

NOAA West Watch: Reporting Regional Environmental Conditions & Impacts in the West

October 26, 2021

Desert Research Institute

WESTERN REGIONAL CLIMATE CENTER

NOAA

IOOS | Integrated Ocean Observing System

Call Agenda

- Project Background (Dan McEvoy)
- Regional Climate and ENSO brief (Dan McEvoy)
- IOOS Nearshore Conditions brief (Jan Newton, Henry Ruhl, Clarissa Anderson)
- Discussion - Environmental conditions and impacts reporting (All)
  - Additional impacts to share?

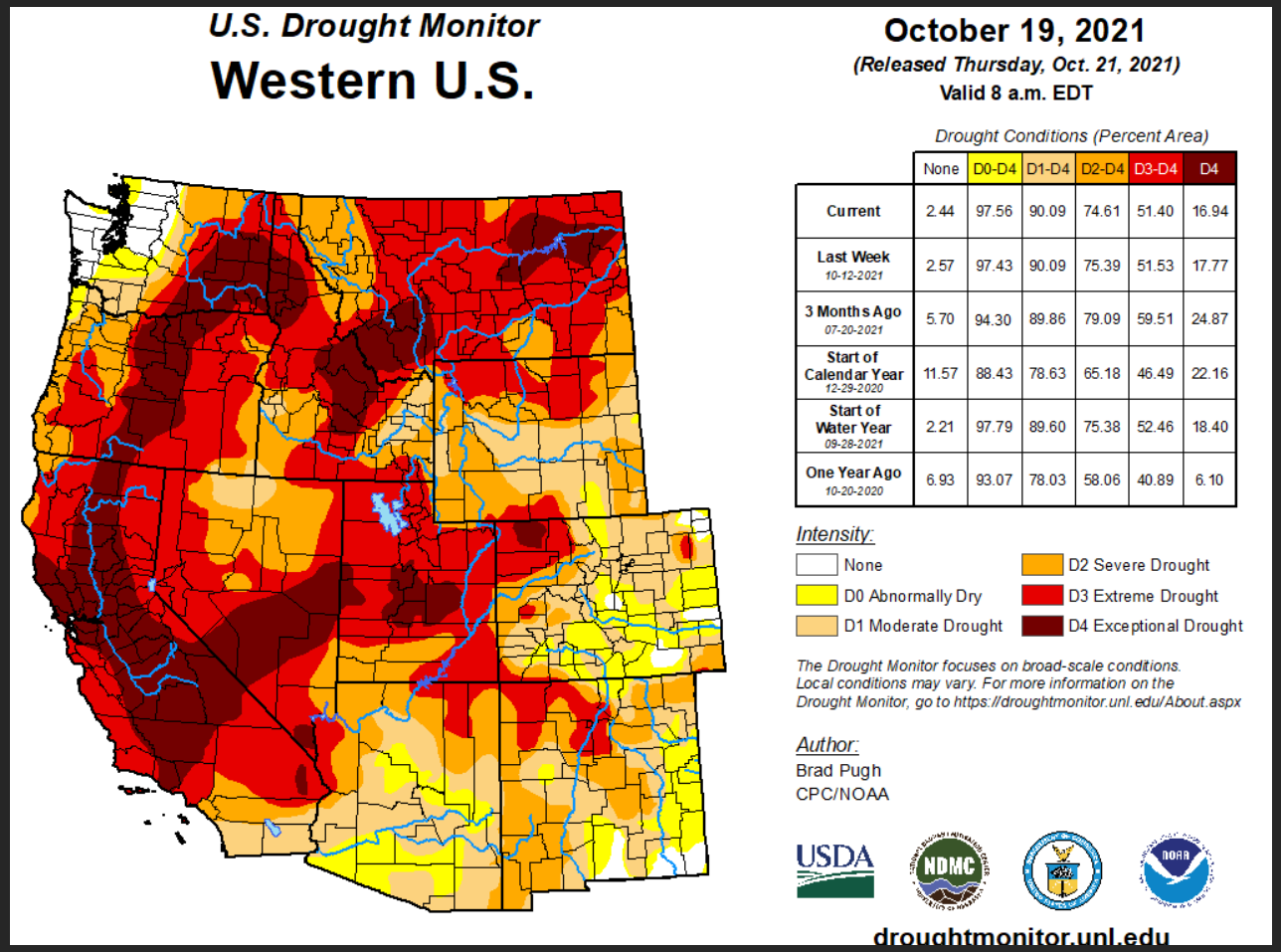
Project Background

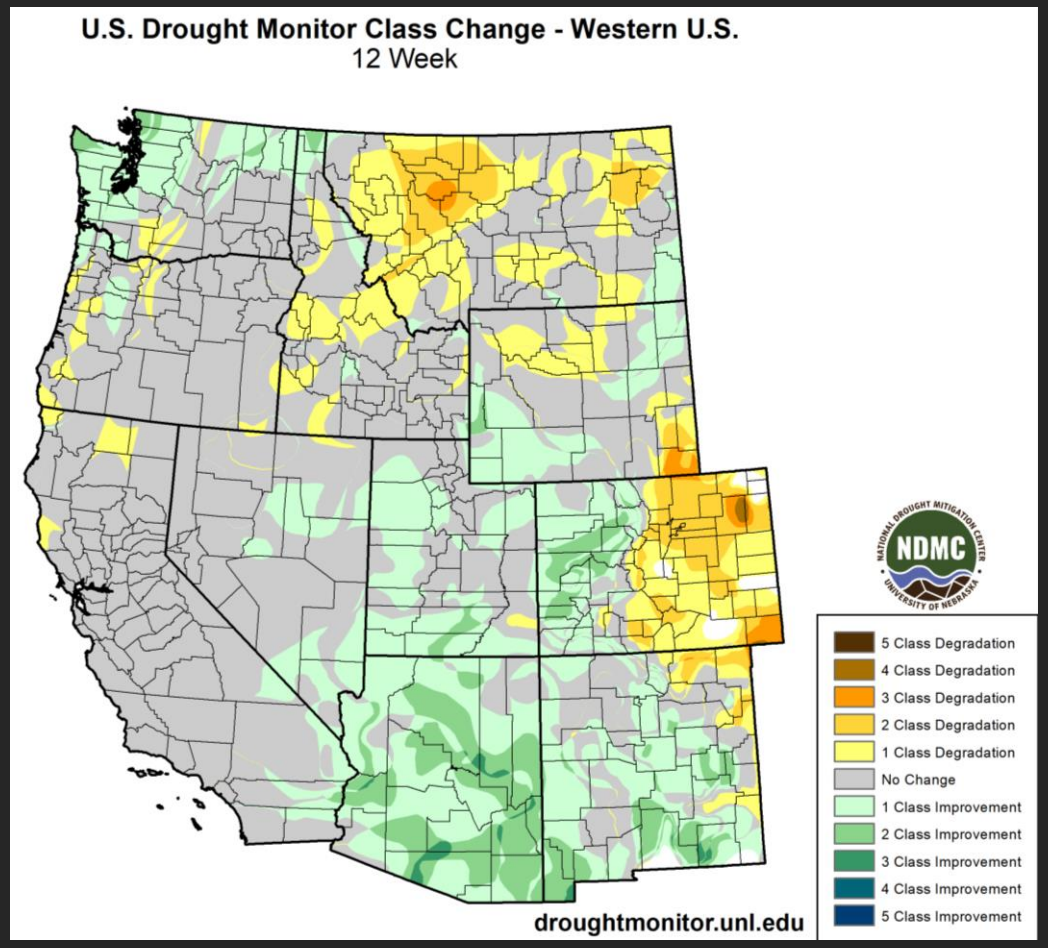
- Run by the Western Regional Climate Center, in partnership with the NOAA Western Regional Collaboration Team (NOAA West)
- Standing contributions from the three Integrated Ocean Observing System Regional Associations.

- Project Goals:
  - Serve as forum for bringing together NOAA staff and partners from across the agency and region to share information about regional scale environmental observations and impacts on human systems.
  - Help facilitate interdisciplinary connections and the exchange of information among agency staff and partners on regional climatic and oceanic conditions, particularly departures from normal.

These webinars are not formal public releases of data.

Drought expands in some areas; reductions in other areas

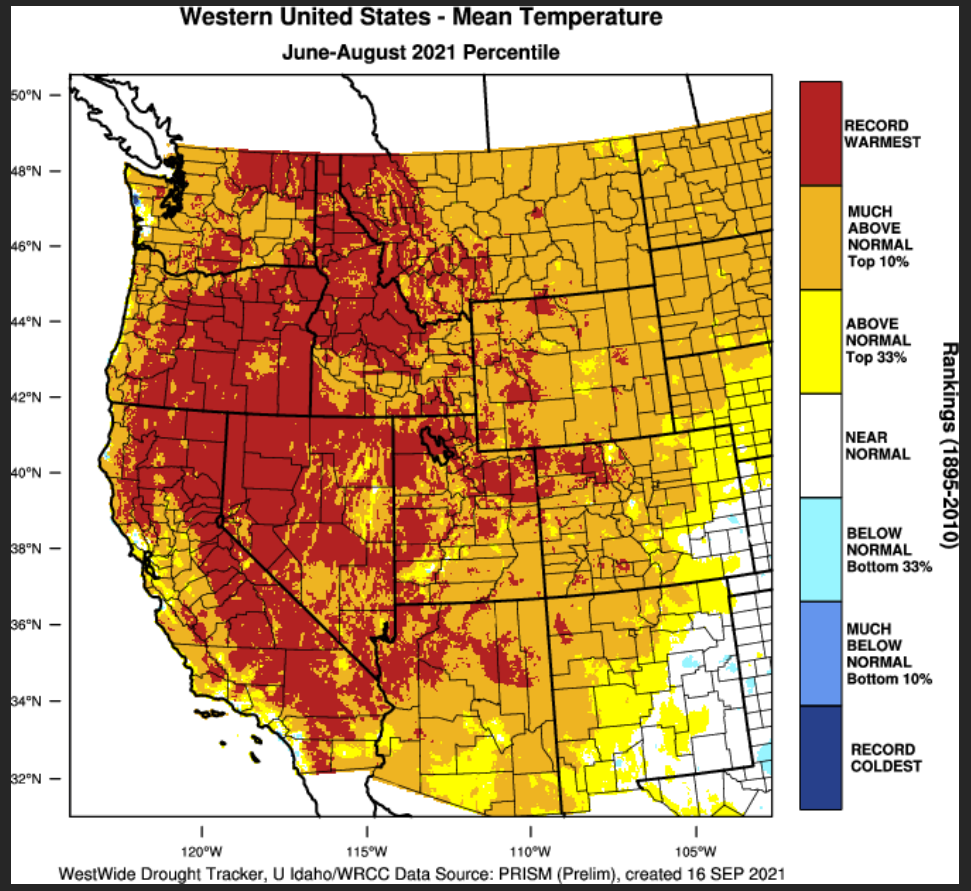




Change from July 27 to October 19, 2021

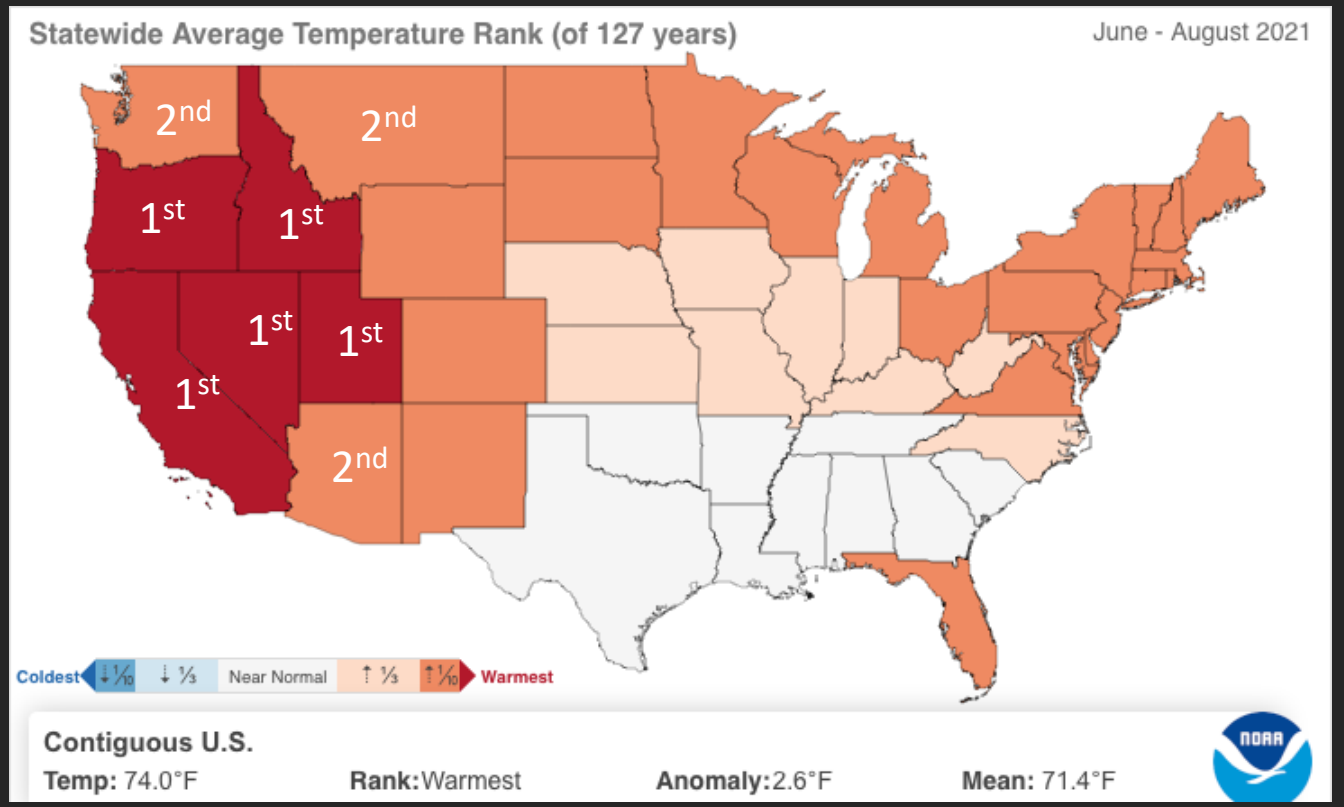
Scorcher of a Summer

Summer Temperature Percentiles: Gridded Data



https://wrcc.dri.edu/wwdt/

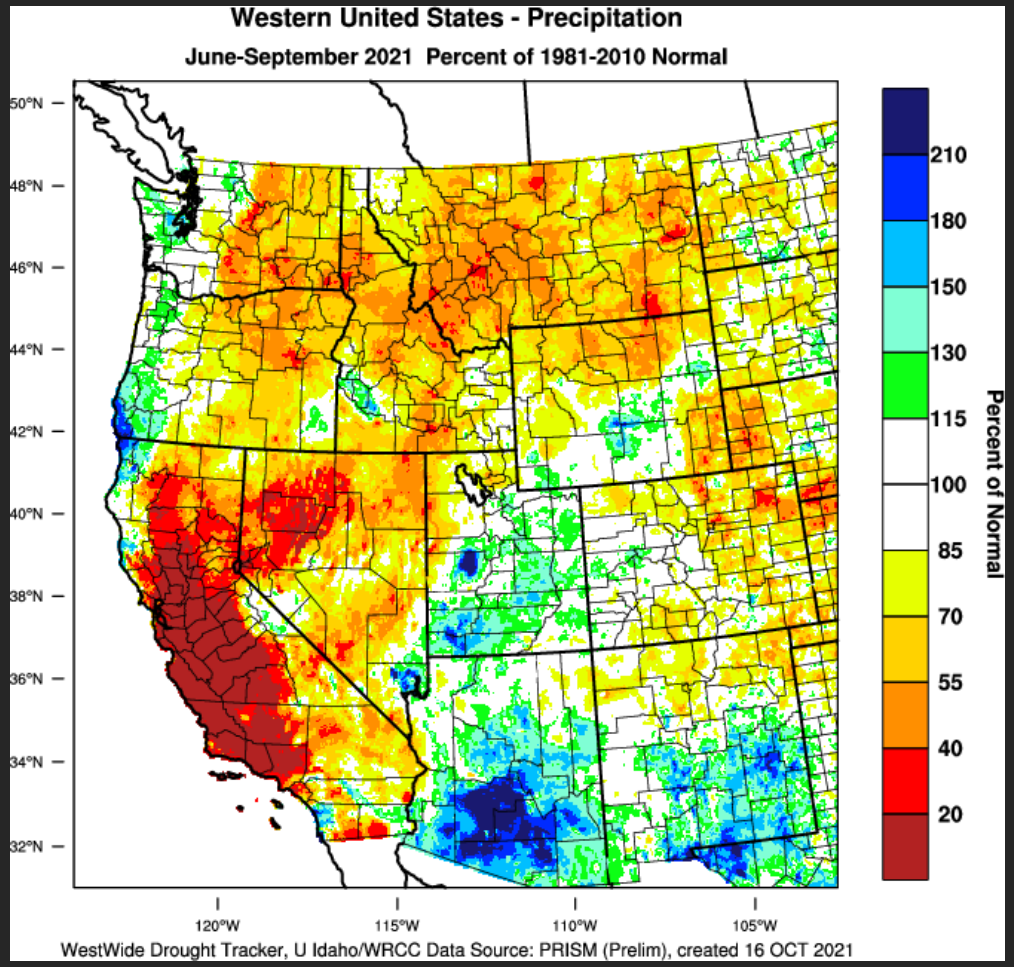
Summer Temperature Statewide Rankings



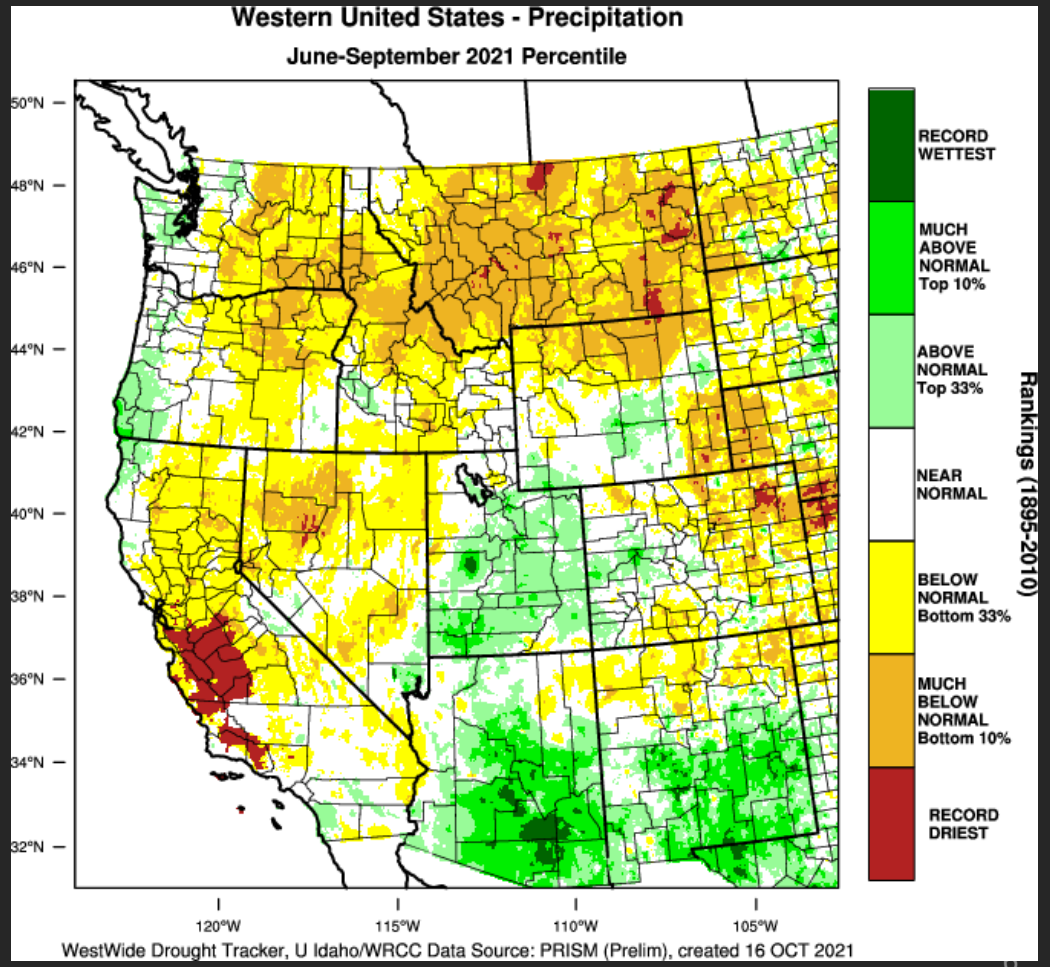
https://www.ncdc.noaa.gov/cag/

Localized Record Monsoon Rains

June-September % of normal Precipitation



June-September Precipitation Percentile



https://wrcc.dri.edu/wwdt/

Vegetation response to Monsoon

MODIS NDVI Percentiles:
August 13-October 11, 2021

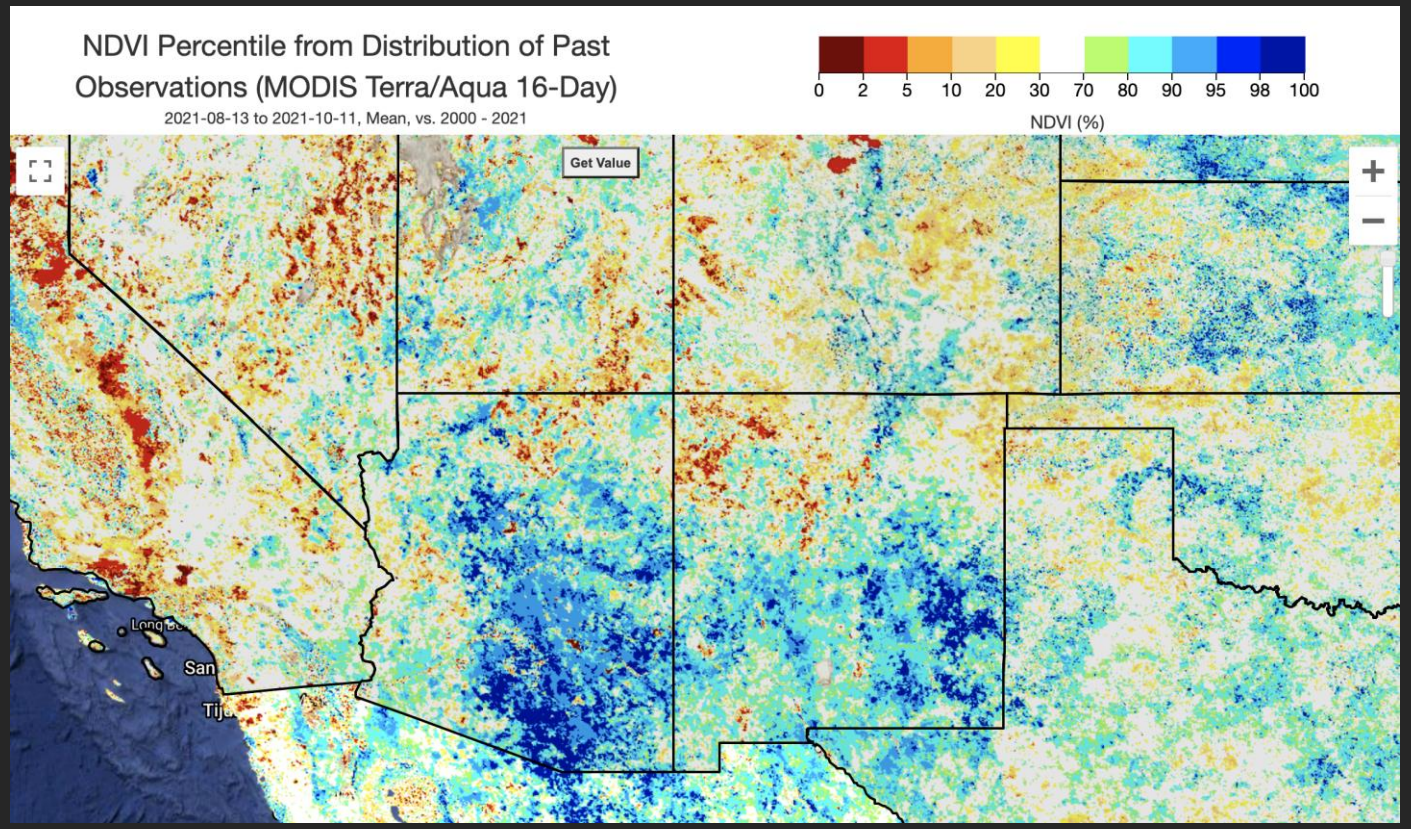




Photo: KGUN9/Joseph CYR

NDVI: Normalized Difference Vegetation Index

https://app.climateengine.org/climateEngine

2021 Fire Season Update

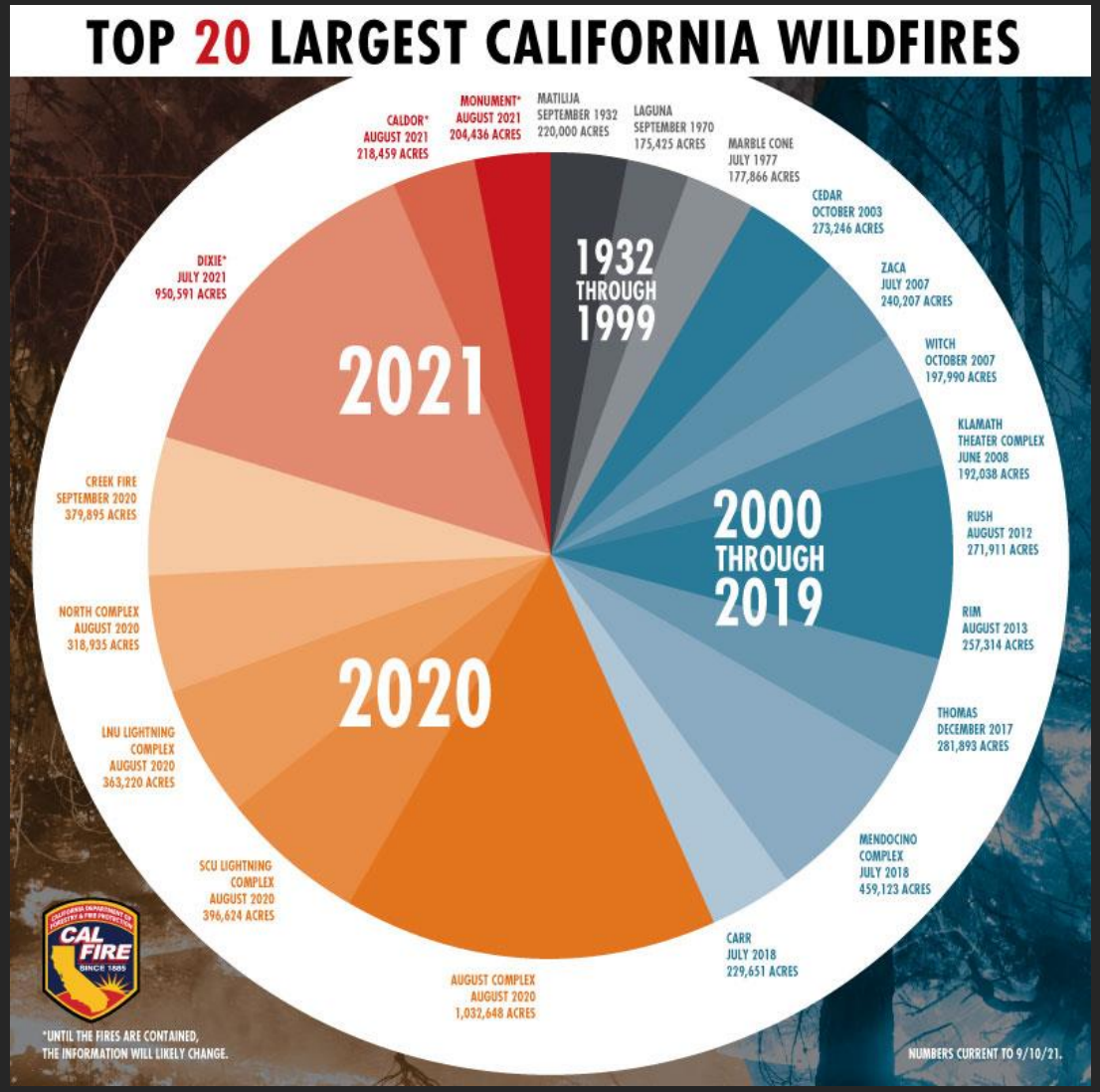
Year-to-date stats:

- 2021 # Fires: 47,884
- 2011-2020 average: 49,188

- 2021 acres: 6,515,883
- 2011-2020 average: 6,884,437

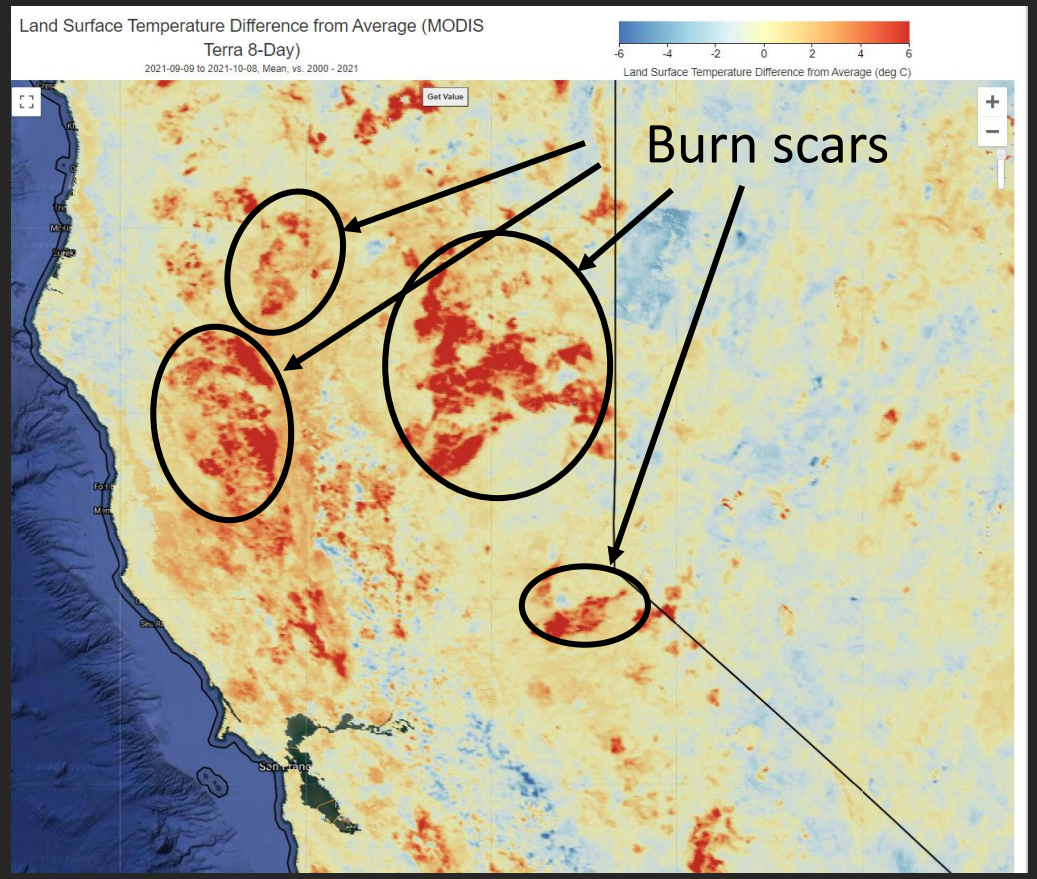
- Fire stats from the National Interagency Fire Center

Nationally, # of fires and acres burned below average. Another big year for California despite national numbers.

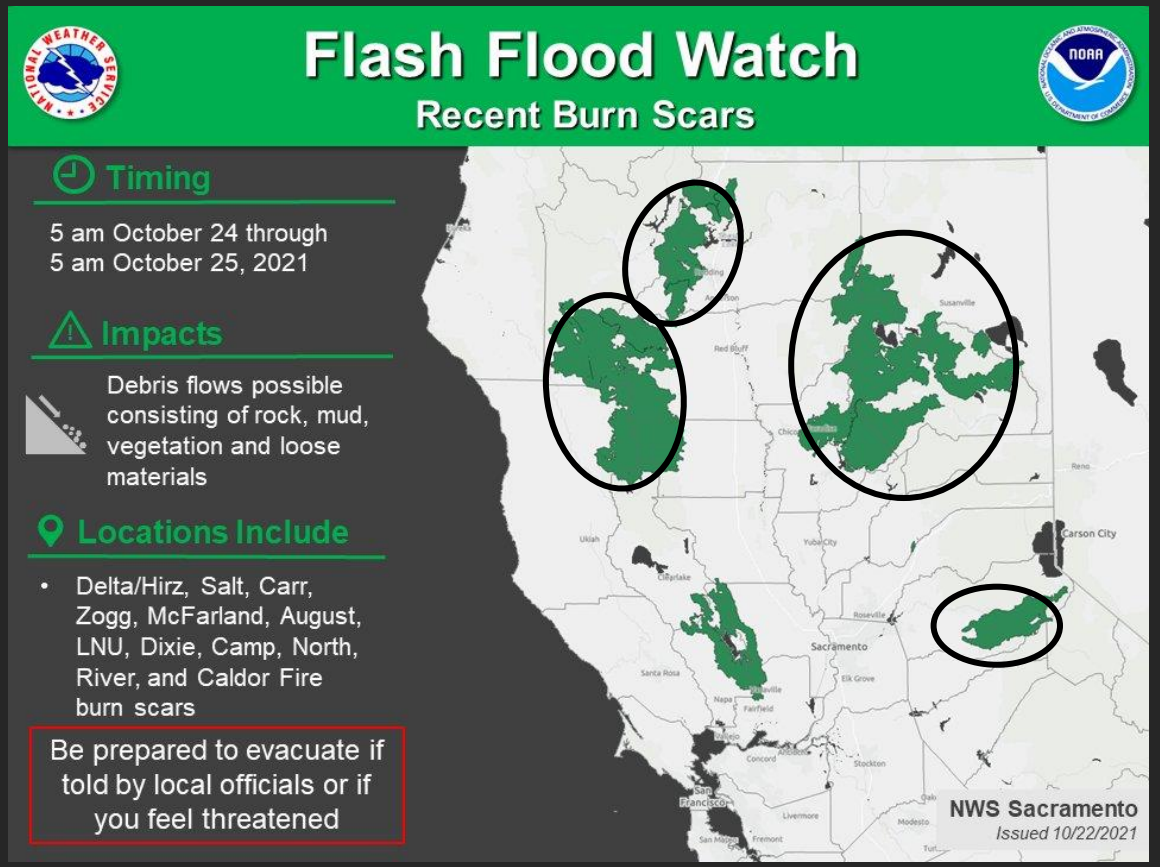


Big Year (again) for Northern California Fires

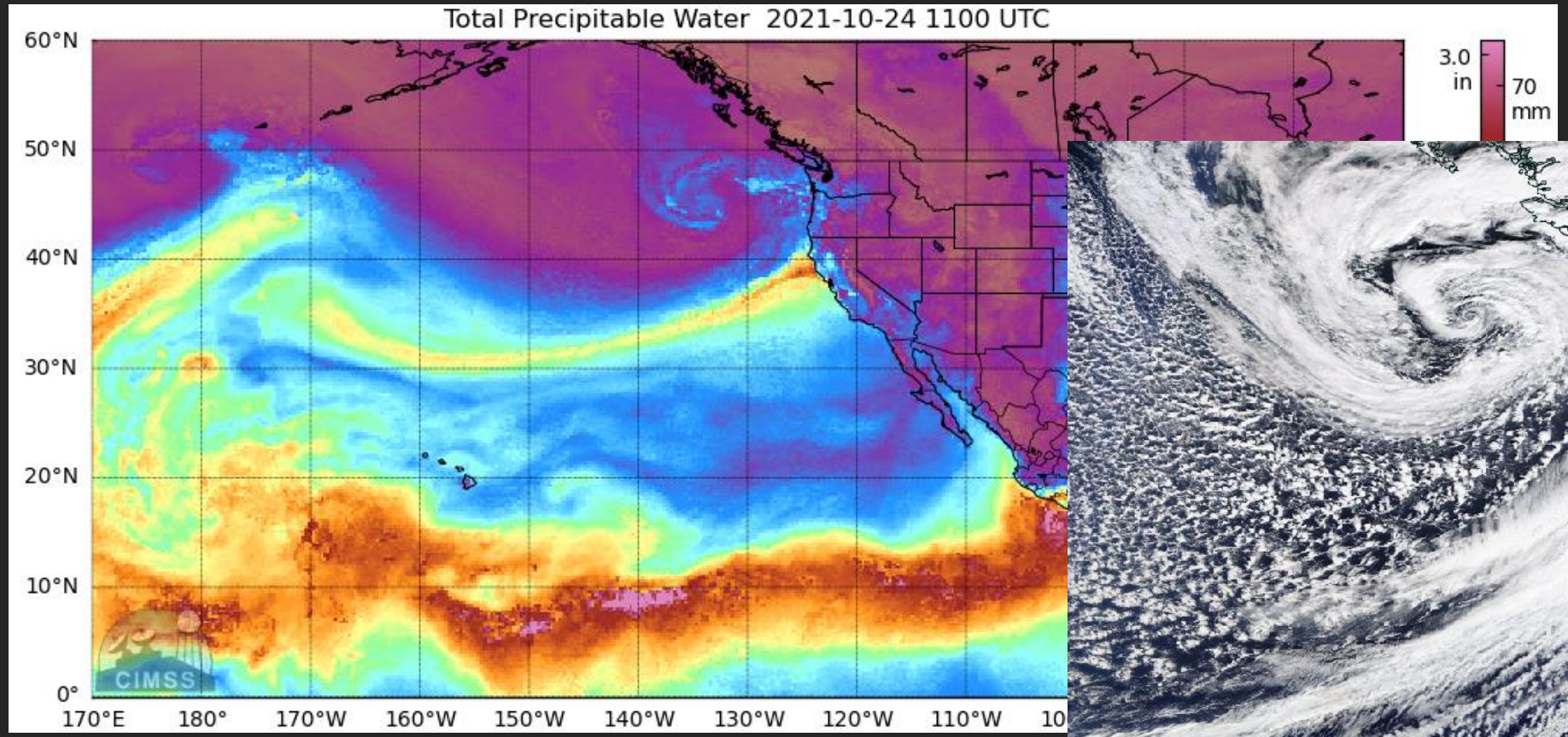
MODIS Land Surface Temperature Anomaly:
September 9-October 8, 2021



https://app.climateengine.org/climateEngine

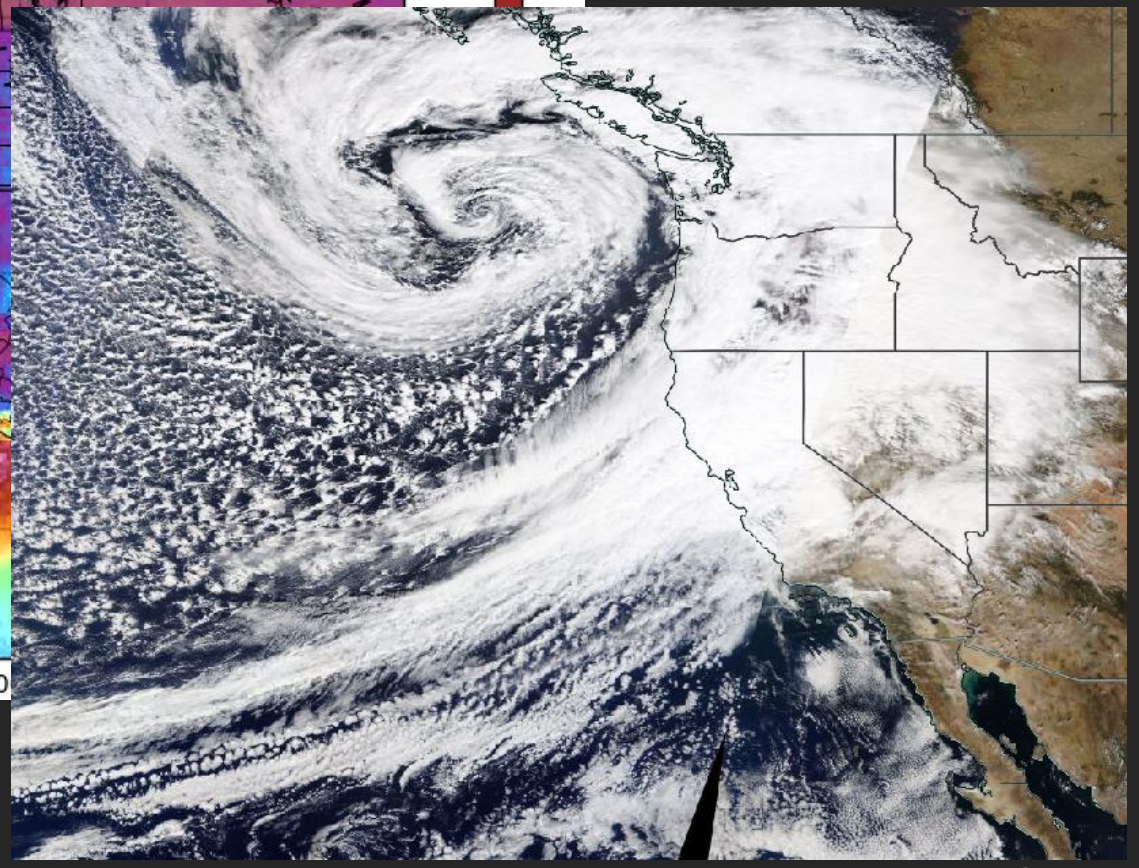


Fire Season Ending Atmospheric River?



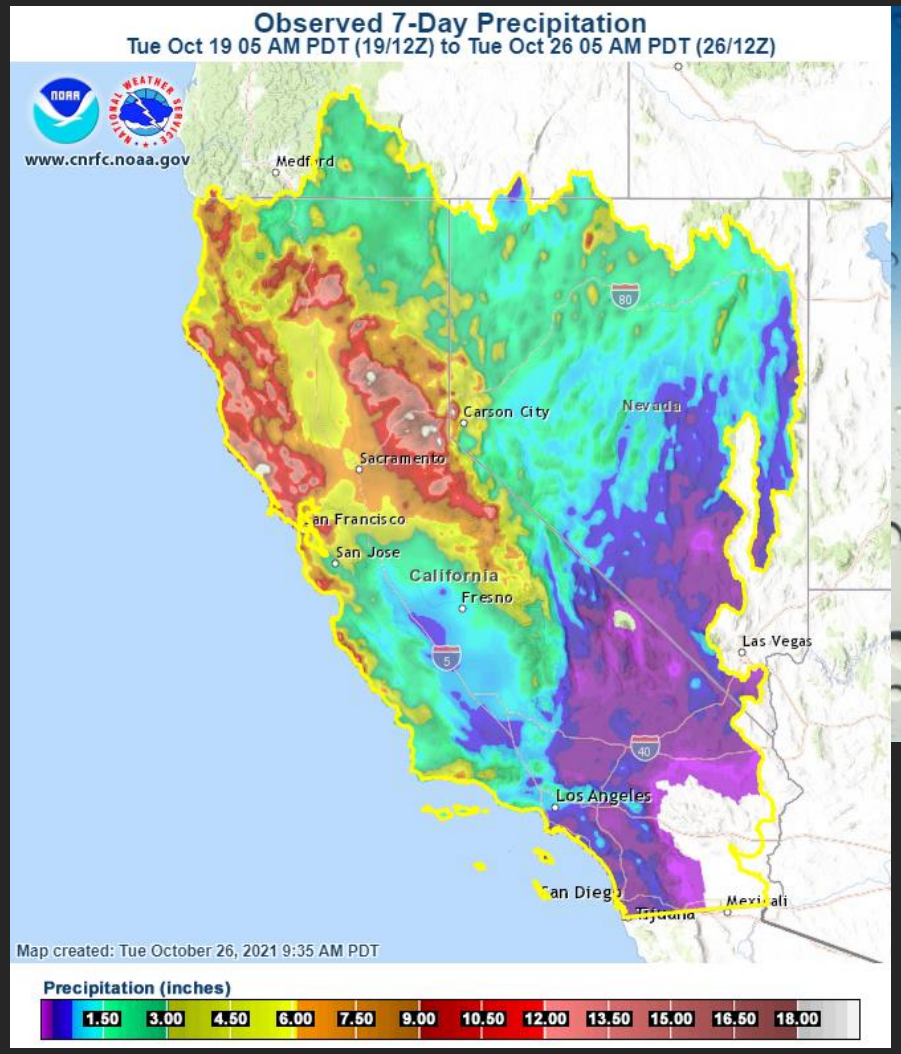
http://tropic.ssec.wisc.edu/

MODIS True Color
October 24, 2021



https://worldview.earthdata.nasa.gov/

Extreme California/Nevada Rainfall



https://www.cnrfc.noaa.gov/



https://twitter.com/NWSSacramento/status/1452576872378761216

Maximum 1-Day Total Precipitation for SAN FRANCISCO DOWNTOWN, CA

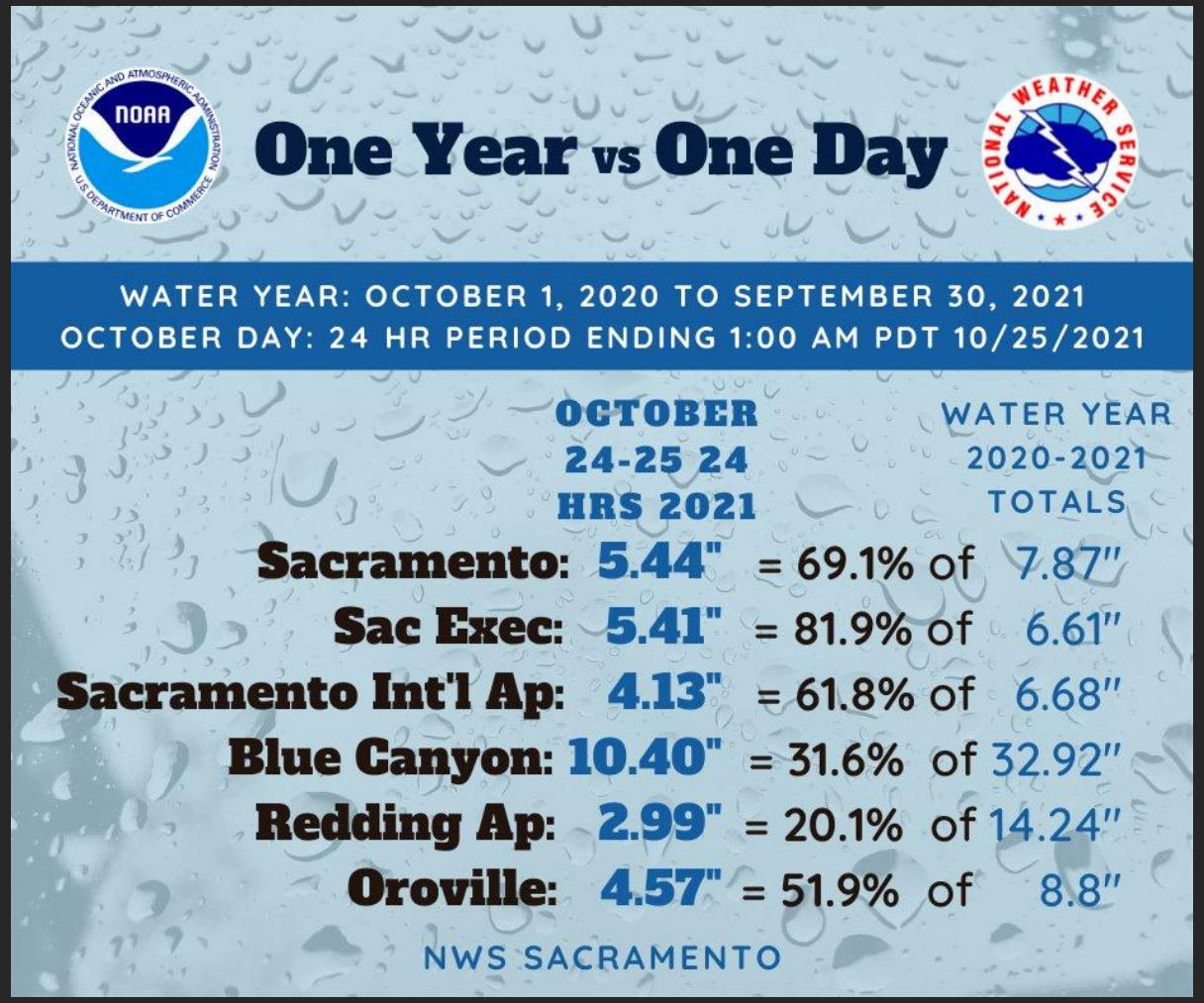
Click column heading to sort ascending, click again to sort descending.

