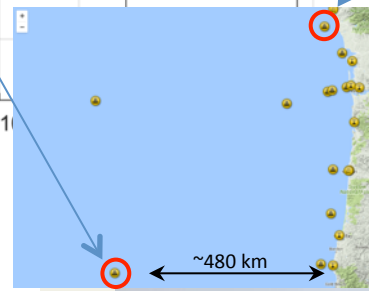
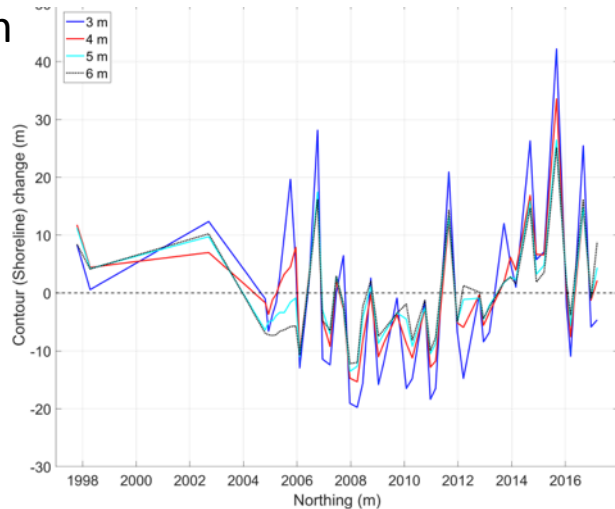
NDBC 46041, Cape Elizabeth, Wa



Waves



Beach



Mean shoreline change for different contour elevations

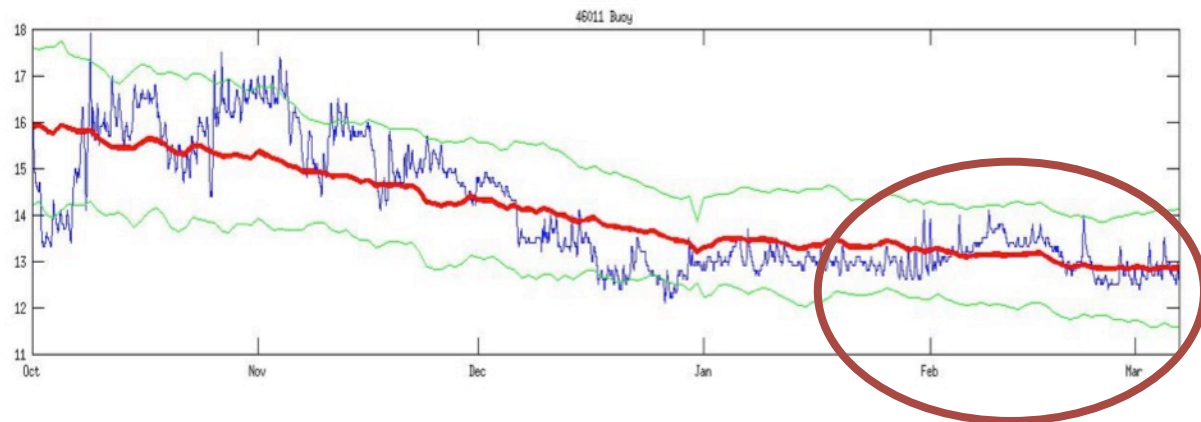
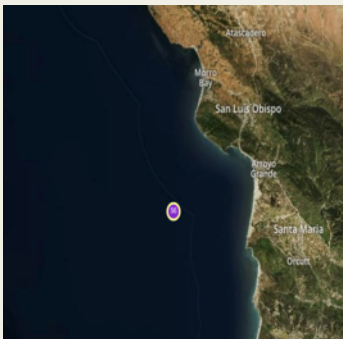
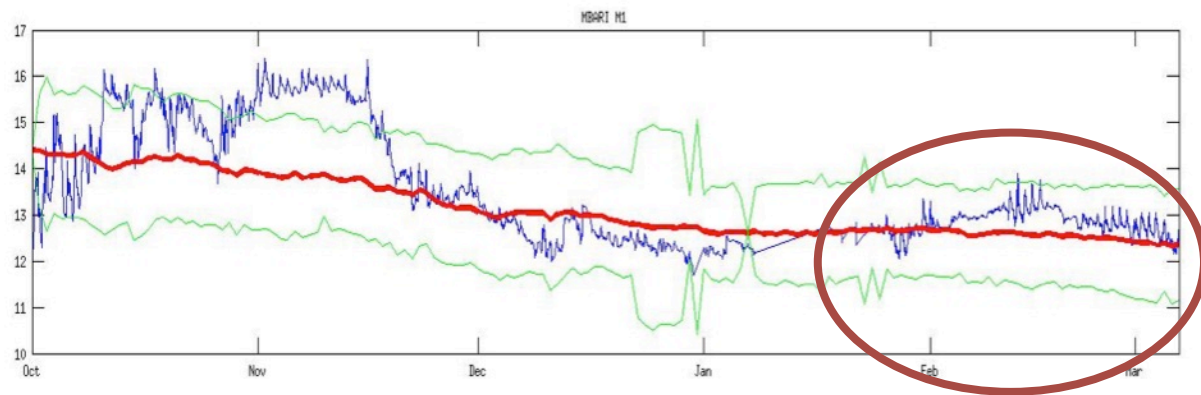
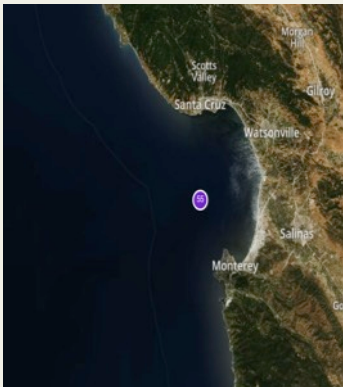
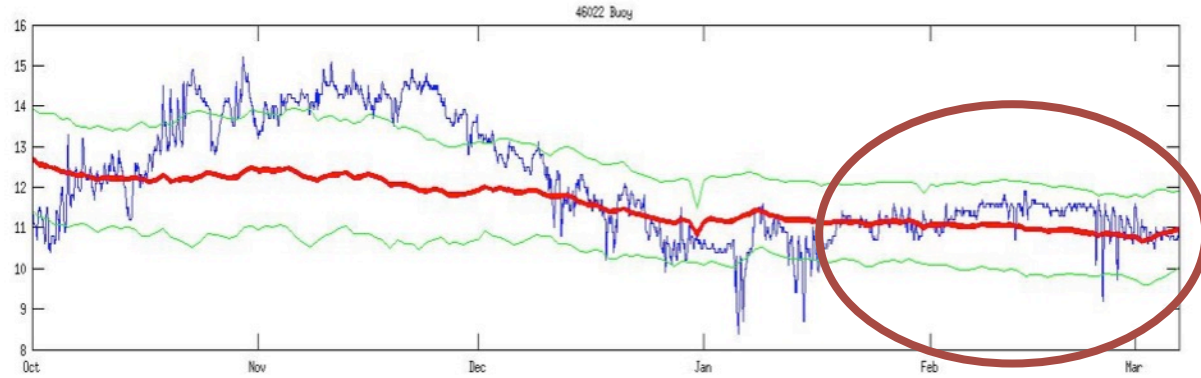
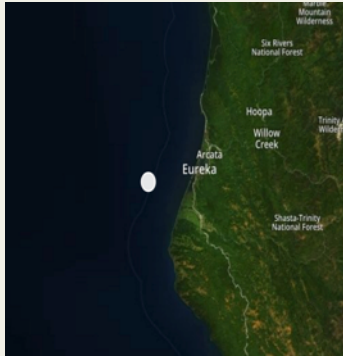
Central and Northern California Ocean Observing System (CeNCOOS)