Rank	Value	Ending Date
1	5.54	1994-11-05
2	4.67	1881-01-29
3	4.28	1866-12-19
4	4.02	2021-10-24
5	3.98	1874-11-23
-	3.98	1864-11-26
7	3.90	1982-01-04
8	3.62	1866-12-20
9	3.61	1995-12-11
10	3.50	1862-01-09
Period of record: 1849-10-01 to 2021-10-24		

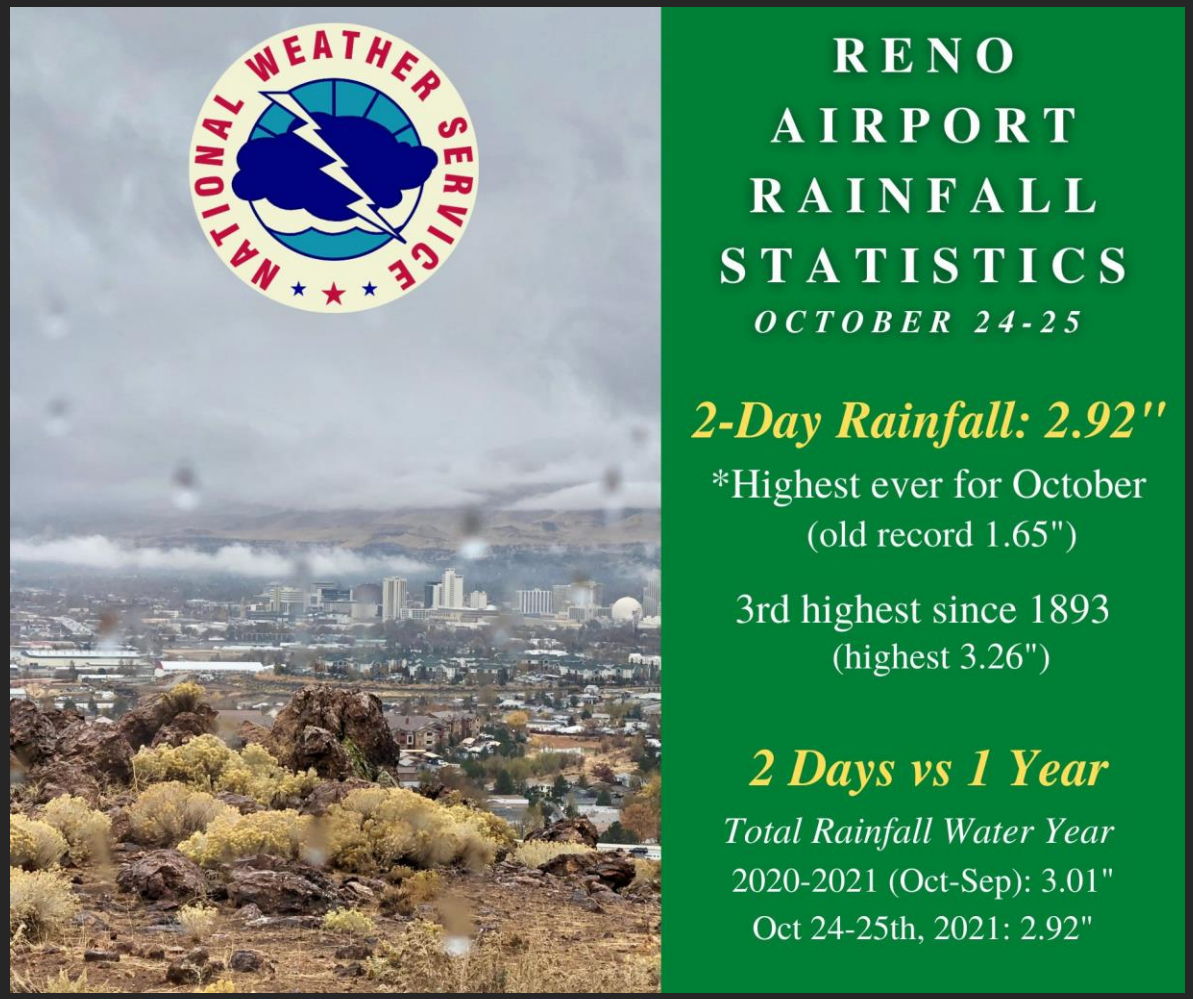
https://xmacis.rcc-acis.org/

- Wettest day in Sacramento, records begin in 1877
- 4th wettest day in San Francisco, records begin in 1849

Extreme California/Nevada

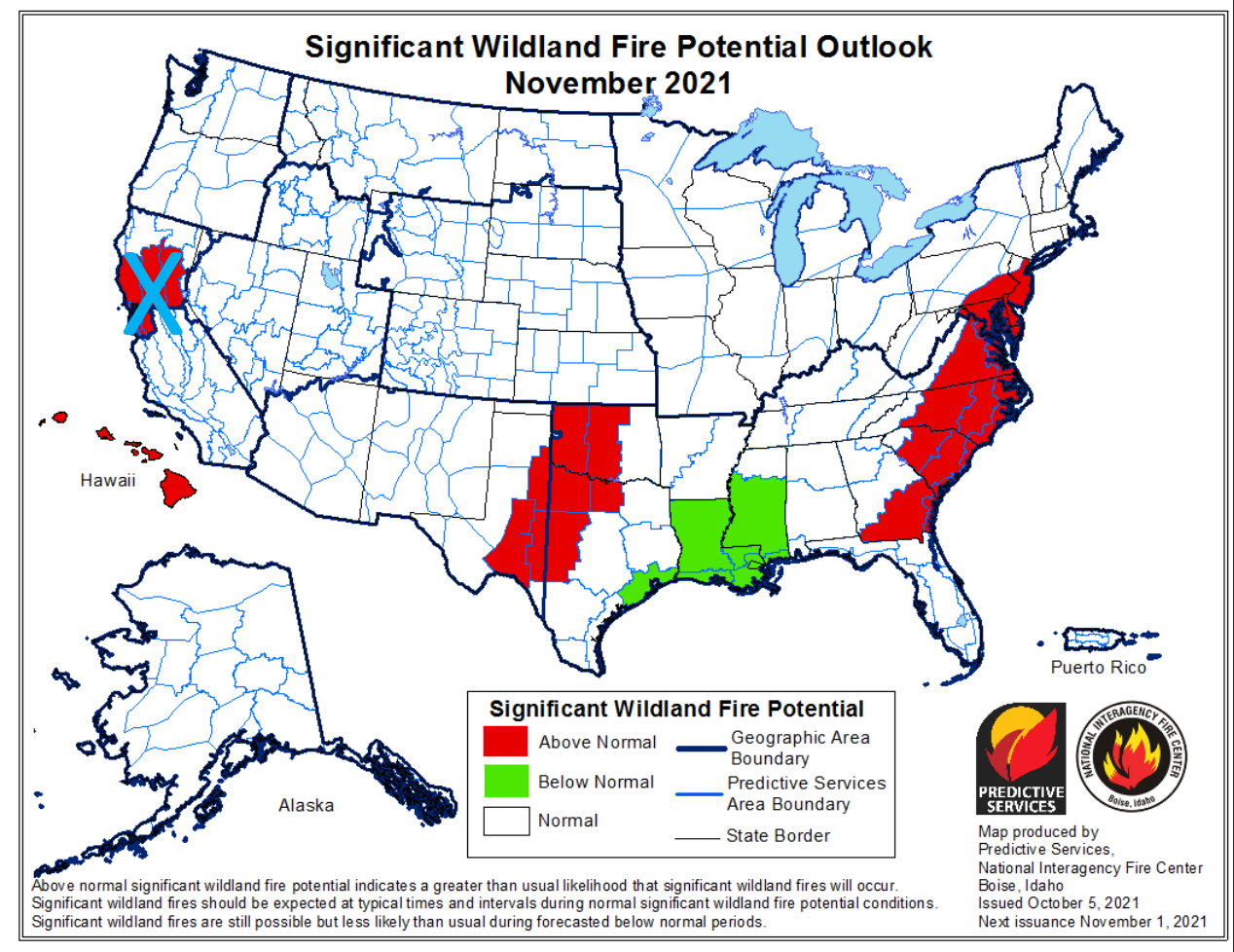


https://twitter.com/NWSSacramento/status/1452631334623473666



https://twitter.com/NWSReno/status/1452822586627289089

Fire Season Ending Atmospheric River?

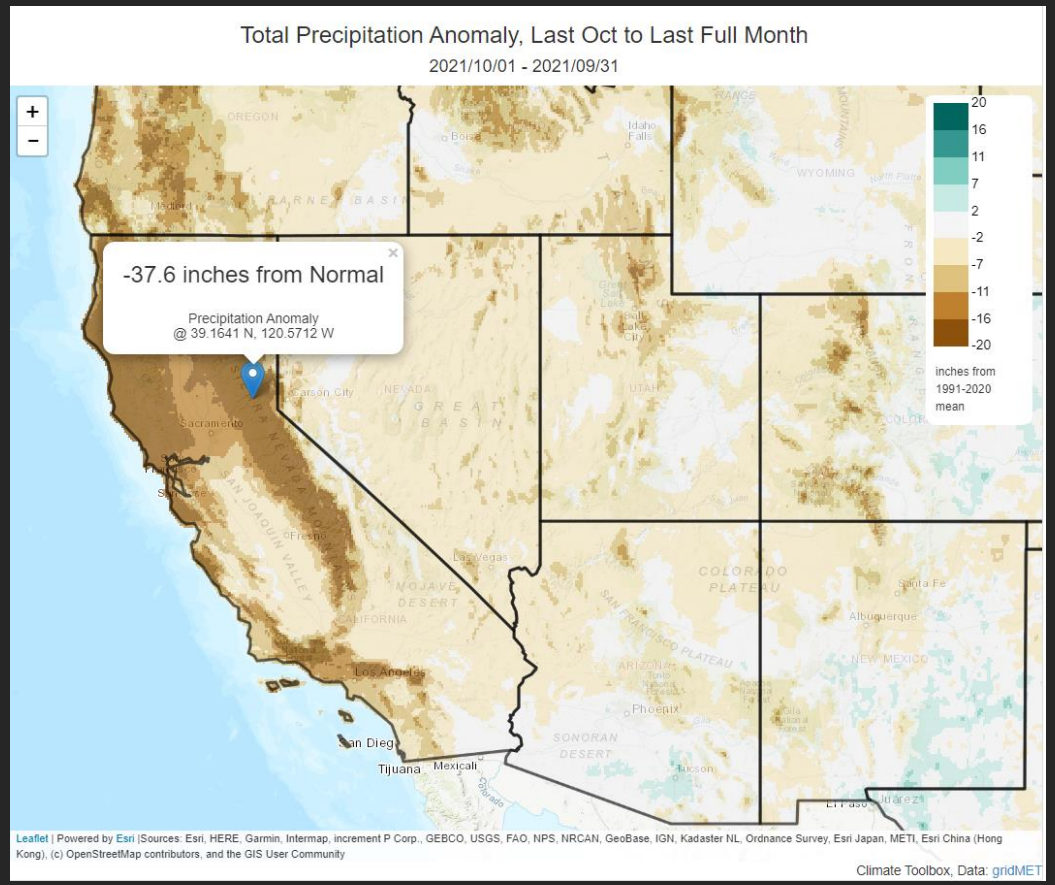


- Outlook issued October: Above normal significant wildland fire potential in November for much of Northern California

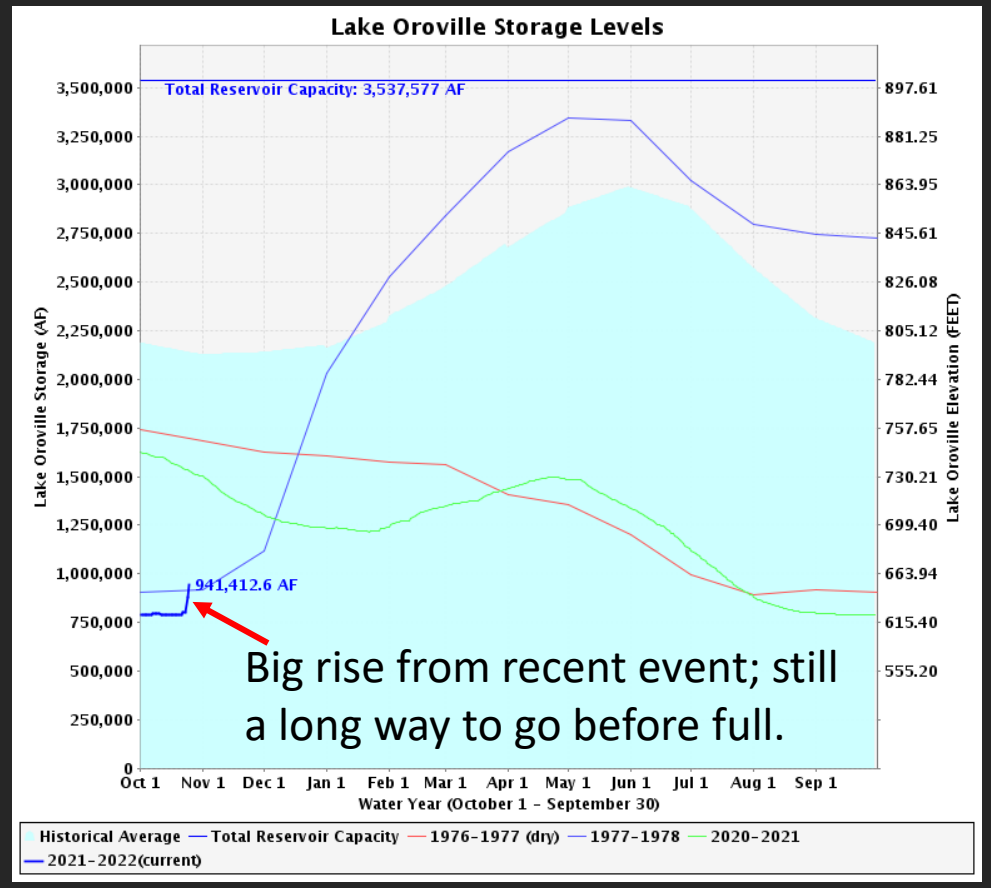
- This will likely be removed from the outlook issued on November 1
- Near-term fire danger is now minimal in northern CA
- *Things can dry out again if we go weeks or longer without significant precipitation again.*

Drought buster? Not quite.

Water Year 2021 Precipitation Anomaly (Inches)

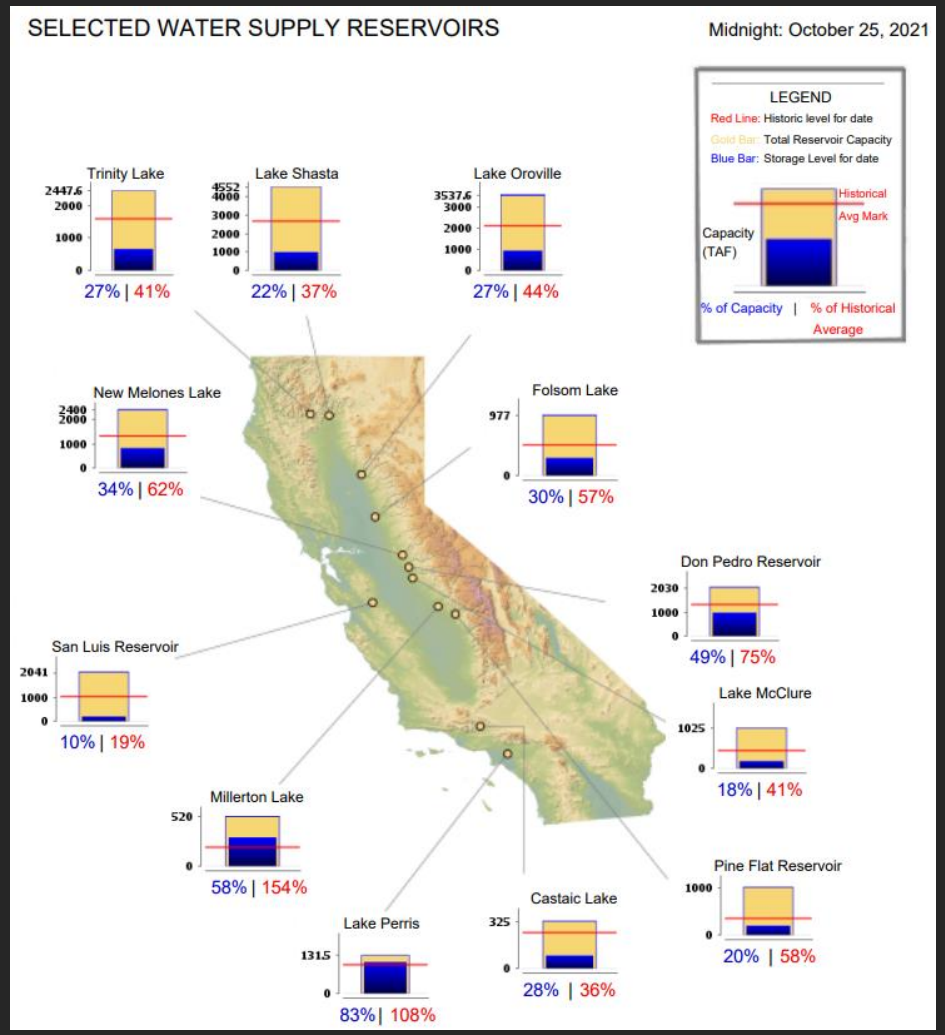


https://climatetoolbox.org/tool/climate-mapper



- Lake Oroville elevation 10/21: 629 feet
- Lake Oroville elevation 10/25: 655 feet

Drought buster? Not quite.

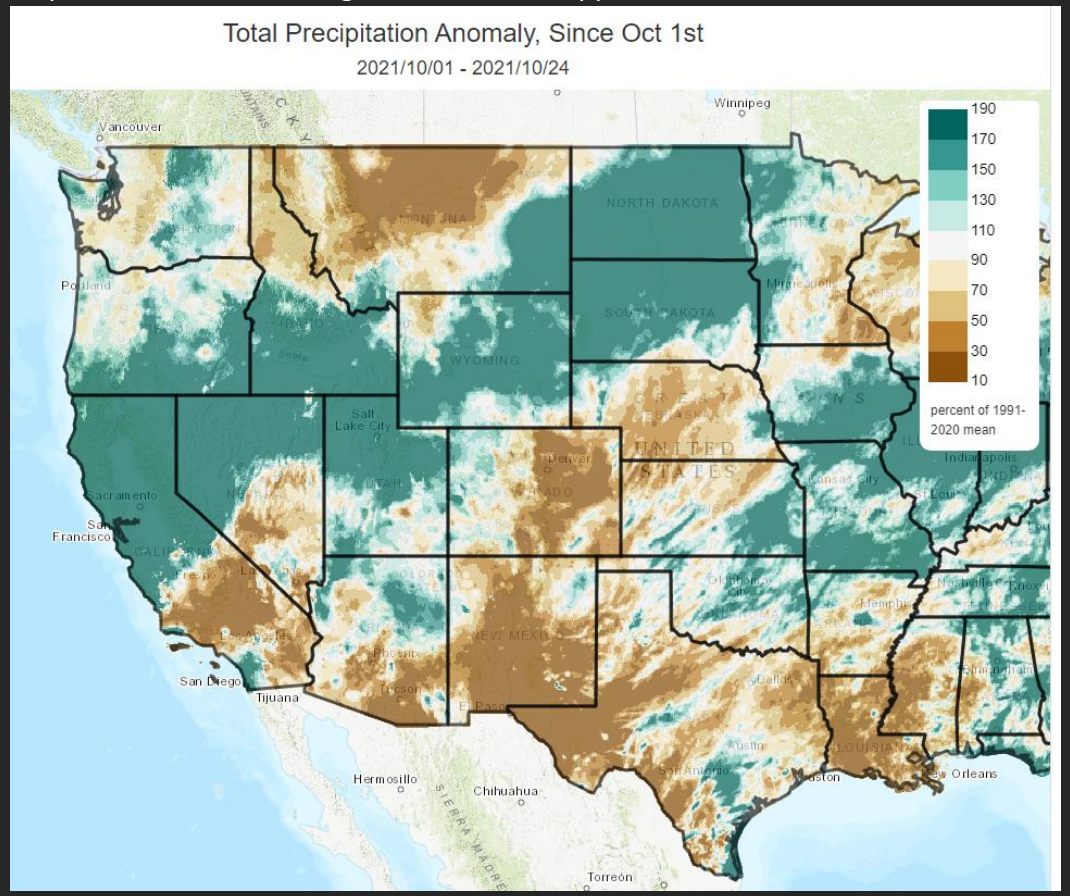


https://cdec.water.ca.gov/reservoir.html

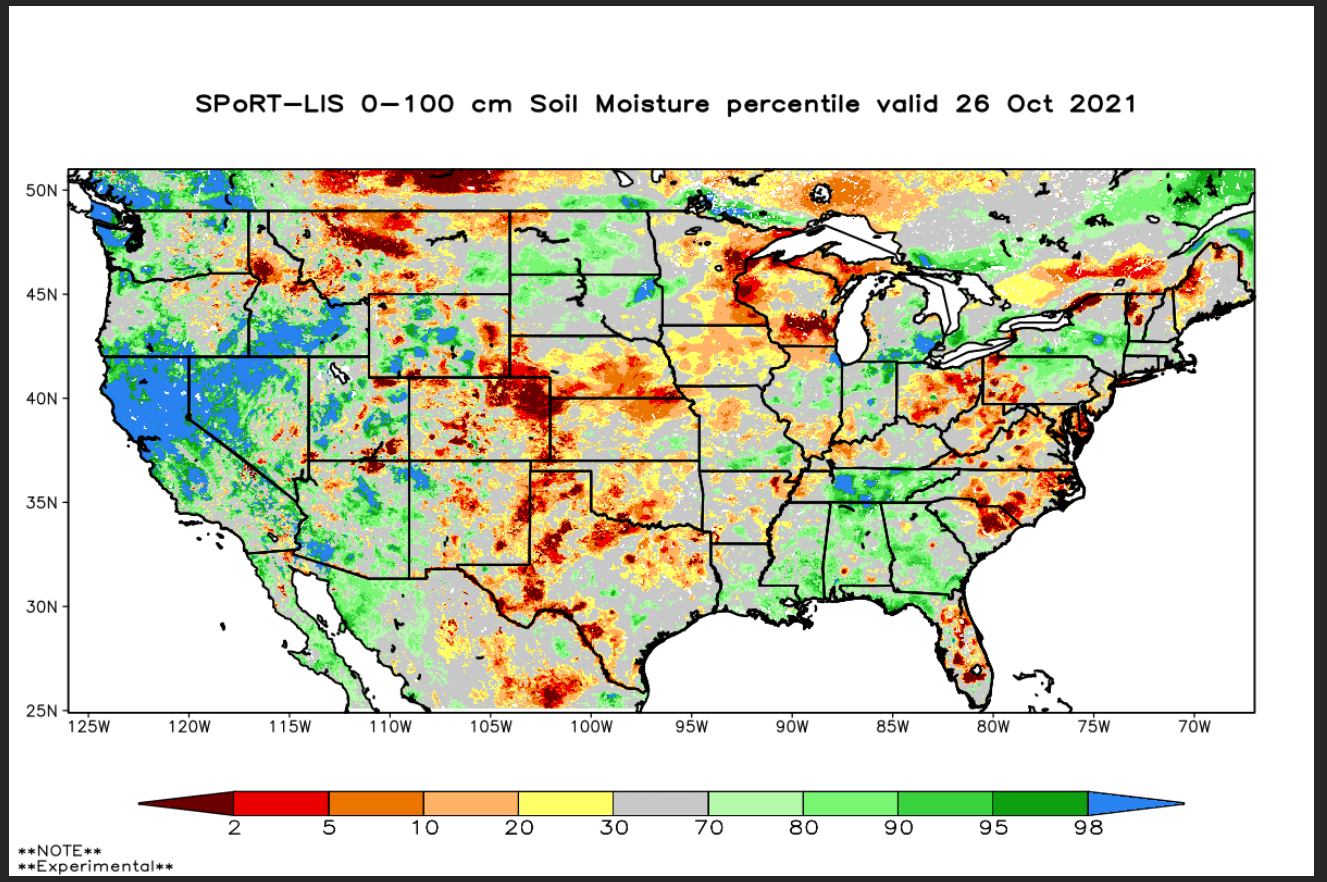
- Except for some rock/land slides and minor flooding this precipitation event was extremely beneficial to the region.
- However, huge precipitation deficits over the past two years have depleted reservoirs to near record low levels.
- Even after this event most reservoirs remain well below normal.

More drought improvements likely across parts of West

https://climatetoolbox.org/tool/climate-mapper



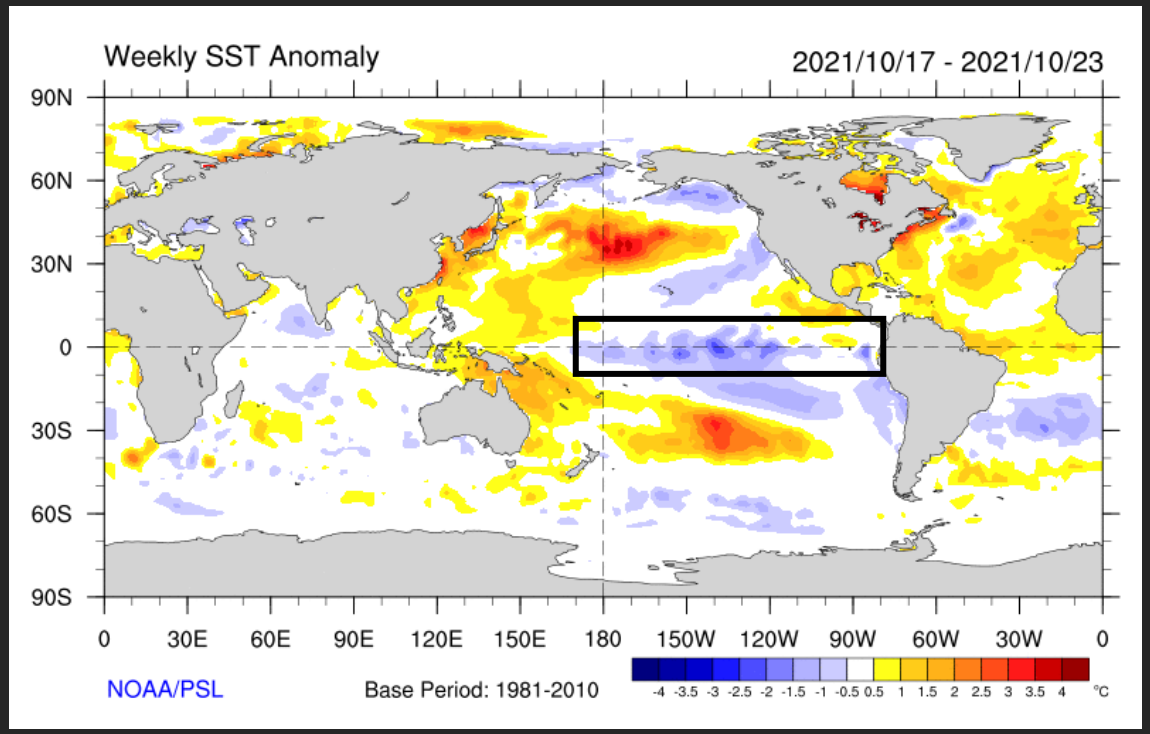
https://weather.msfc.nasa.gov/sport/case_studies/lis_CONUS.html



Wetting of the soils prior to mountain snowpack building is critical for drought improvements.

ENSO Update

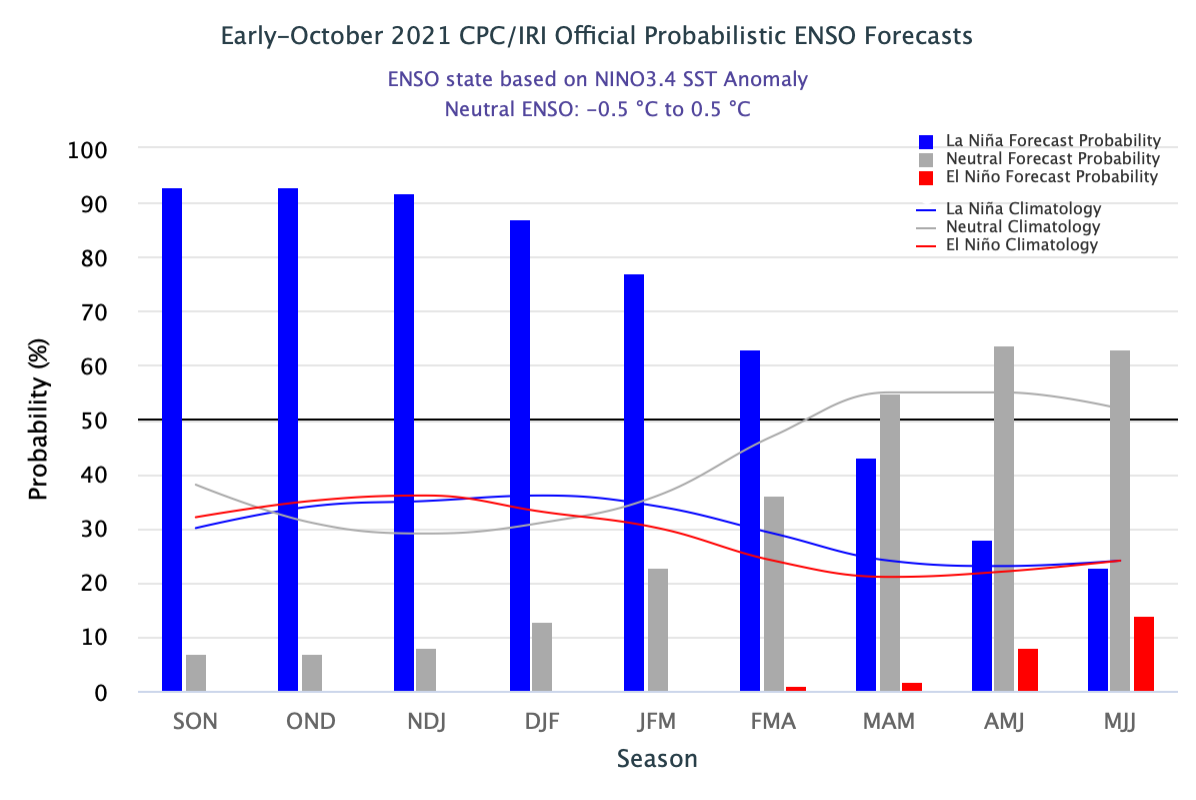
- ENSO Alert System Status: **La Niña Advisory**
- La Niña conditions have developed.
- Equatorial sea surface temperatures (SSTs) are below average across the central and east-central Pacific Ocean.
- The tropical Pacific atmosphere is consistent with La Niña conditions.
- La Niña is expected to continue with an 87% chance in December 2021- February 2022.

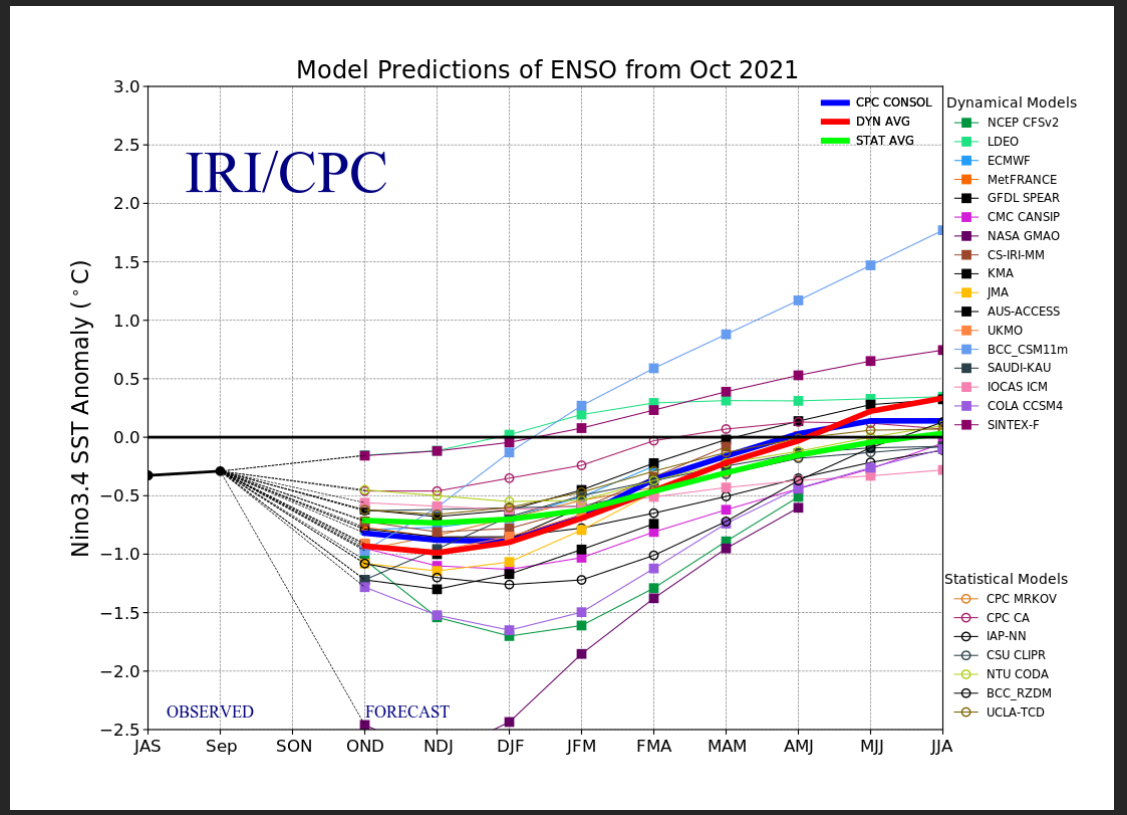


Source: Climate Prediction Center

https://psl.noaa.gov/map/clim/sst.shtml

ENSO Outlook

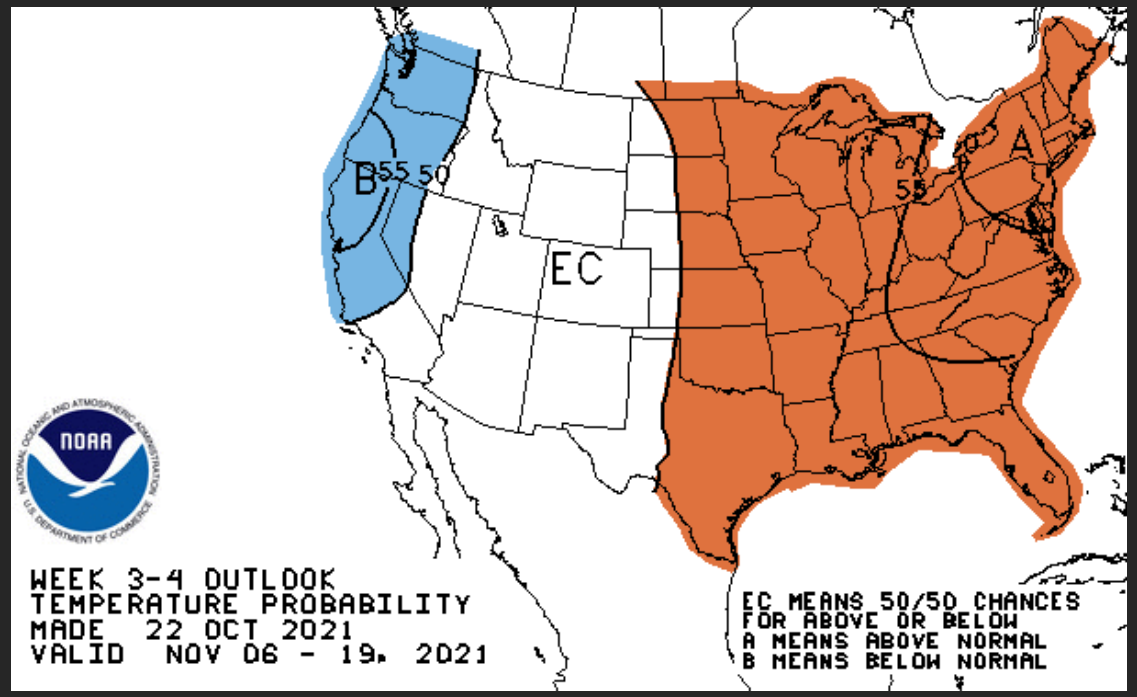




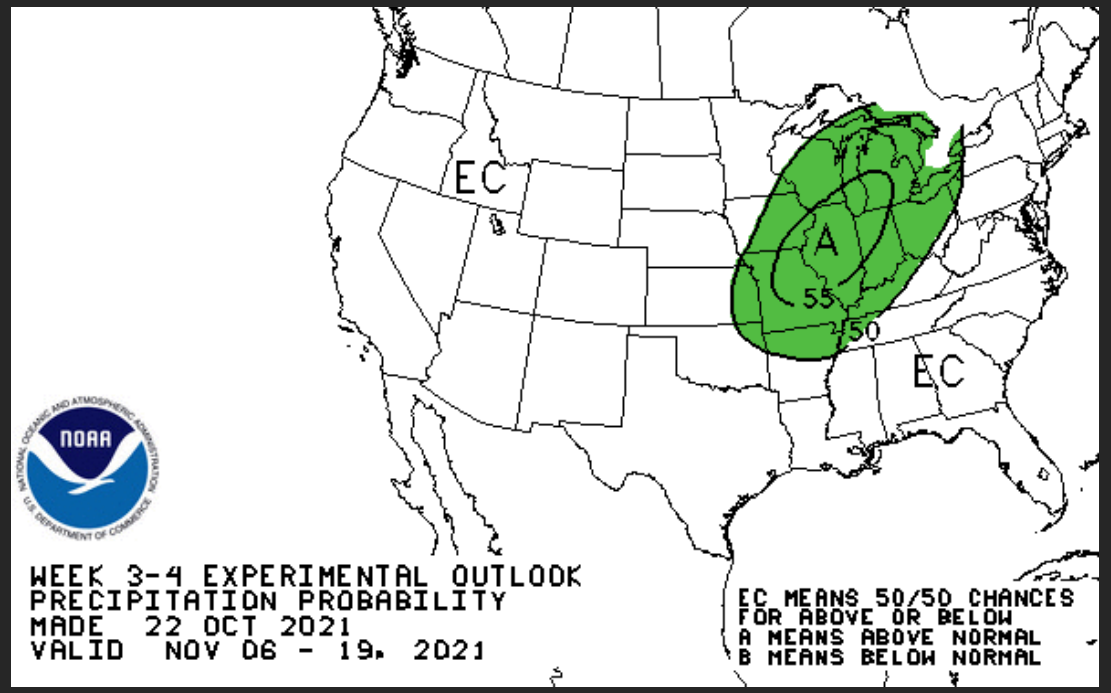
https://iri.columbia.edu/our-expertise/climate/forecasts/enso/current/

Week 3-4 Outlook: November 6-19

Temperature Probability



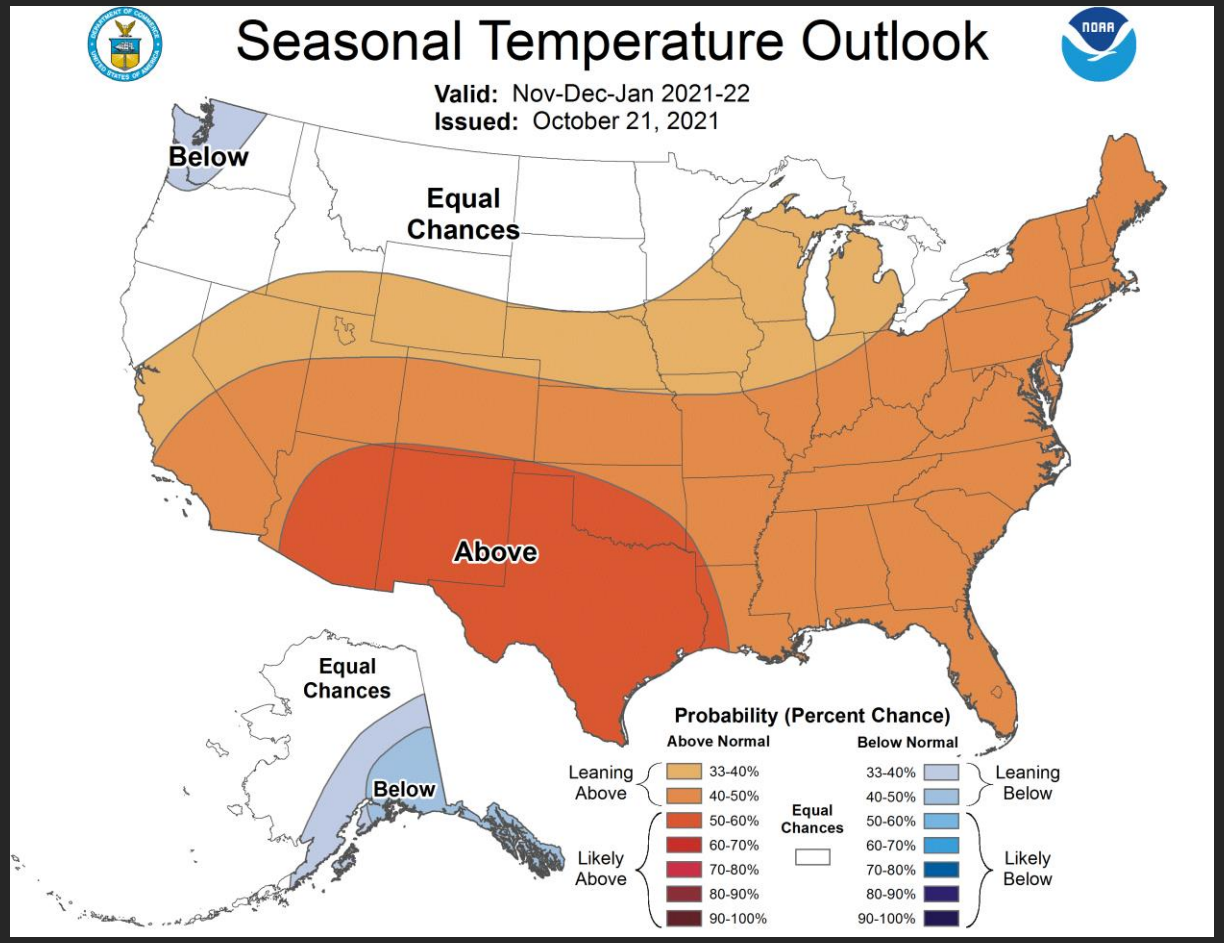
Precipitation Probability



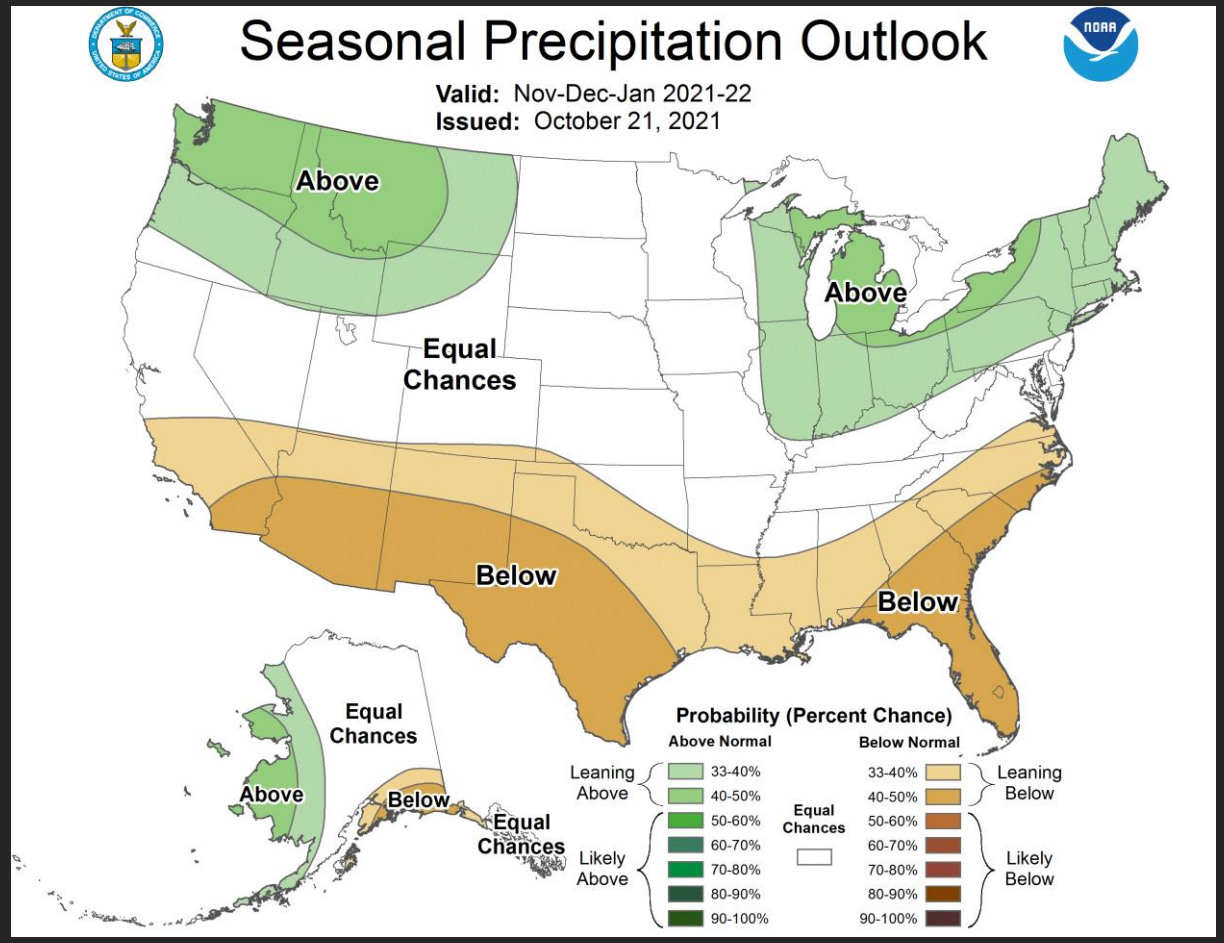
https://www.cpc.ncep.noaa.gov/products/predictions/WK34/

Seasonal Outlook: November-January

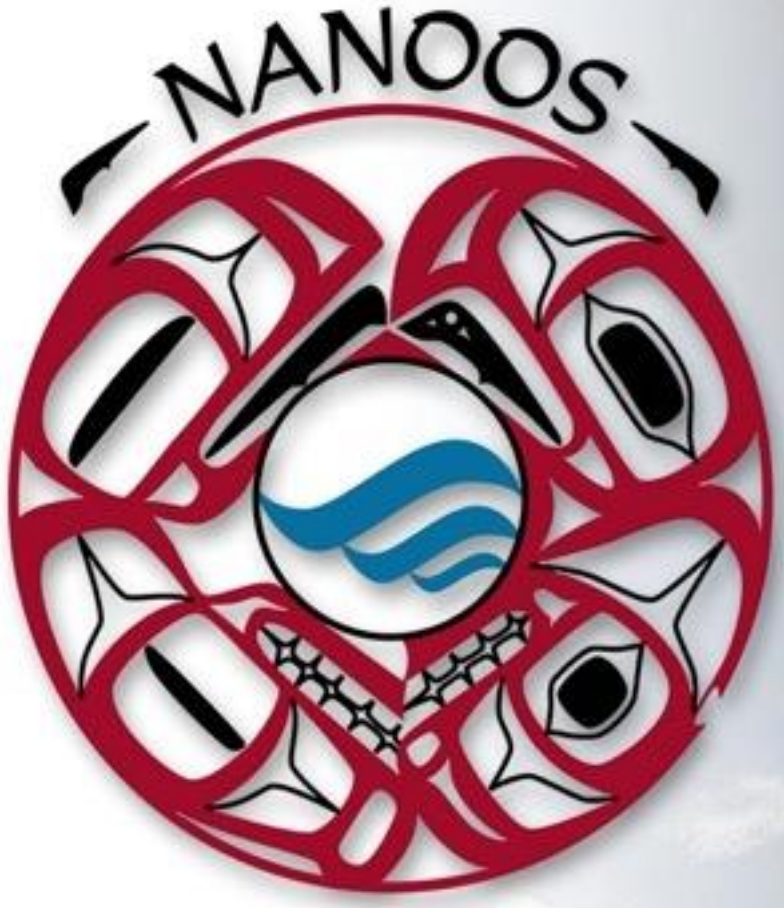
Temperature Probability



Precipitation Probability



Northwest Association of Networked Ocean Observing Systems



NOAA West Watch Update 26 October 2021: Washington / Oregon Observations

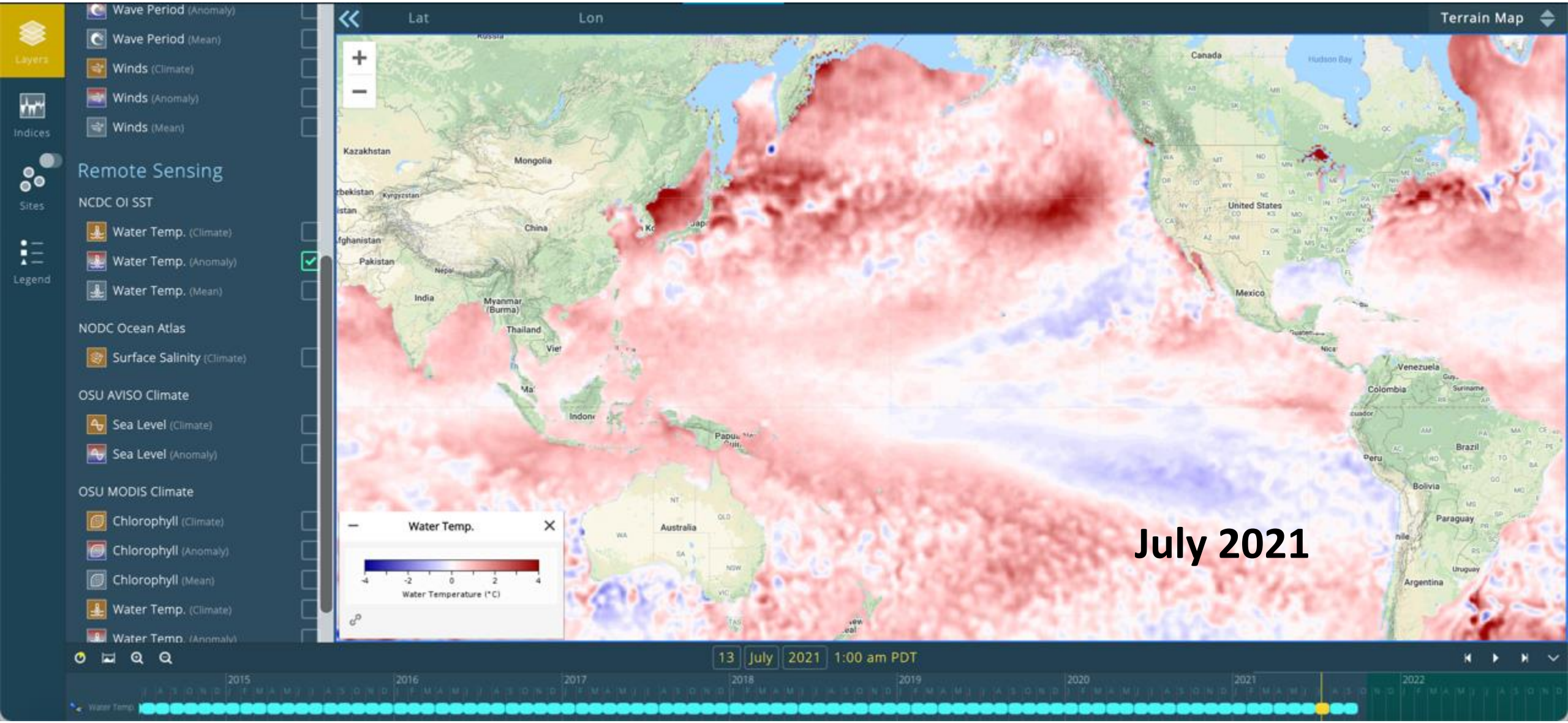
Jan Newton, NANOOS Executive Director
Roxanne Carini, NANOOS Associate
Anna Boyar, NANOOS Staff