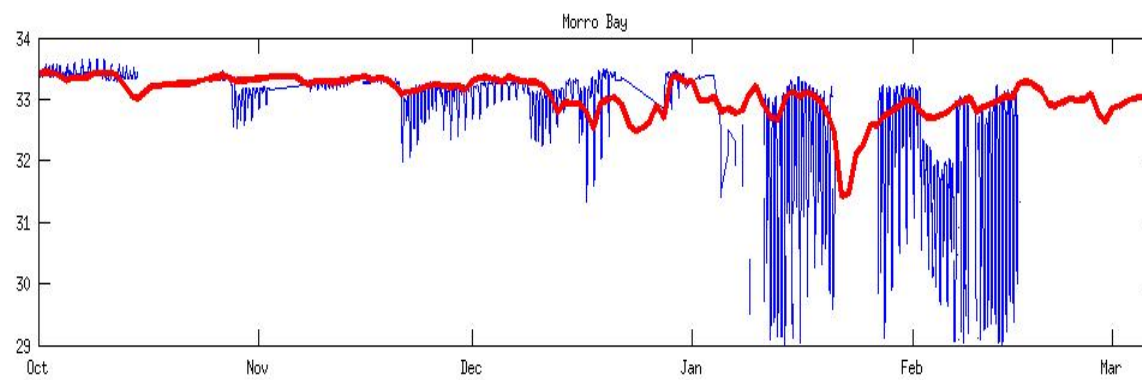
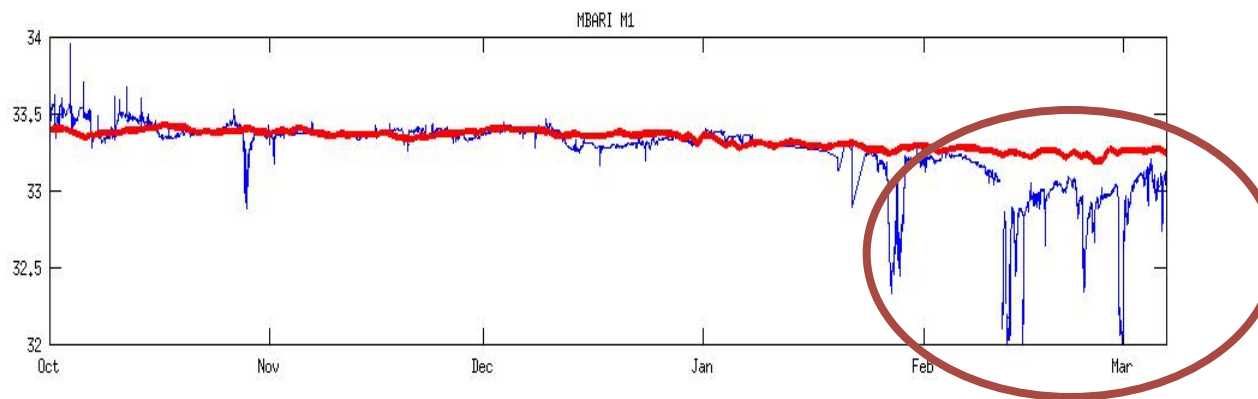
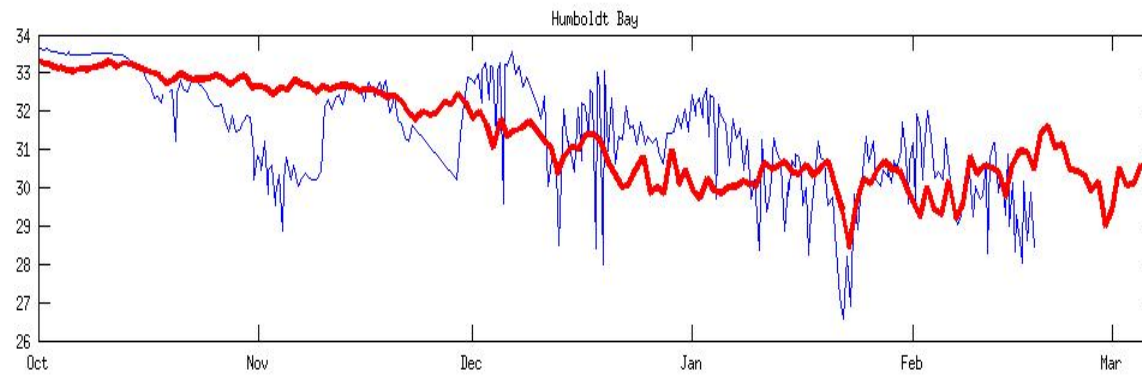
cencoos.org

data.cencoos.org

Surface Temperature

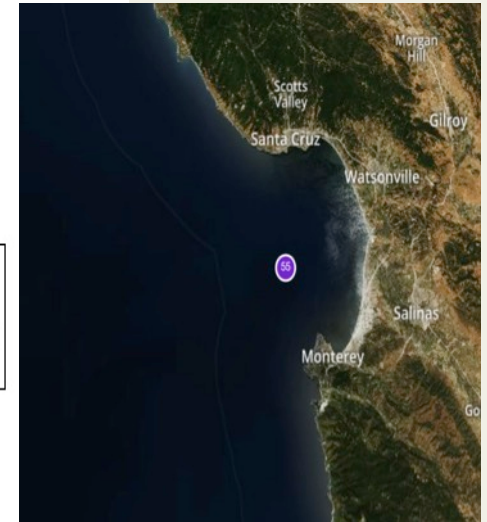
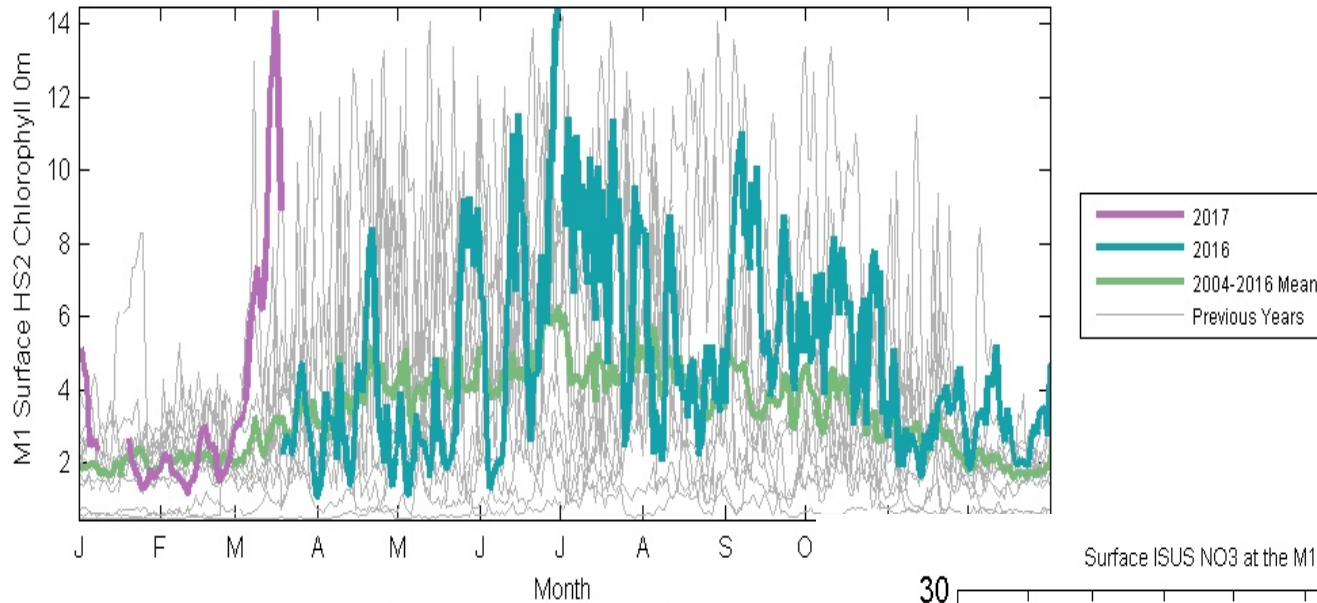


Salinity



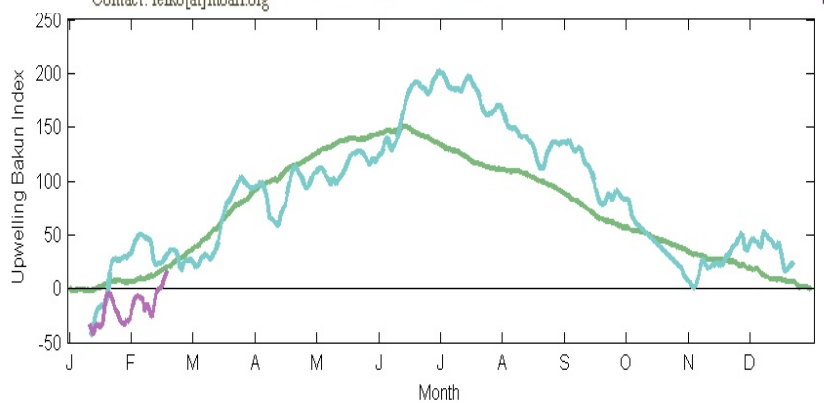
Chlorophyll, Nitrates, and Upwelling

HS2 Chlorophyll mg m-3 at the M1 Mooring (36.7N, -122W), Monterey Bay CA



Climatology Minimum on 02-Feb-2011, 0.4556 mg m-3; Maximum on 28-Jun-2016, 14.48 mg m-3
 2017 YTD Minimum on Feb-10, 1.158 mg m-3; Maximum on Mar-15, 14.36 mg m-3