IOOS Integrated Ocean Observing System

www.nanoos.org

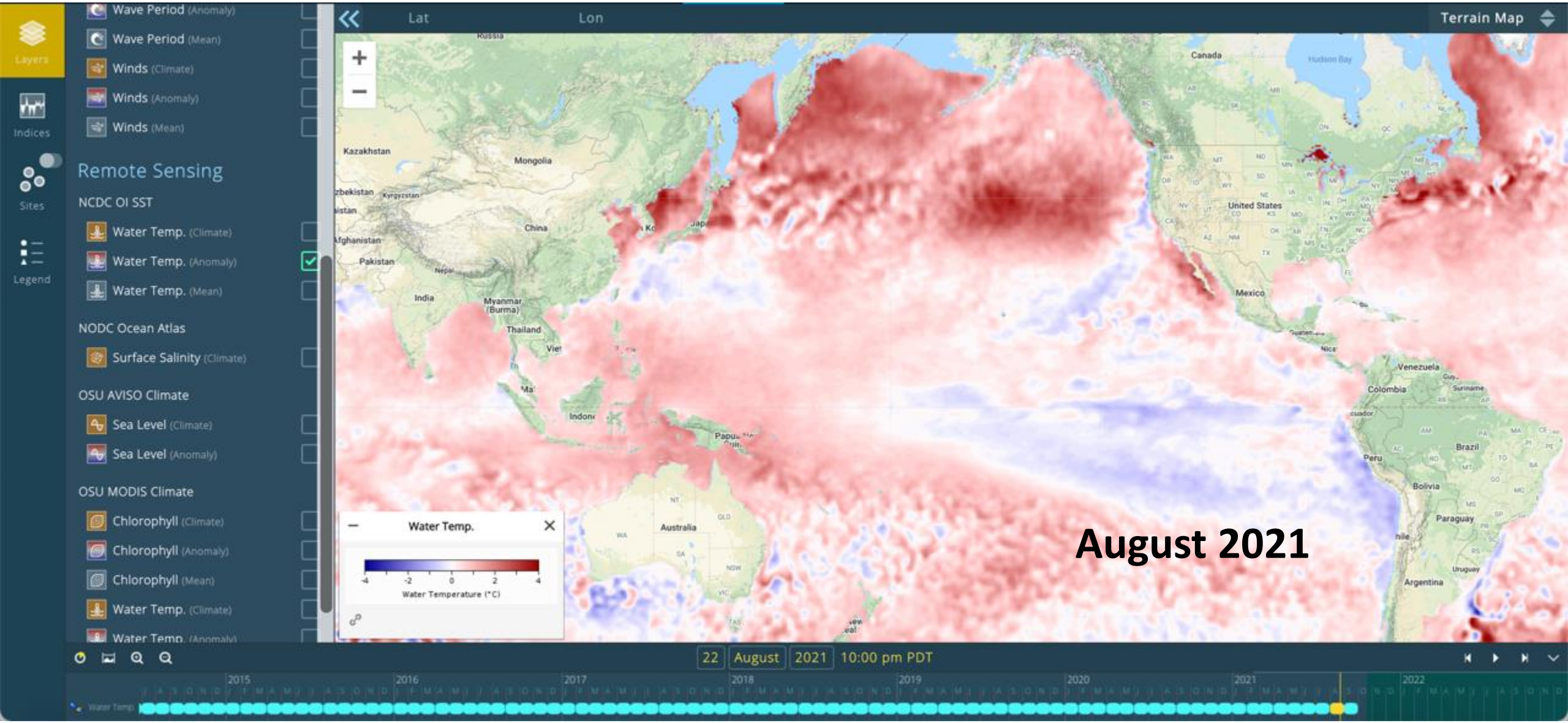
NANOOS: www.nanoos.org Climatology app

Sea Surface Temperature Anomaly
NCEI Optimum Interpolation SST



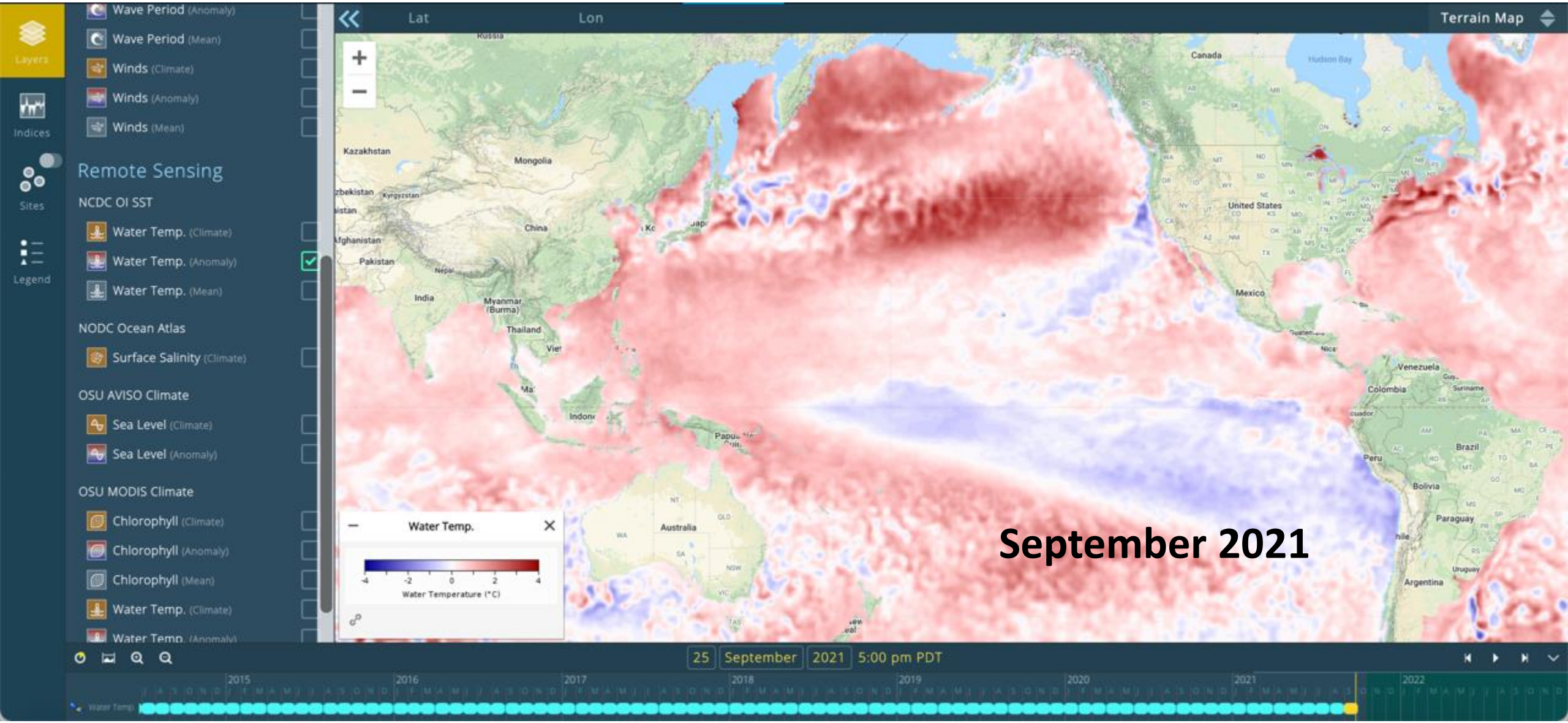
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Sea Surface Temperature Anomaly
NCEI Optimum Interpolation SST



NANOOS: www.nanoos.org Climatology app

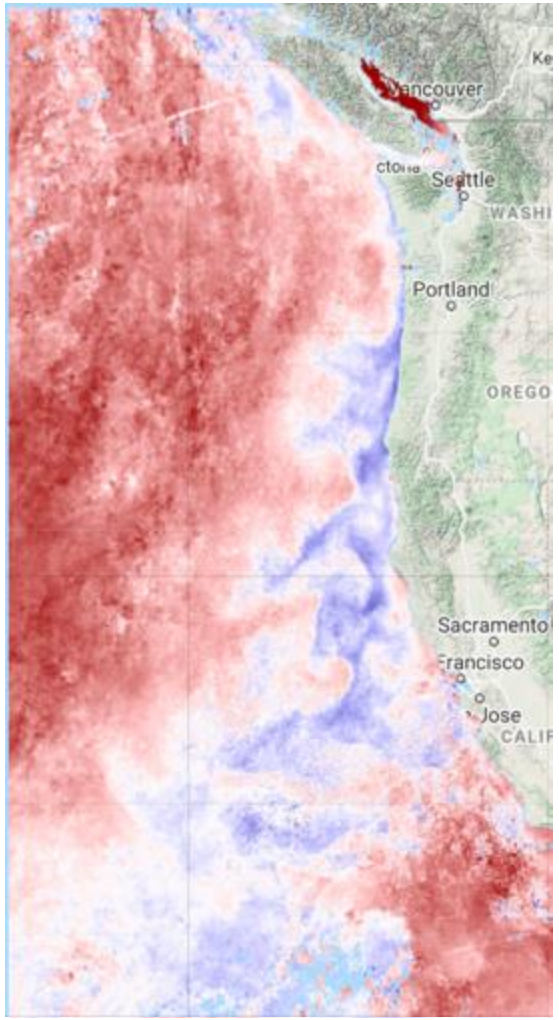
Sea Surface Temperature Anomaly
NCEI Optimum Interpolation SST



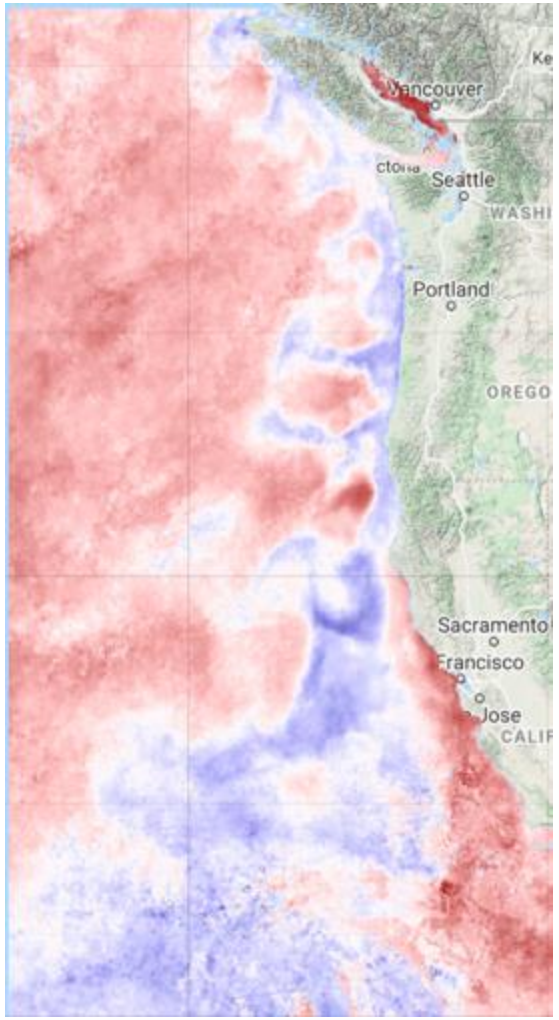
NANOOS: www.nanoos.org Climatology app

Sea Surface Temperature Anomaly
OSU Modis

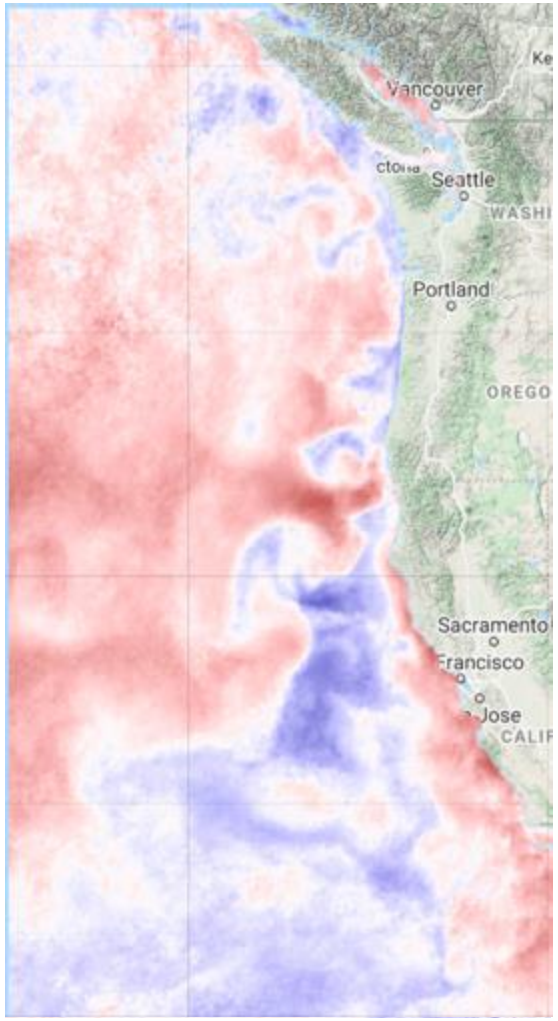
July 2021



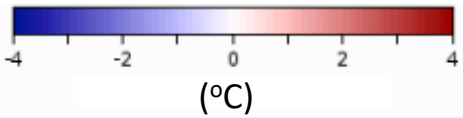
August 2021



September 2021

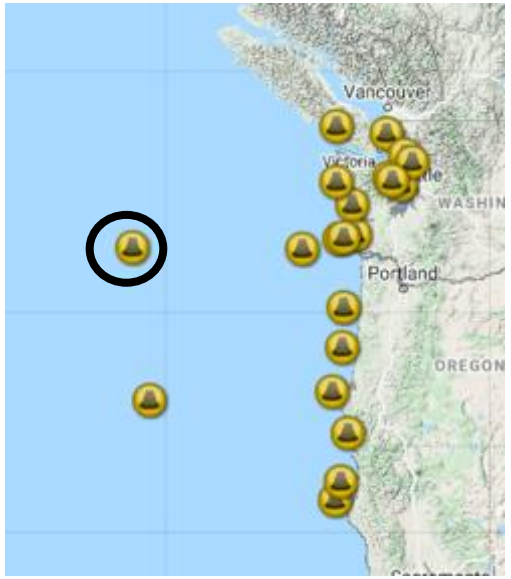


Water Temperature Anomaly

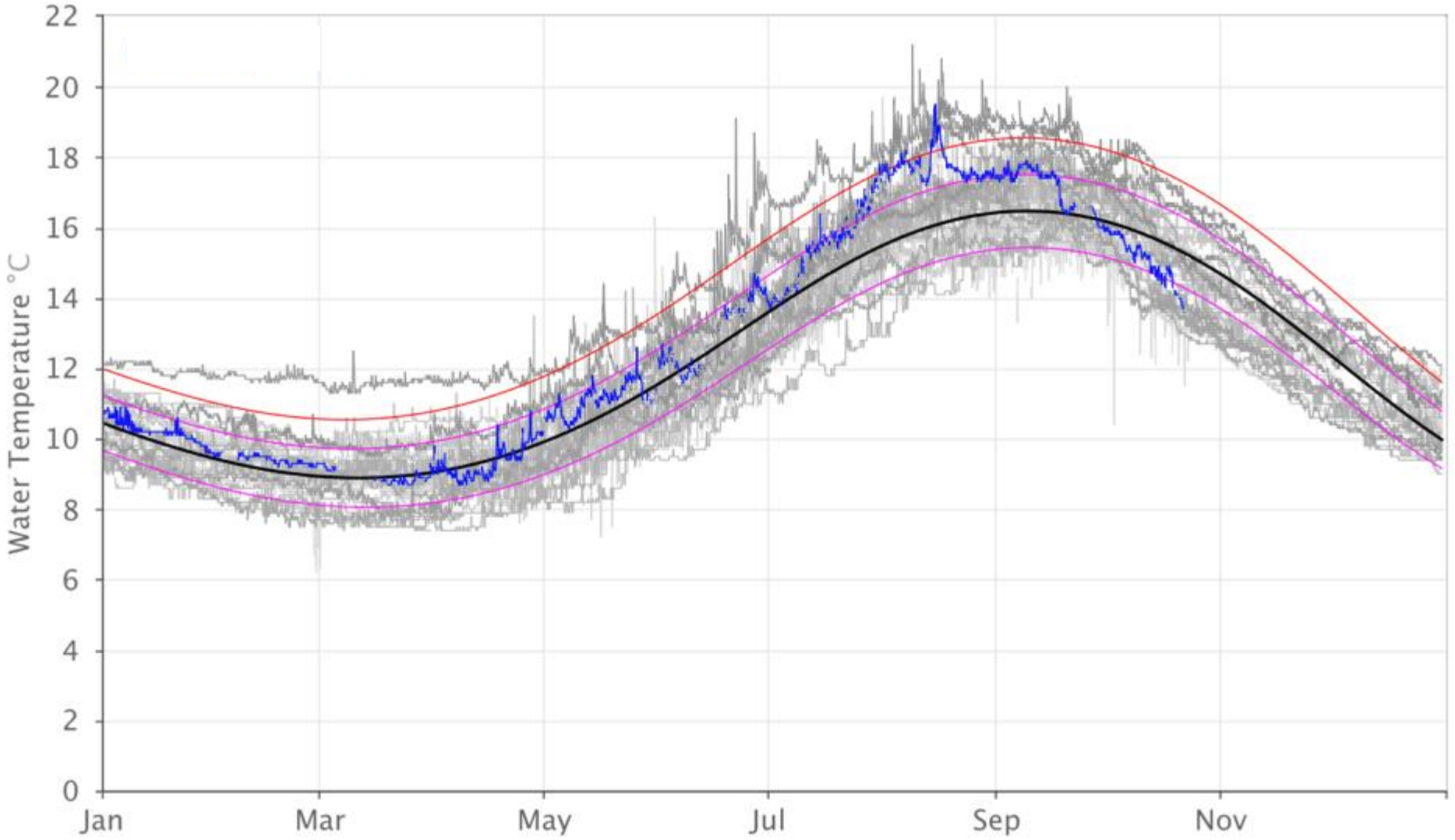


NANOOS: www.nanoos.org Climatology app

Sea Surface Temperature



NDBC Washington

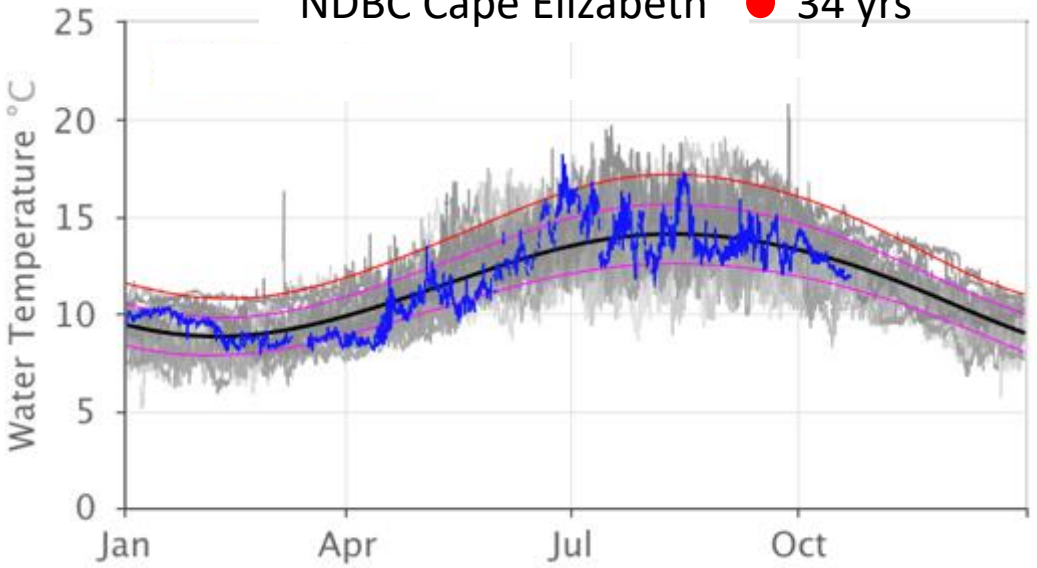


IOOS

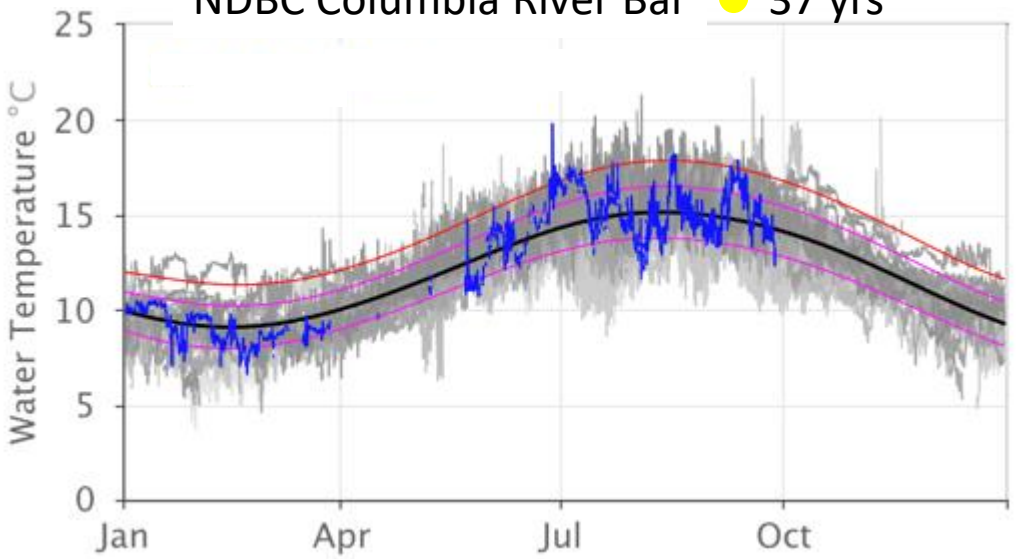
NANOOS: www.nanoos.org Climatology app

Sea Surface Temperature

NDBC Cape Elizabeth ● 34 yrs

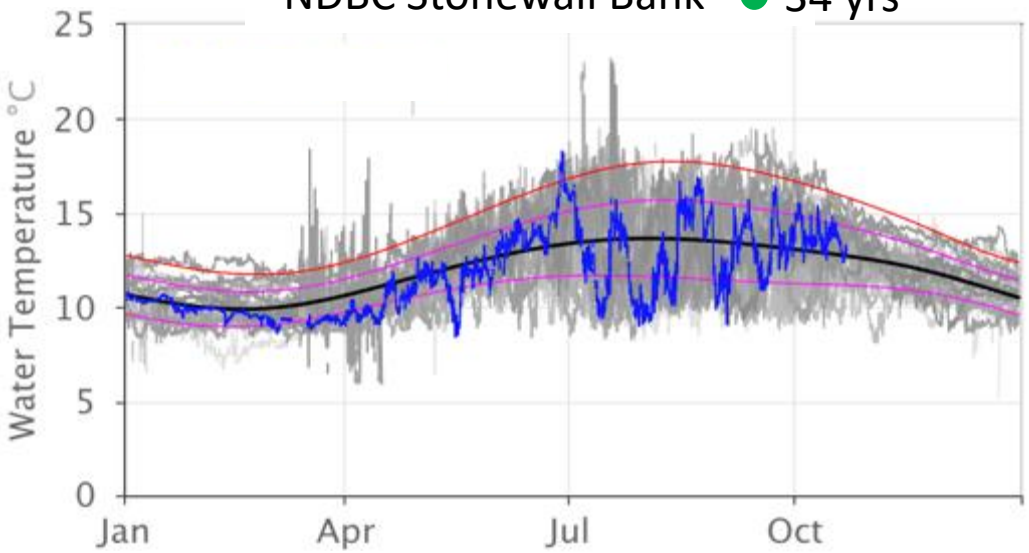


NDBC Columbia River Bar ● 37 yrs

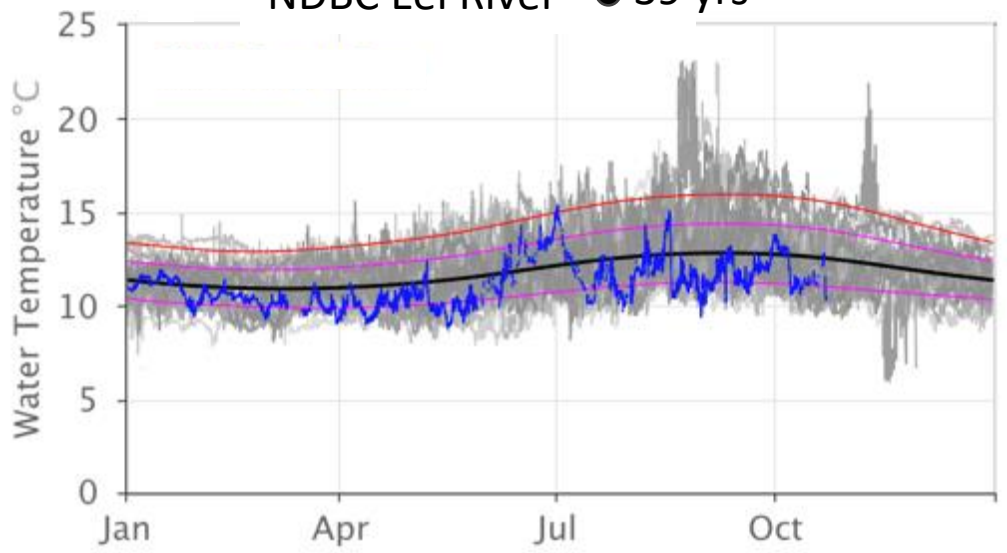


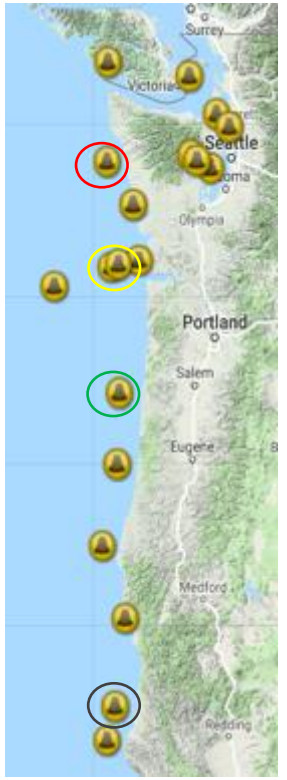
Seasonal Cycle
-1 STD
+1 STD
+2 STD
2021

NDBC Stonewall Bank ● 34 yrs



NDBC Eel River ● 39 yrs





IOOS

To summarize, right now we have:*

**20 July 2021*

- Heat
- Hypoxia
- But also, real-time data with which to visualize and track these conditions, allowing informed responses.

www.nanoos.org

IOOS Integrated Ocean Observing System

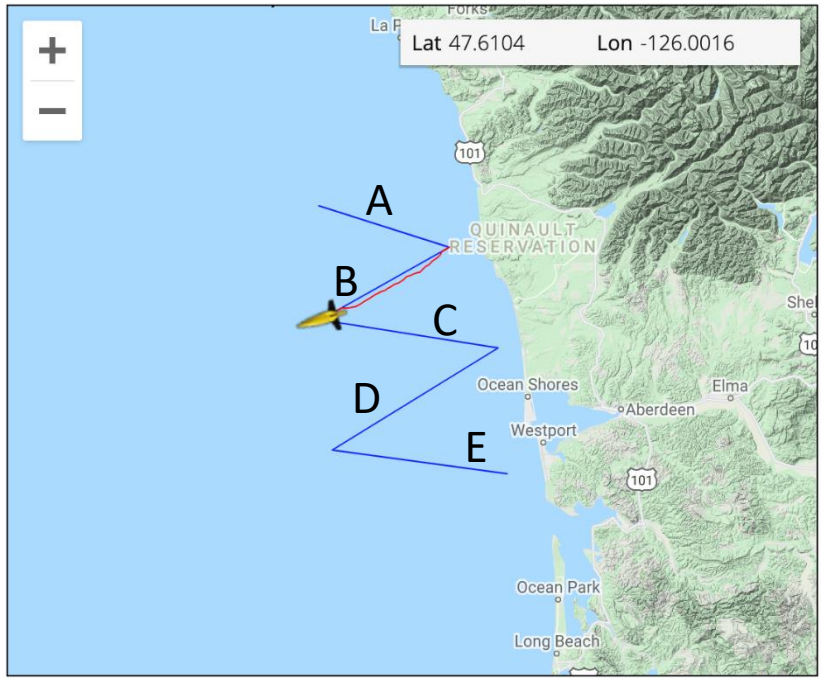
NANOOS

WA Shelf Glider

Jack Barth, Anatoli Erofeev, & Stephen Pierce, OSU
Charles Seaton, CRITFC
Joe Schumacker, QIN

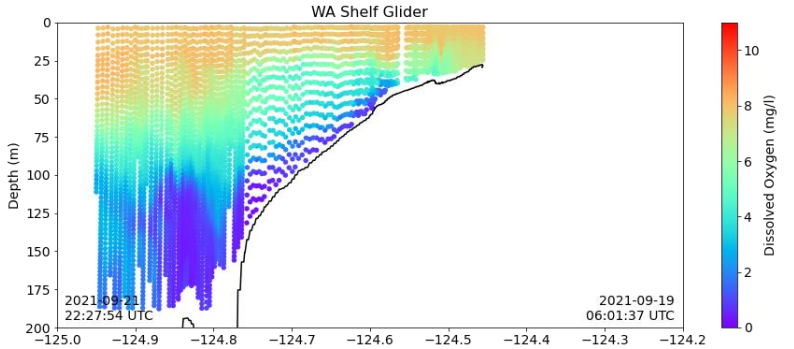
10 days to transit B-C-D-E

19 Sept – 29 Sept

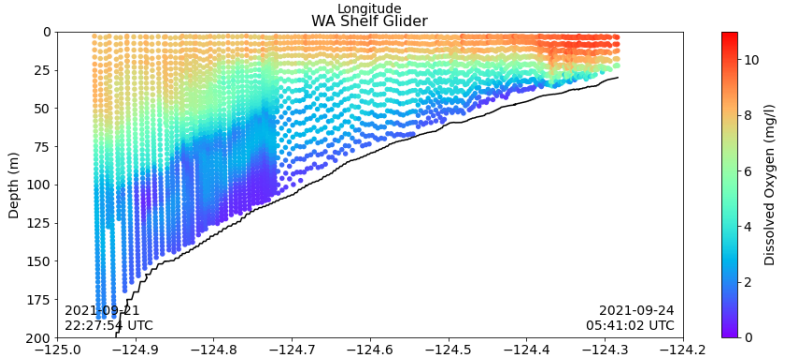


"This mission was concluded just as early fall storms swept through the area helping to bring an end to the "hypoxia season." The glider was successfully recovered during 10-foot seas off Westport, WA.
We will conduct maps next year, 2022, in April, July and September."