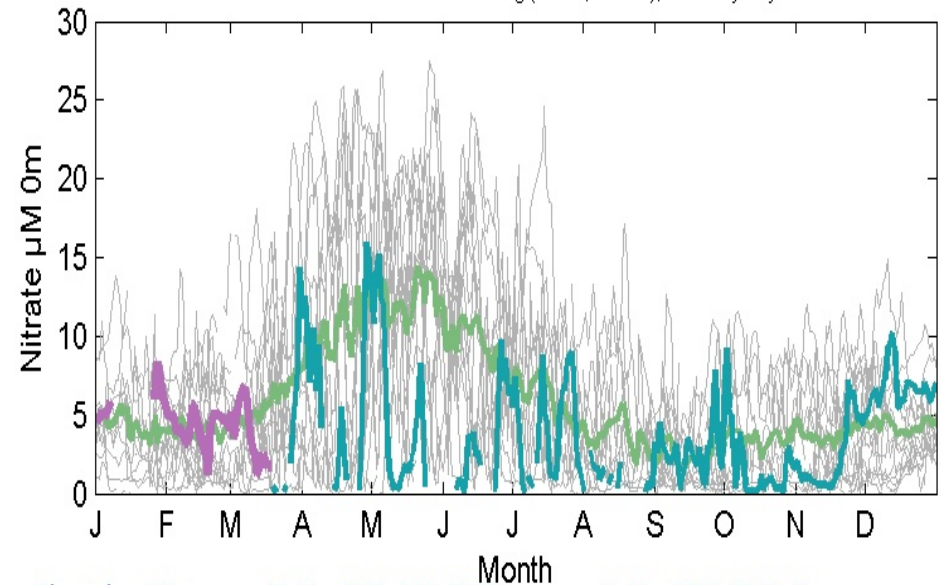
Monterey Bay Aquarium Research Institute: <http://www.mbari.org>
 Contact: reiko[at]mbari.org



Bakun Index Values from NOAA/NMFS/PPFBG for: 36N 122W Values are daily average of wind-driven crossshore transports computed from FNMOC six-hourly surface pressure analyses. Indices are in units of cubic meters per second along each 100 meters of coastline. -9999 indicates ml value. Positive numbers indicate offshore transport. Day is based on PST. Last data point is on Feb 28, 2017

Updated: Mar 04, 2017 Monterey Bay Aquarium Research Institute: <http://www.mbari.org>

Surface ISUS NO3 at the M1 Mooring (36.7N, -122W), Monterey Bay CA



Climatology Minimum on 08-Mar-2010, 0.01µM; Maximum on 25-May-2013, 27.52µM
 2017 YTD Minimum on Mar-11, 1.209µM; Maximum on Jan-27, 8.361µM

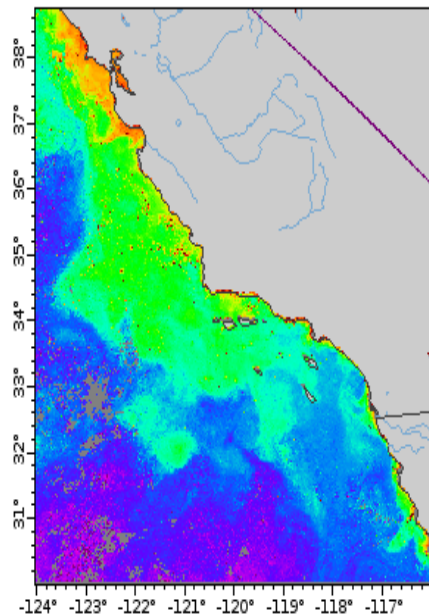
Monterey Bay Aquarium Research Institute: <http://www.mbari.org>
 Contact: reiko[at]mbari.org

Updated: Mar 17, 2017 06:

SCCOOS REGION: Anomalous Winter Storms & Nearshore Effects

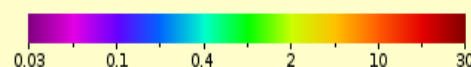
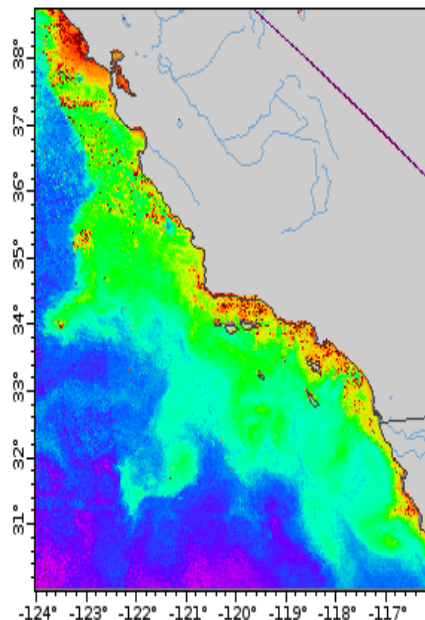
January 19-24

Pre-Storm Chlorophyll



Chlorophyll a (mg m^{-3})
Chlorophyll a, North Pacific, NOAA VIIRS, 750m resolution,
2015-present (8 Day Composite)
(2017-01-15T00:00:00Z, Altitude=0.0 m)
Data courtesy of NOAA NMFS SWFSC ERD

Post-Storm Chlorophyll



Chlorophyll a (mg m^{-3})
Chlorophyll a, North Pacific, NOAA VIIRS, 750m resolution,
2015-present (8 Day Composite)
(2017-01-28T00:00:00Z, Altitude=0.0 m)
Data courtesy of NOAA NMFS SWFSC ERD

VIIRS, 8-day composites

What looks like an increase in phytoplankton growth in response to the storm may not actually be the case

Evidence: Weekly sampling at shore stations revealed very low living biomass at Scripps Pier and Stearns Wharf (Santa Barbara)

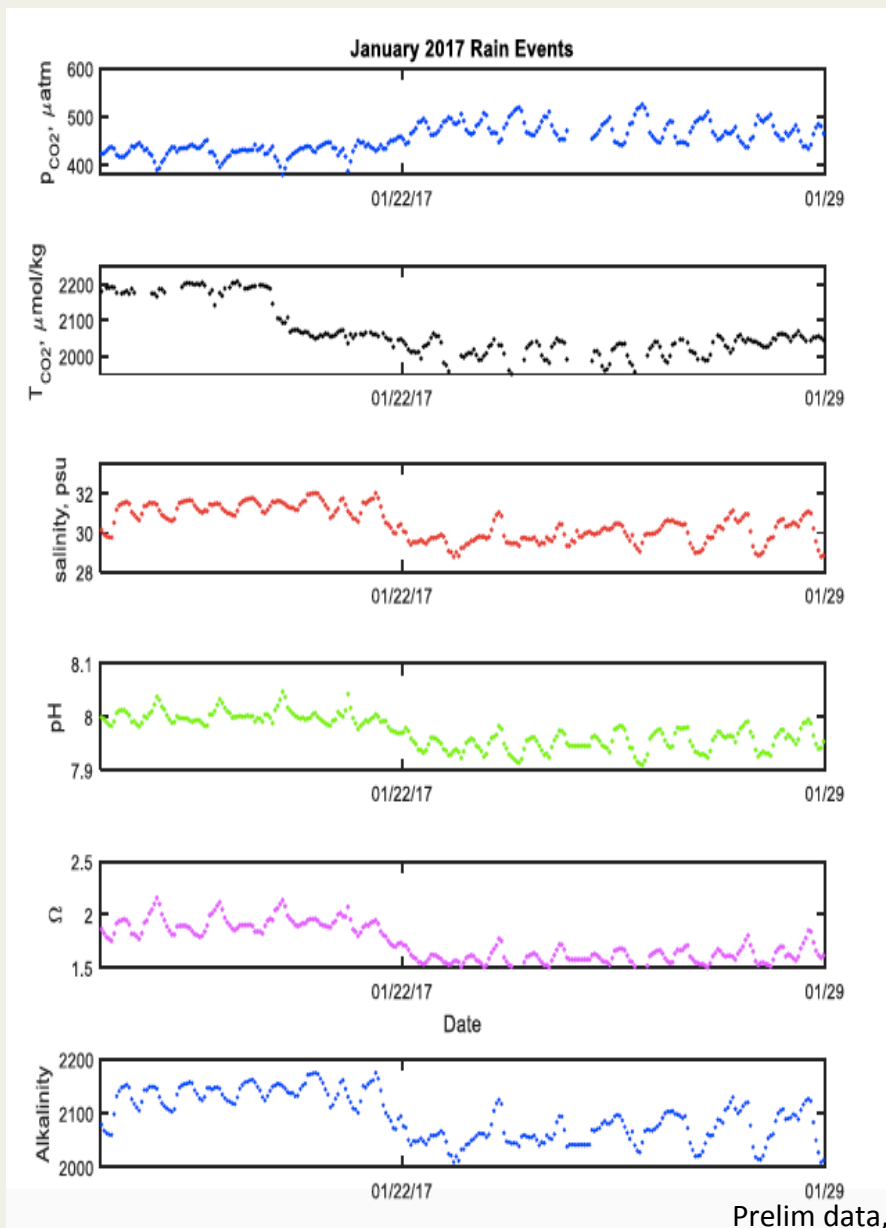
Explanation: The higher Chl retrievals from VIIRS are most likely false positives due to run-off and turbidity that is not properly deconvolved by the standard algorithm