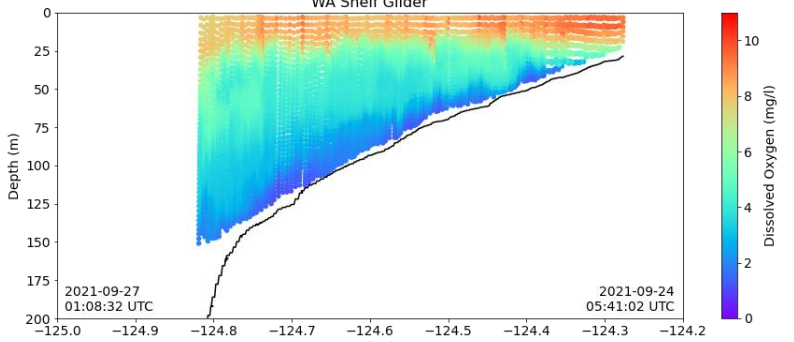
B



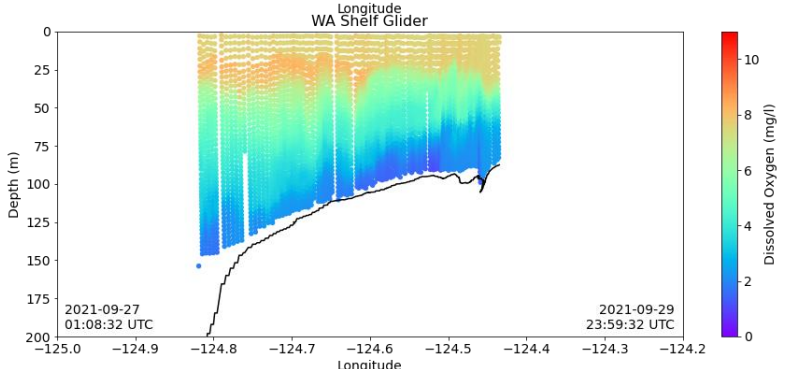
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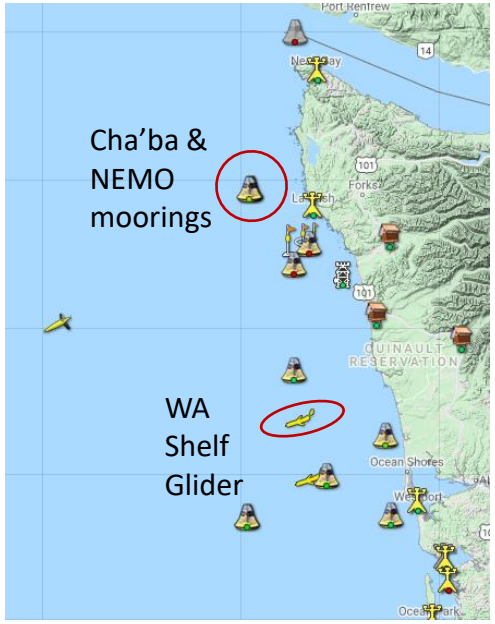


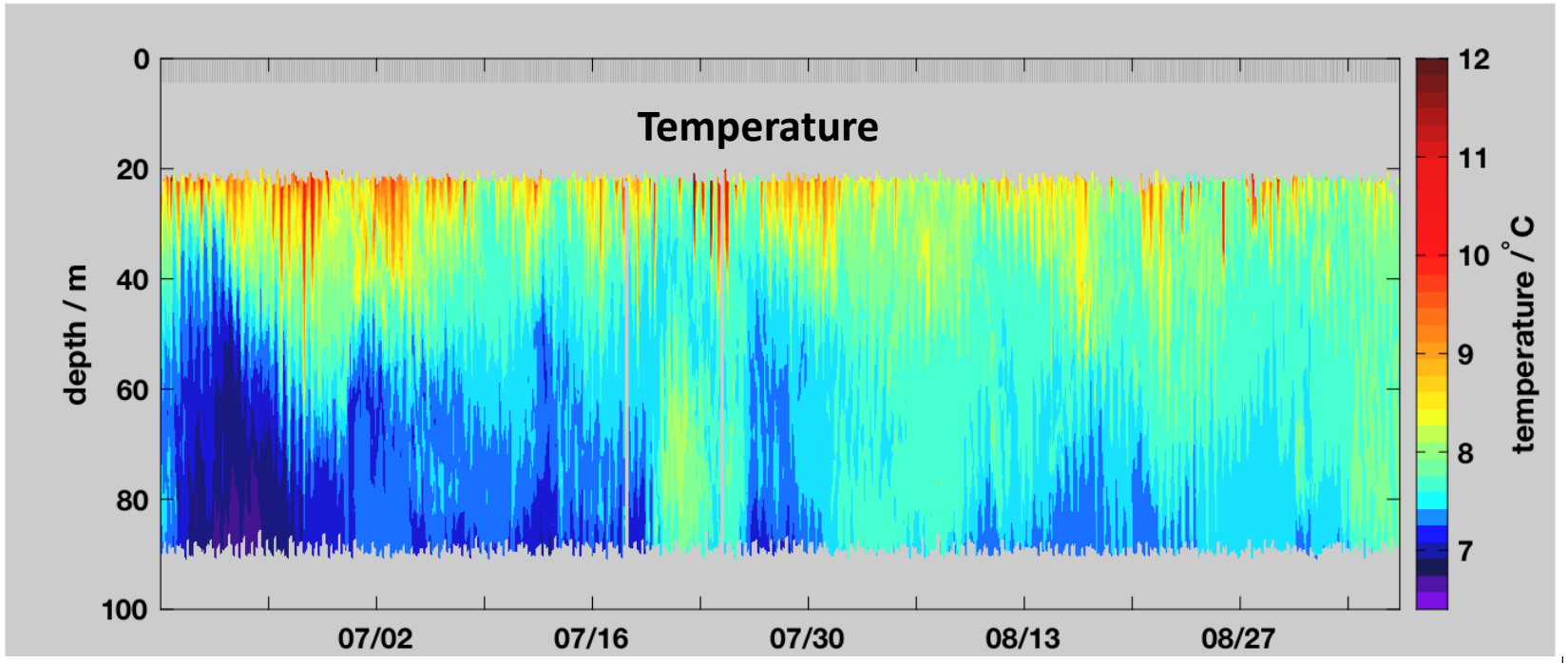
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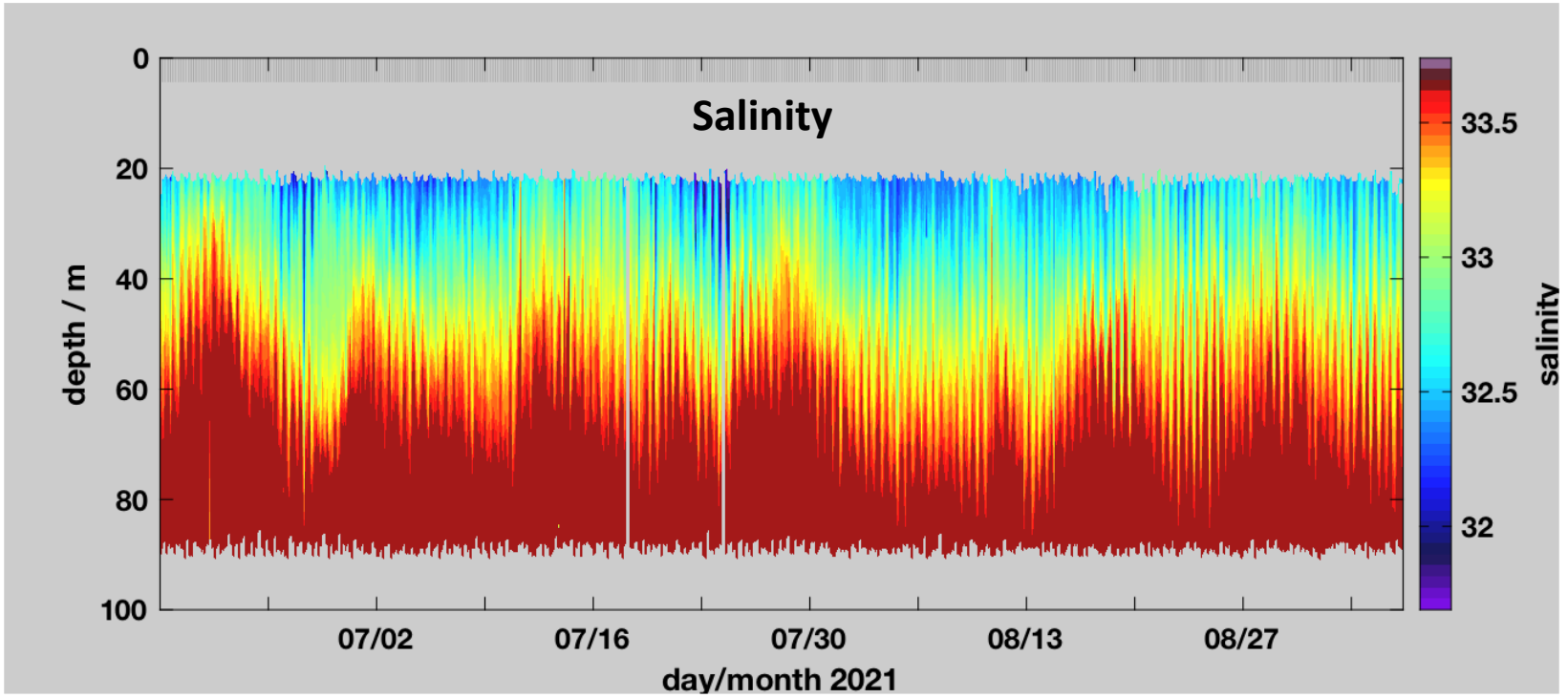


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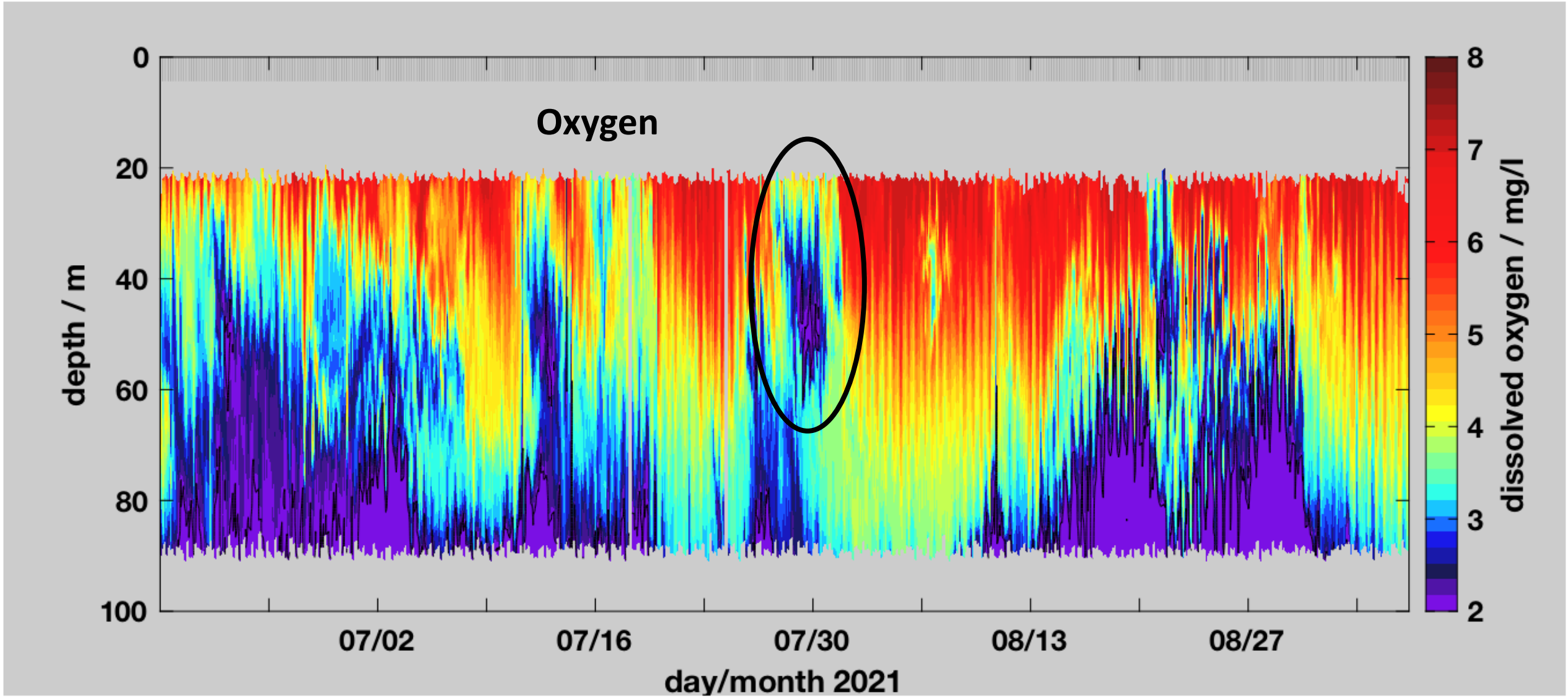


NEMO sub-surface profiling mooring

Manalang, Mickett, UW-APL

"Internal waves off the WA shelf"

Alford et al., 2012 Oceanography


Oxygen
depth / m
0
20
40
60
80
100
07/02
07/16
07/30
08/13
08/27
day/month 2021
dissolved oxygen / mg/l
8
7
6
5
4
3
2

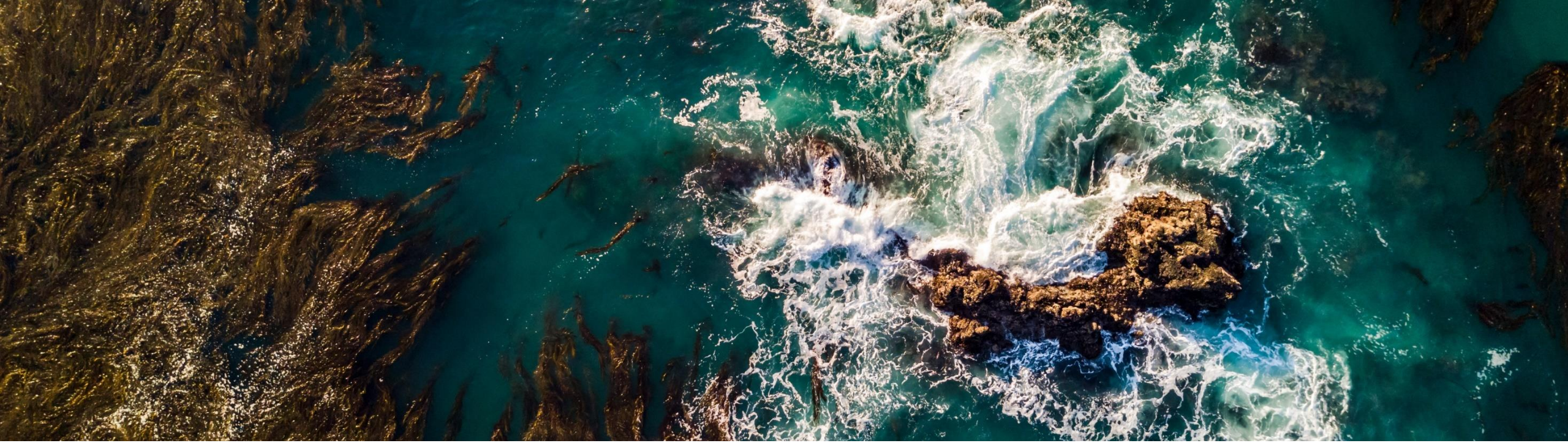
To summarize:

- Heat and hypoxia abated
- Incredibly complex ocean dynamics
- Observing data is allowing insights into the highly variable conditions

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IOOS
Integrated Ocean
Observing System

NANOOS



The Central and Northern California Ocean Observing System:

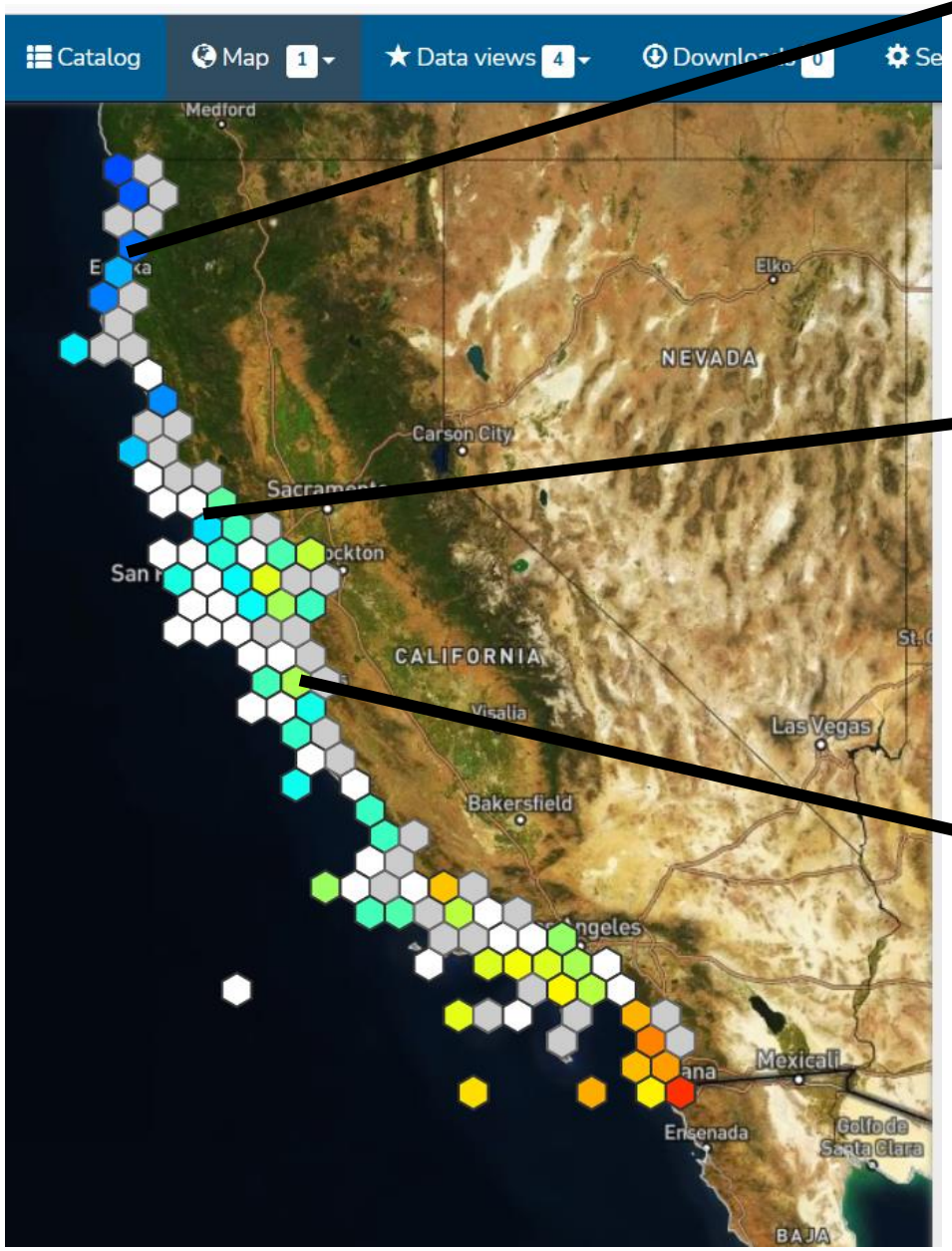
West Watch Update

IOOS Integrated Ocean Observing System

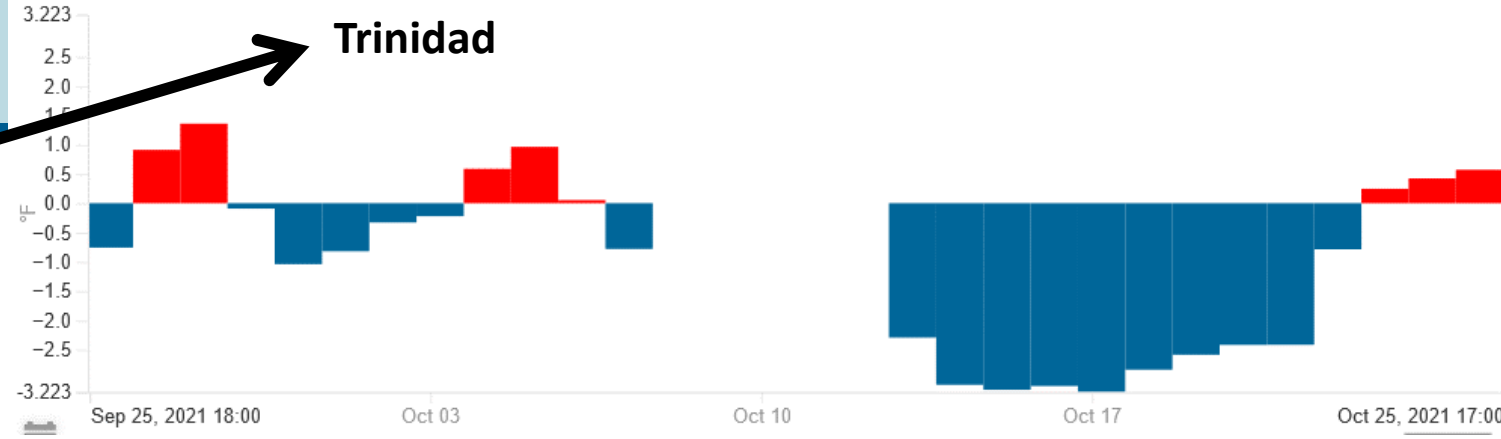
CENTRAL & NORTHERN CALIFORNIA OCEAN OBSERVING SYSTEM

CENTRAL & NORTHERN CALIFORNIA OCEAN OBSERVING SYSTEM

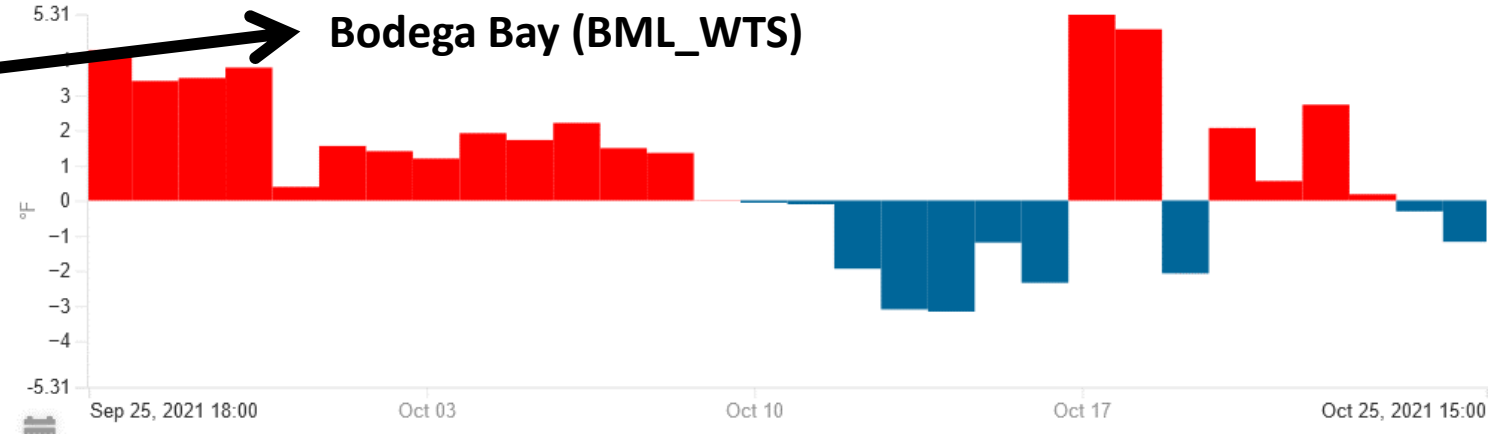
Shore Sta.



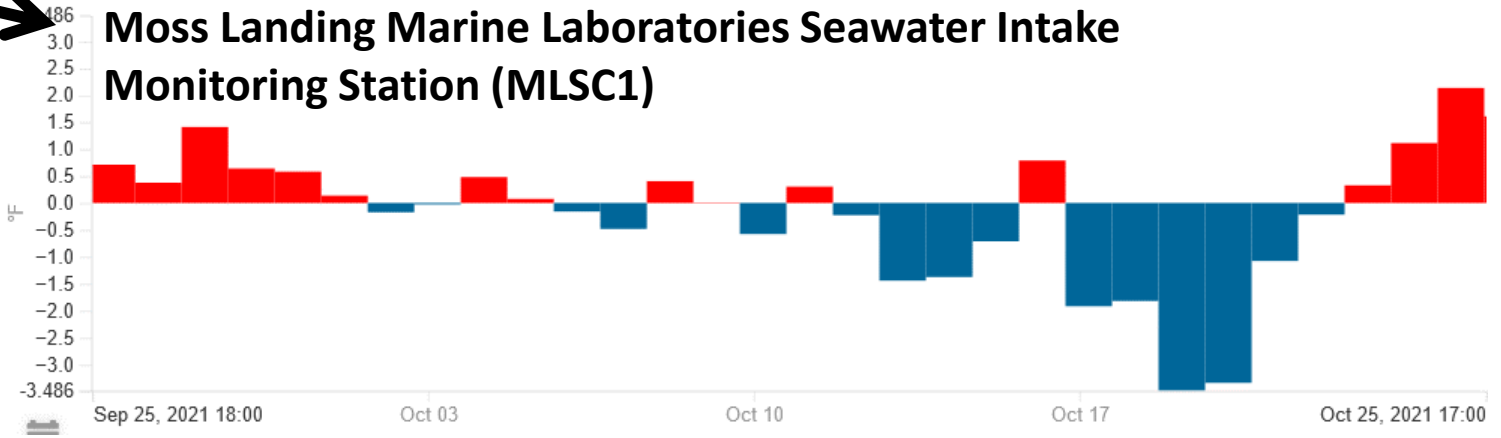
Trinidad



Bodega Bay (BML_WTS)

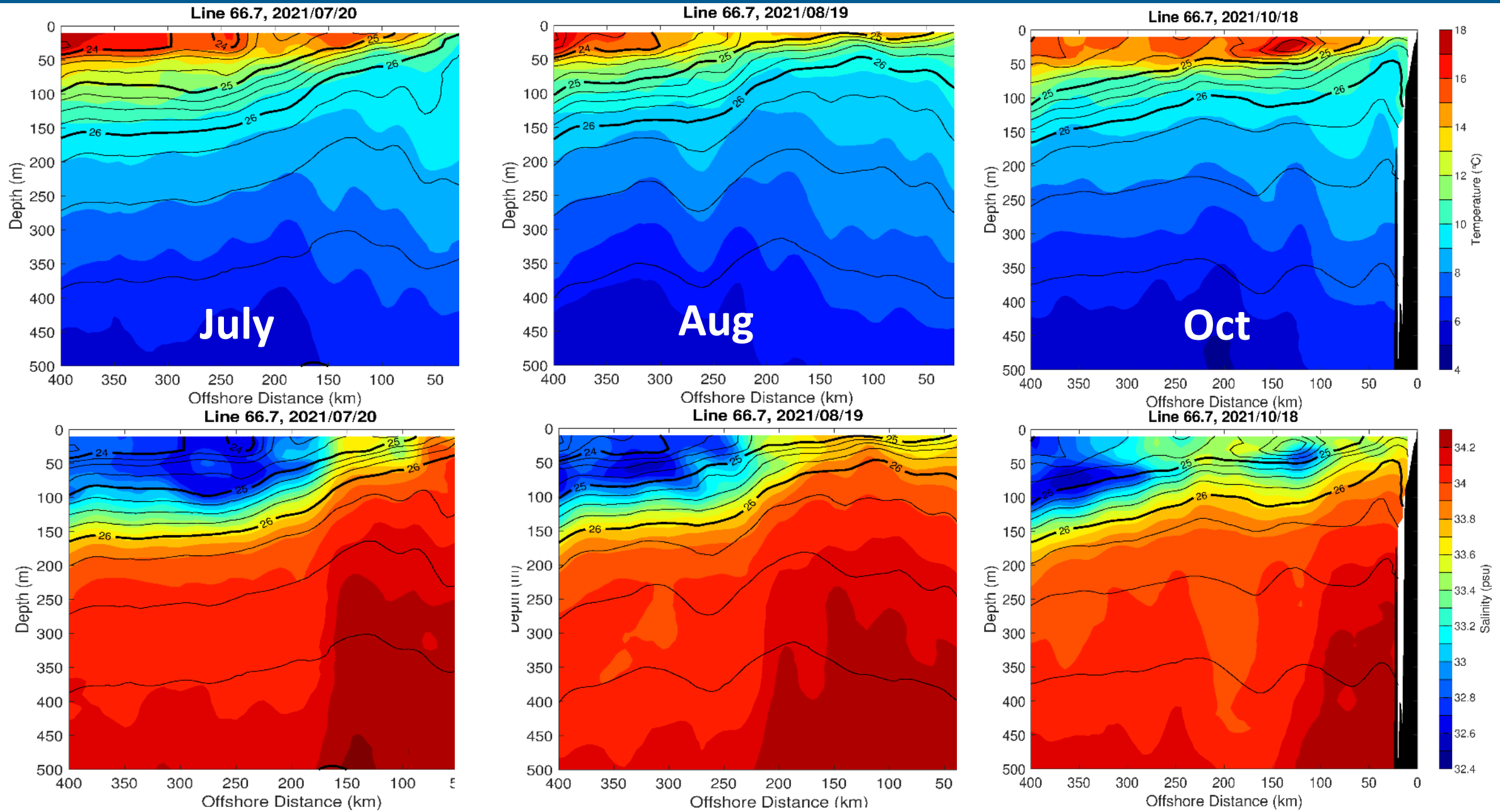


Moss Landing Marine Laboratories Seawater Intake Monitoring Station (MLSC1)