SCCOOS REGION: Anomalous Winter Storms & Nearshore Effects

January 19-24

Burke-o-Later® at Carlsbad Aquafarm measures Ocean Acidification

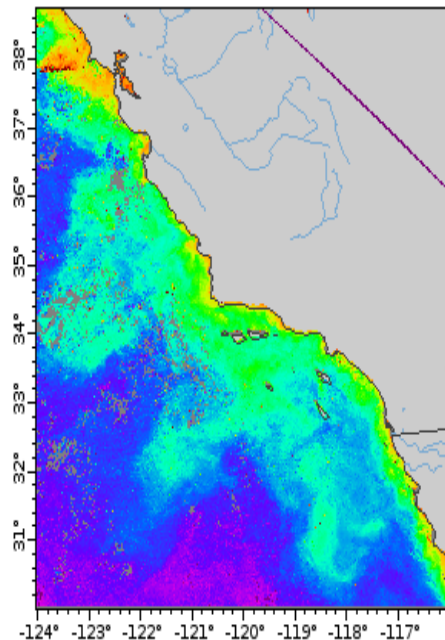
- Large rains Jan 19-24 led to a significant dip in pH, alkalinity, and aragonite saturation state (omega)
- Omega typically 2-3 at Carlsbad Aquafarm



SCCOOS REGION: Anomalous Winter Storms & Nearshore Effects

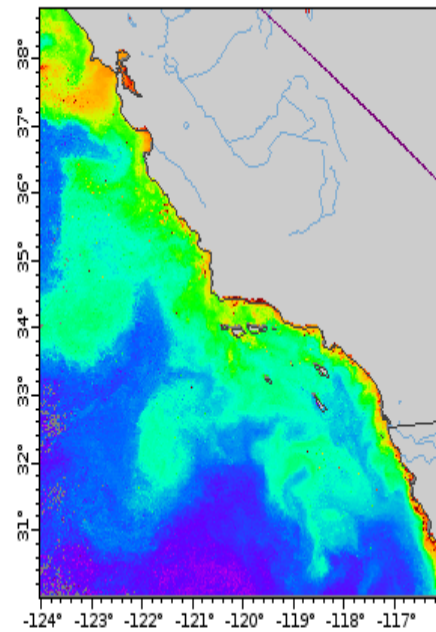
February 26-28

Pre-Storm Chlorophyll



Chlorophyll a (mg m^{-3})
Chlorophyll a, North Pacific, NOAA VIIRS, 750m resolution,
2015-present (8 Day Composite)
(2017-02-20T00:00:00Z, Altitude=0.0 m)
Data courtesy of NOAA NMFS SWFSC ERD

Post-Storm Chlorophyll



Chlorophyll a (mg m^{-3})
Chlorophyll a, North Pacific, NOAA VIIRS, 750m resolution,
2015-present (8 Day Composite)
(2017-03-01T00:00:00Z, Altitude=0.0 m)
Data courtesy of NOAA NMFS SWFSC ERD

This time the enhanced Chl concentrations after the storm period are likely associated with runoff and spring upwelling bloom conditions

Evidence: Weekly sampling at shore stations revealed increasing biomass and diversity, including an increase in *Pseudo-nitzschia* (HAB) cells at Scripps Pier and Santa Monica Pier

Explanation: The higher Chl retrievals from VIIRS are most likely capturing some false positives in the San Diego area where the storm track was focused but much of this Chl could still be attributed to regional changes in Spring Bloom biomass

**** No glider data quite yet to examine nearshore upwelling!**

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)**
 - **Others**
- Discussion

Regional Impacts Summary



Reporting Status:

- 40 entries since last reporting period (Jan 24, 2017)
- 87 entries total NOAA West Watch 2016-2017
- Thanks to Shawn Roj, intern with Western Regional Climate Center

Environmental Conditions

- Floods
- Drought Relief
- Atmospheric river storms
- Widespread dead trees
- Sewage Spills
- Wind Storm
- Ice Jam
- Poor Air Quality

Human & Environmental Impacts

- Property damage/Loss of property
- Loss of life
- Impacts to recreational access
- School & business closures
- Evacuations
- Increased human health risks
- Increased risk of wildfire

Impacts in Pictures – Oroville Dam Emergency



A giant crack in the concrete spillway of Lake Oroville caused massive amounts of erosion, the temporary evacuation of 200,000 people, and major failures of riverbanks along the Feather River due to dramatically reduced stream flows.



Impacts in Pictures – Oroville Dam Hatchery Fish



Muddy river water from the Oroville Dam catastrophe caused the Feather River Hatchery to relocate 8 million juvenile fish that are too young to be released into the river. Fish were also saved from pools of water no longer connected to the river.



Impacts in Pictures – Puget Sound Sewage Spill



More than 100 million gallons of raw sewage and stormwater have flowed into Puget Sound after a failure at the King County wastewater treatment plant in Seattle caused at least \$25M in damage.



Impacts in Pictures – Colorado Dead Trees



834 million dead trees in Colorado could cause a worsening threat of wildfire.



Impacts in Pictures – Colorado River Drought Alleviation



The Colorado River basin has seen a sharp decline in drought conditions this winter due to a healthy snowpack. Lake Mead could rise by 20 feet or more.



Impacts in Pictures – Snow Event in Seattle



A storm in Washington brought about 2" of snow to portions of Seattle with up to 15" on the higher hills of the eastern suburbs. Schools were closed and close to 100,000 customers were without power. More than 80 flights were canceled at Seattle-Tacoma Int. airport affecting 10,000 passengers.



Impacts in Pictures – Wind Storm in Wyoming



Jackson, Wyoming saw strong, 40-60 mph damaging winds, that toppled steel power poles cutting off power for many, including Teton Village and the Jackson Hole Ski Resort.



Impacts in Pictures – Flooding in Idaho



Southern Idaho saw major flooding due to warm weather, rain, snowmelt and ice jams on rivers. Flooded basements, mudslides, and ice-jam flooding are causing major impacts around the state. One man was rescued from his flooded house.



Impacts in Pictures – S. California Atmospheric Rivers



Atmospheric rivers set in on Southern California this winter.

In Los Angeles:

- surrounding mountains received upwards of 8 and 9 inches of rain, with up to 2 feet of snow in the higher elevations.
- 300 flights canceled.
- 3 people lost their lives.
- 100 homes evacuated due to threat of mudslides.
- 150,000 customers were left without power.

In San Diego:

- 3rd highest recorded flood levels for the San Diego River since 1900



Impacts in Pictures – S. California Atmospheric Rivers



In San Diego:

- Three high rain and wind events in Jan-Feb
- Feb 27 - 3rd highest recorded flood levels for the San Diego River since 1900.
- 65 emergency swift water rescues. All successful; no loss of life.
- Hotel evacuation
- Significant flooding on highways and interstates



Highway 163 crosses has trapped submerged cars on Camino De La Reina.



Road closures were widespread along the San Diego River in Fashion Valley.

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)
 - Others
- **Discussion**
 - Additional impacts to report?
 - Observations on recent environmental anomalies?

Next NOAA West Watch: May 23, 1-2pm PDT