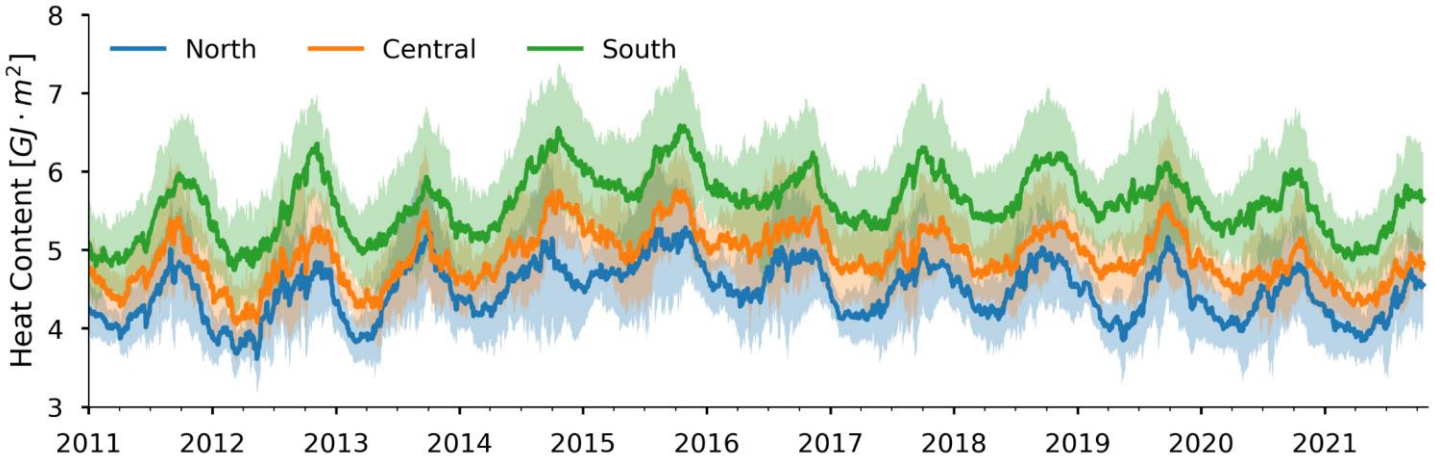
CENTRAL & NORTHERN CALIFORNIA OCEAN OBSERVING SYSTEM

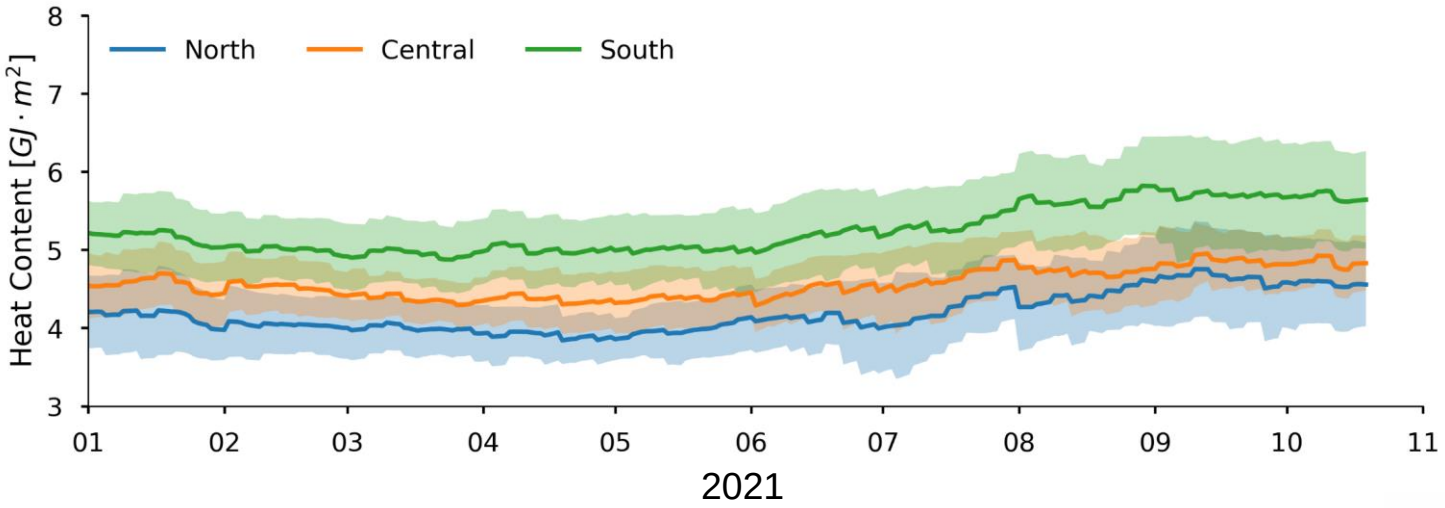
Gliders – Monterey Bay

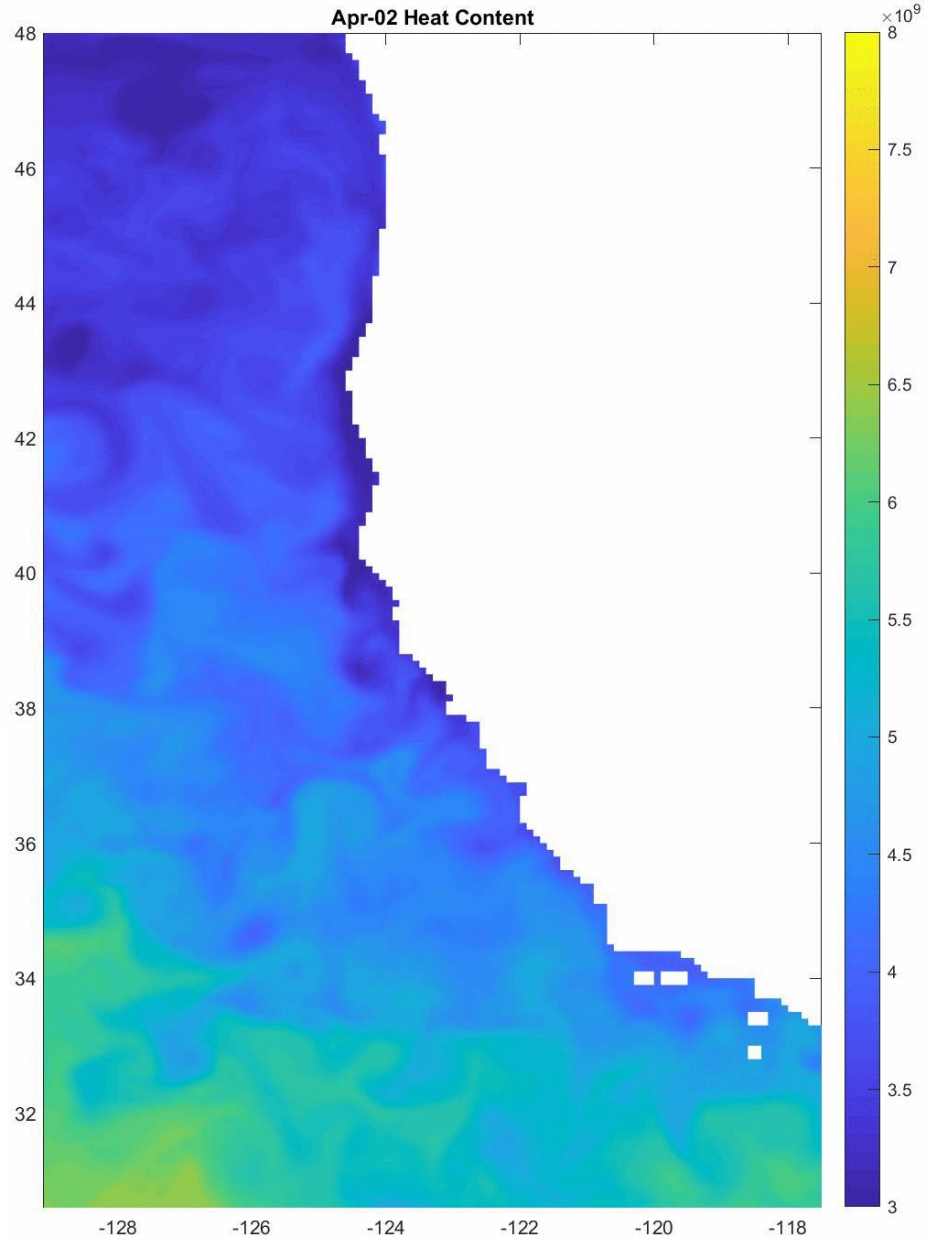


CENTRAL & NORTHERN CALIFORNIA OCEAN OBSERVING SYSTEM

Heat Content

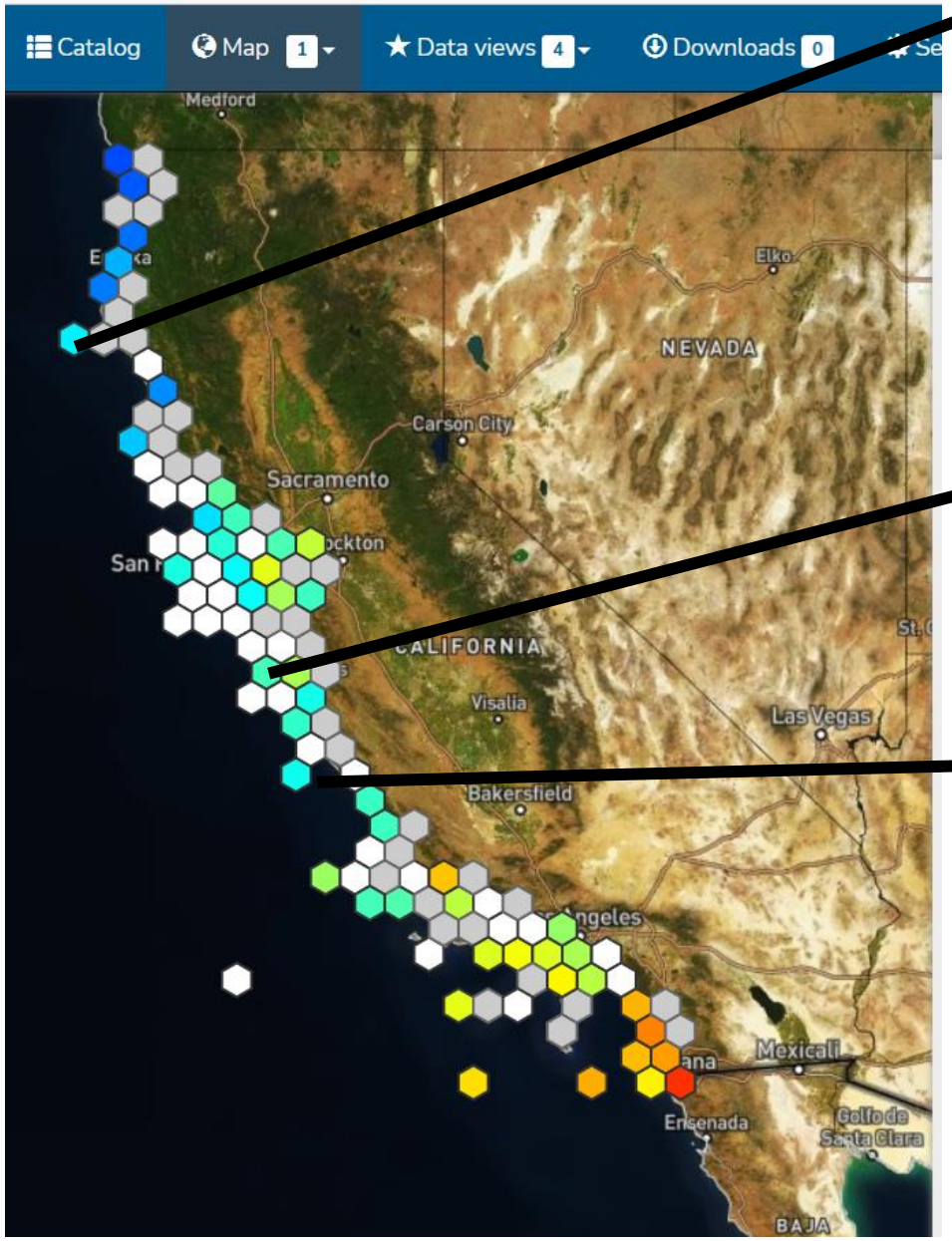


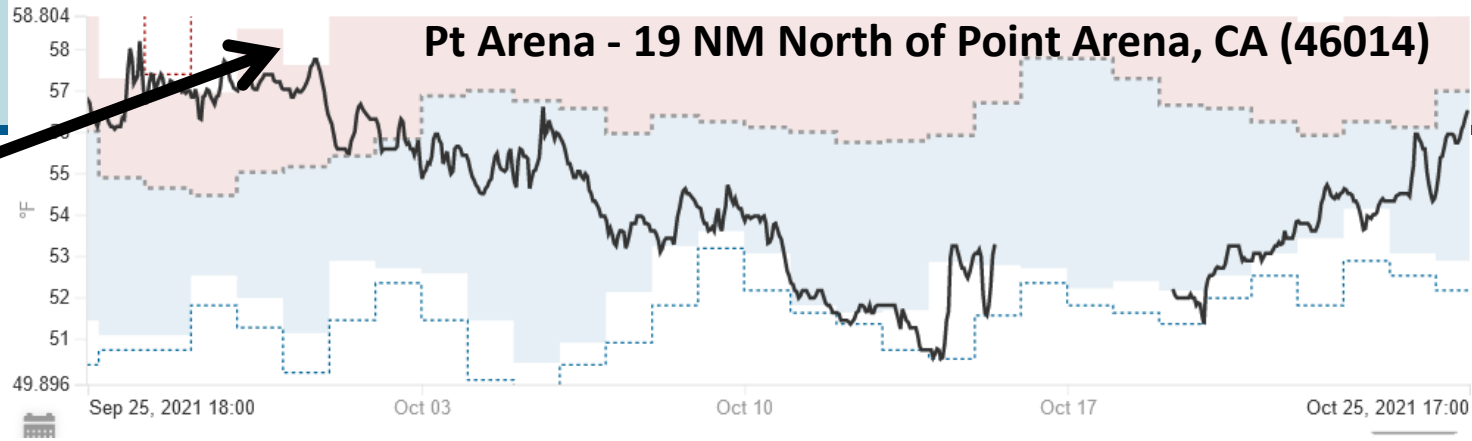


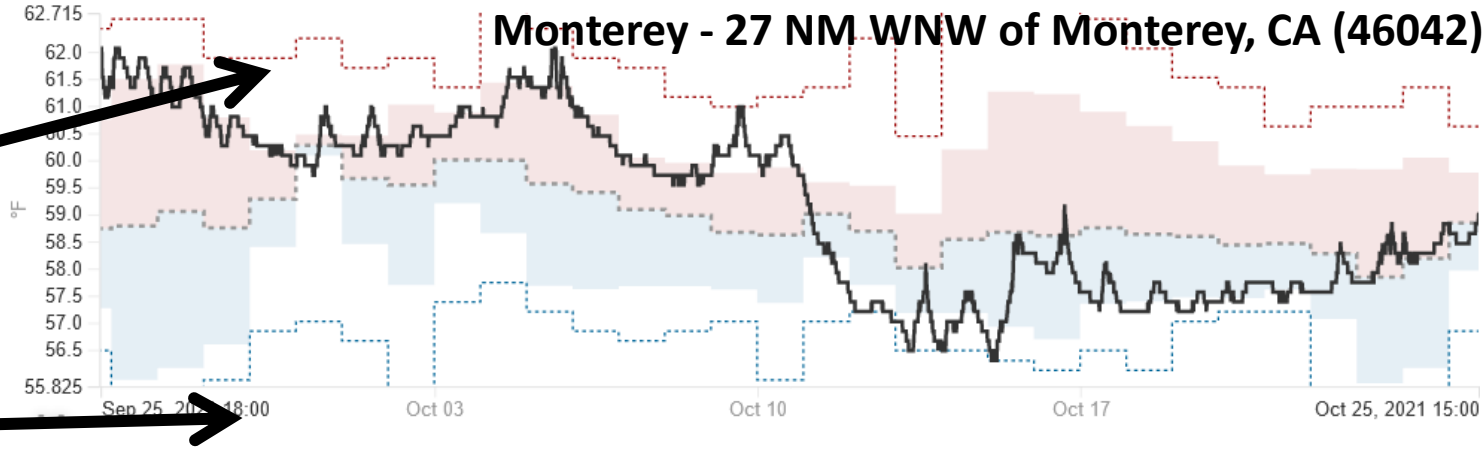


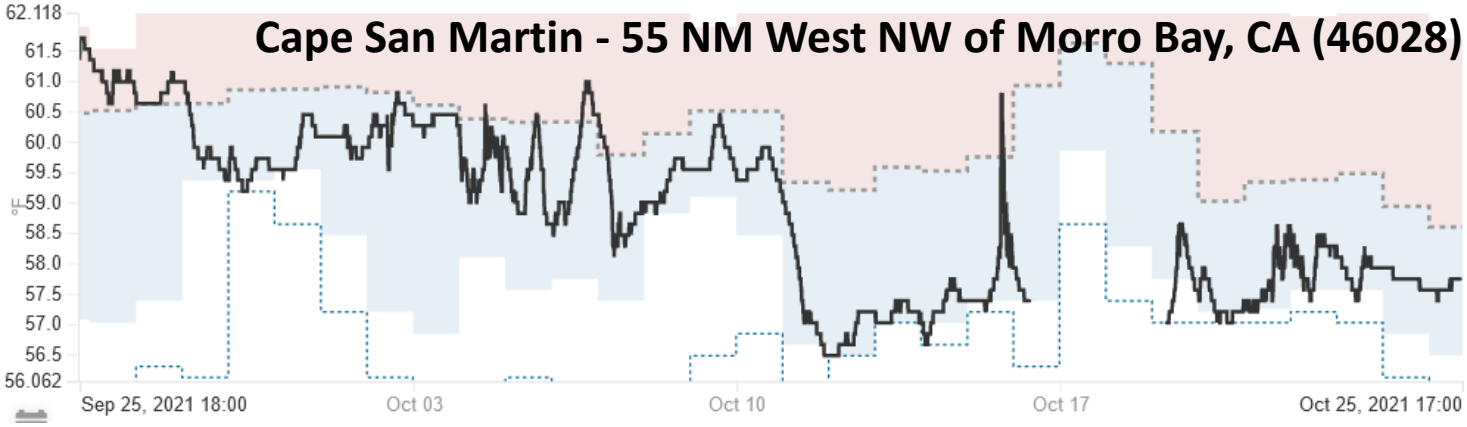
CENTRAL & NORTHERN CALIFORNIA OCEAN OBSERVING SYSTEM

NDBC



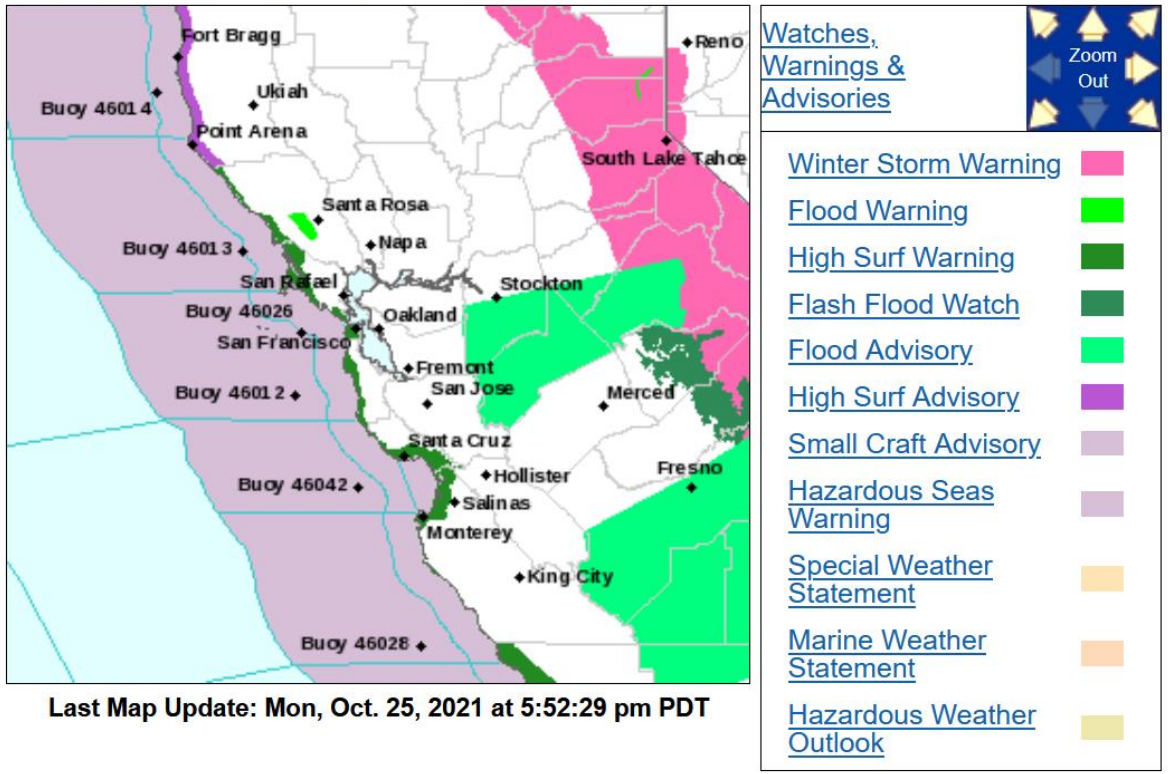




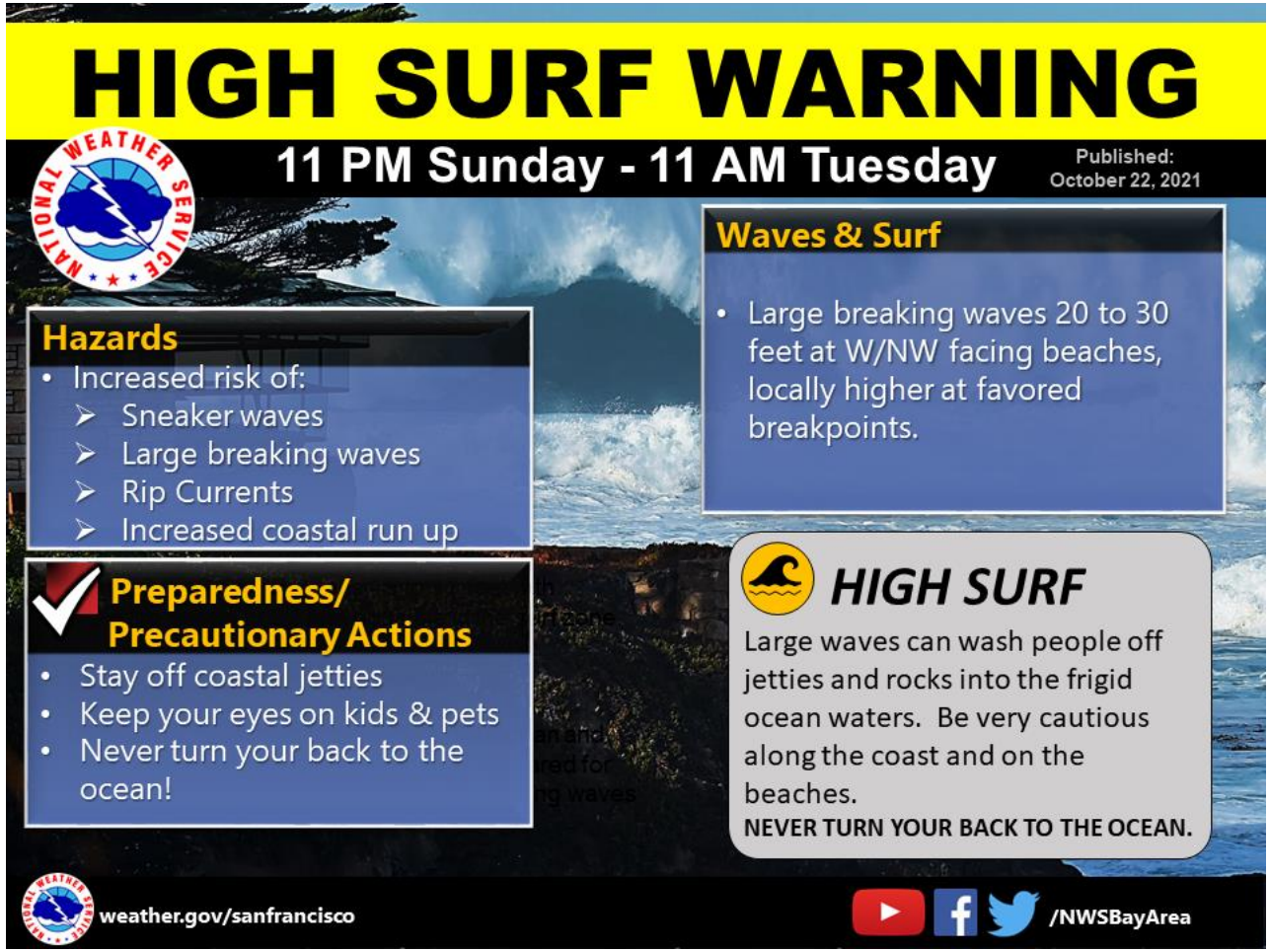


CENTRAL & NORTHERN CALIFORNIA OCEAN OBSERVING SYSTEM

Atmospheric River/Bomb Cyclone



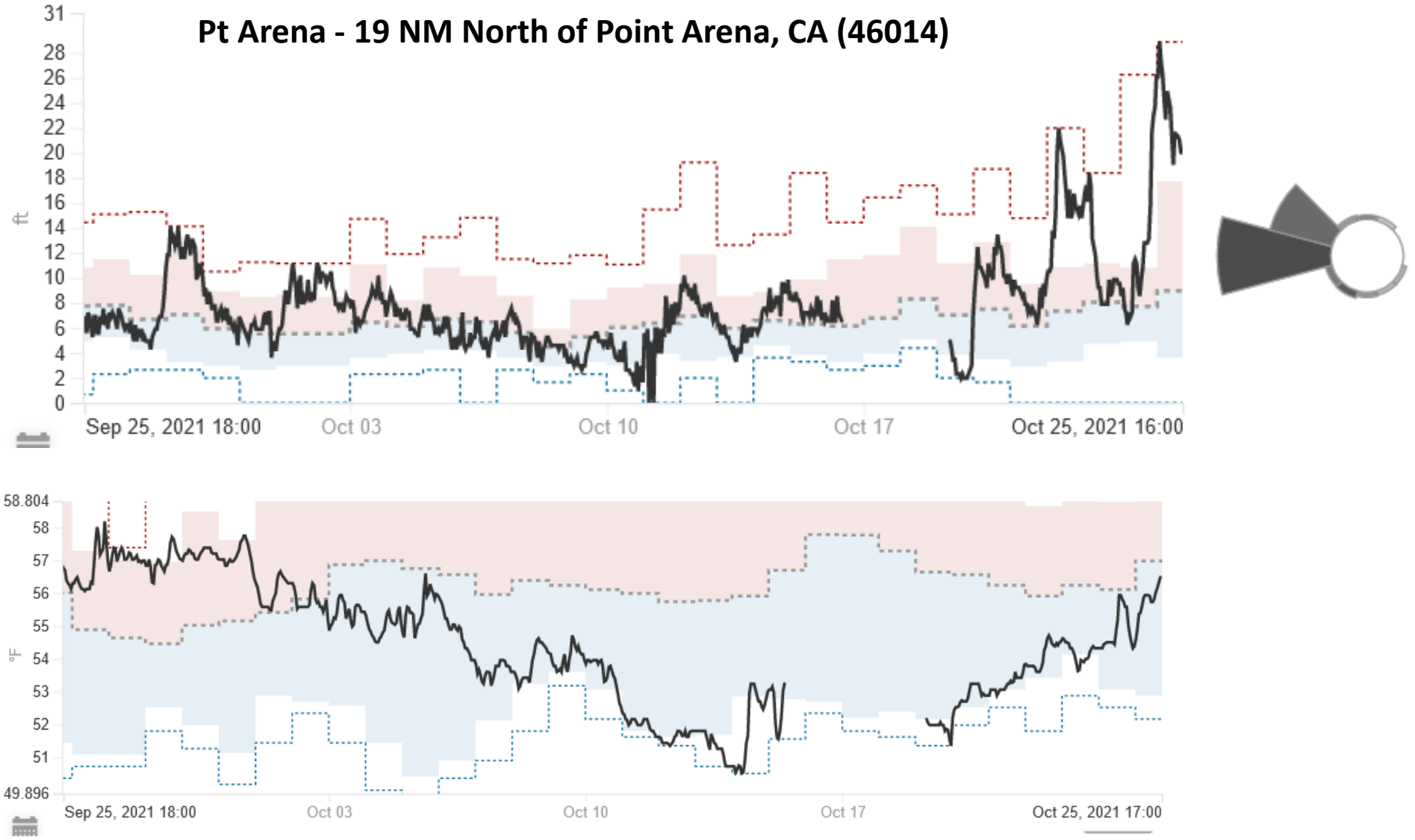
Last Map Update: Mon, Oct. 25, 2021 at 5:52:29 pm PDT



https://www.weather.gov/mtr/

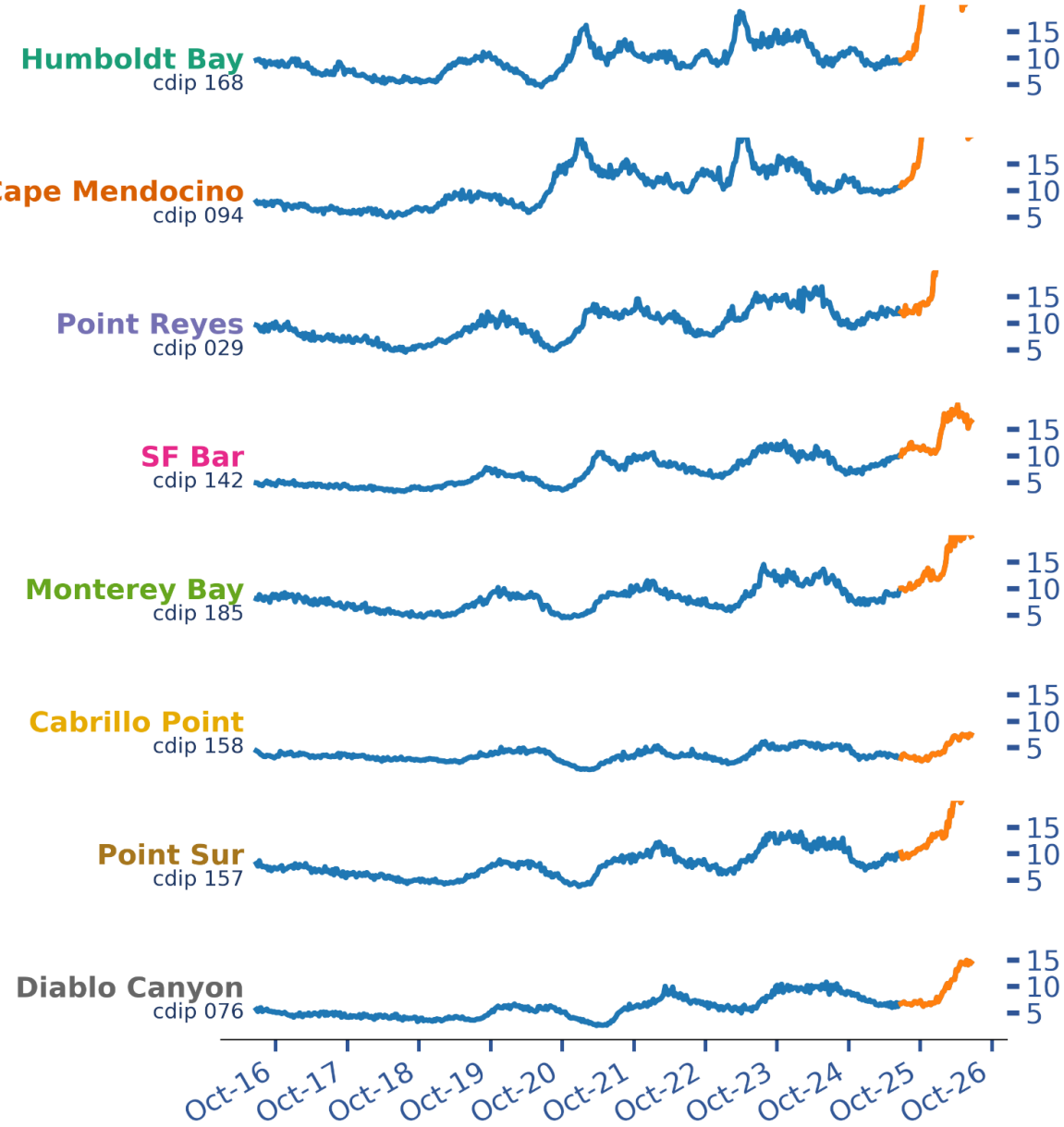
CENTRAL & NORTHERN CALIFORNIA OCEAN OBSERVING SYSTEM

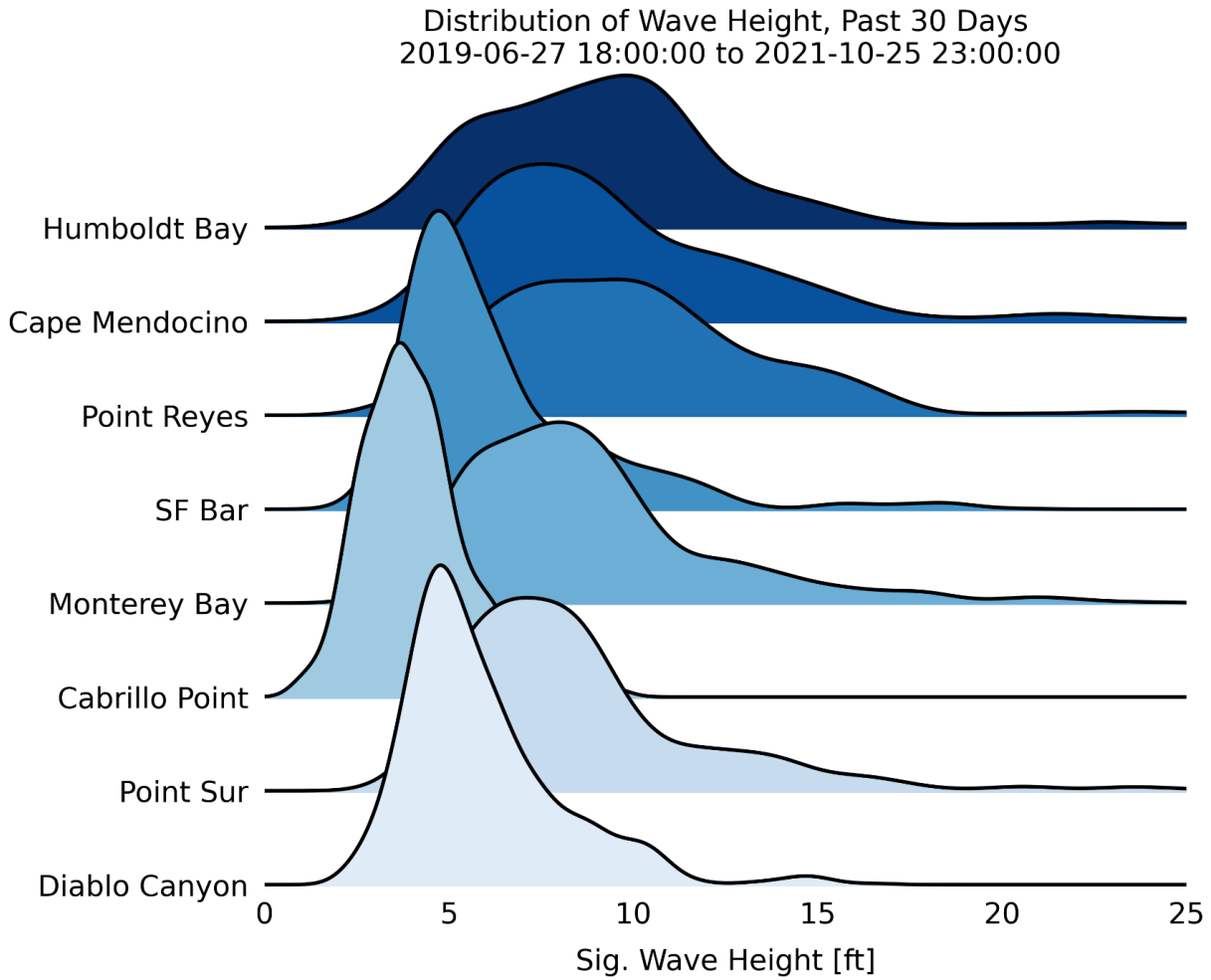
National Data Buoy Center



CENTRAL & NORTHERN CALIFORNIA OCEAN OBSERVING SYSTEM

Waves





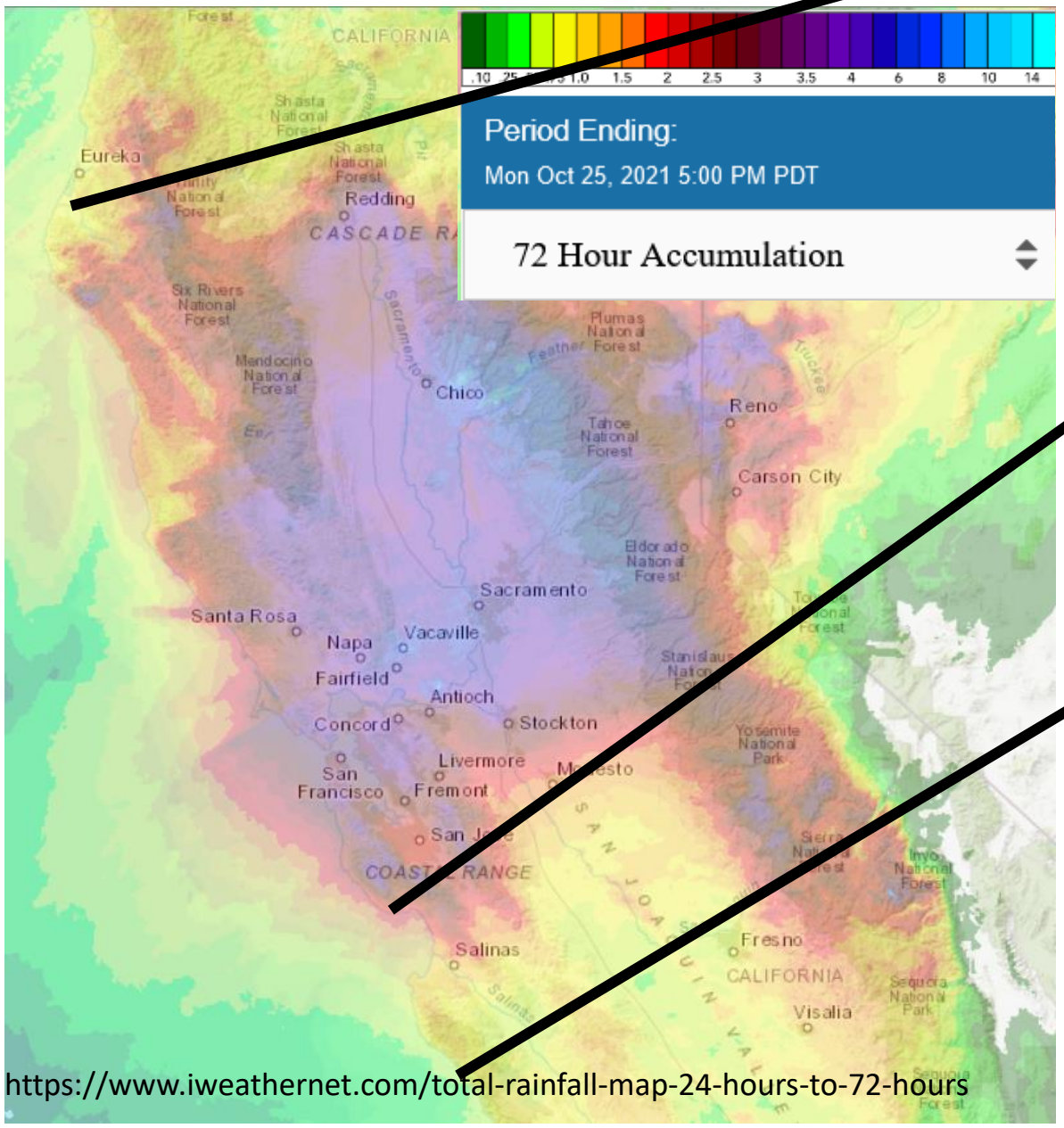
US Army Corps of Engineers®

CDIP

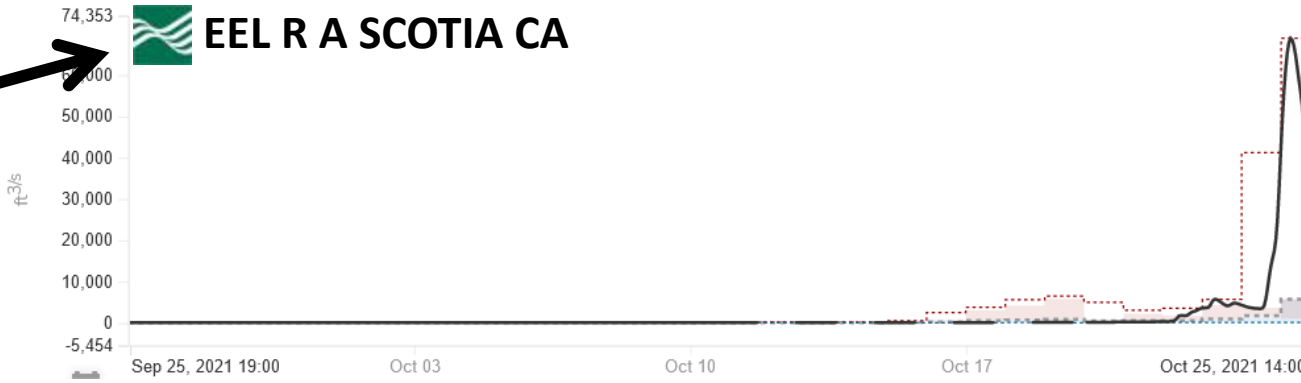
SCRIPPS INSTITUTION OF OCEANOGRAPHY UCSD

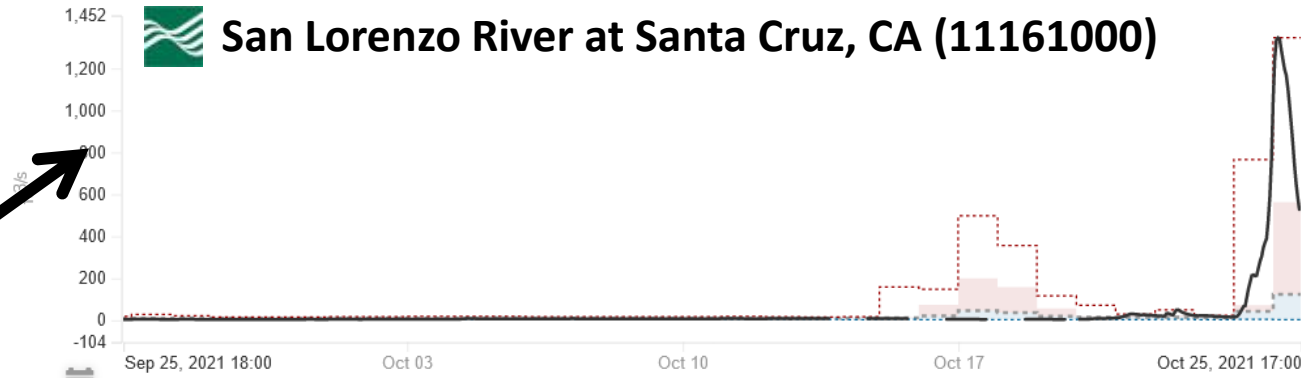
CENTRAL & NORTHERN CALIFORNIA OCEAN OBSERVING SYSTEM

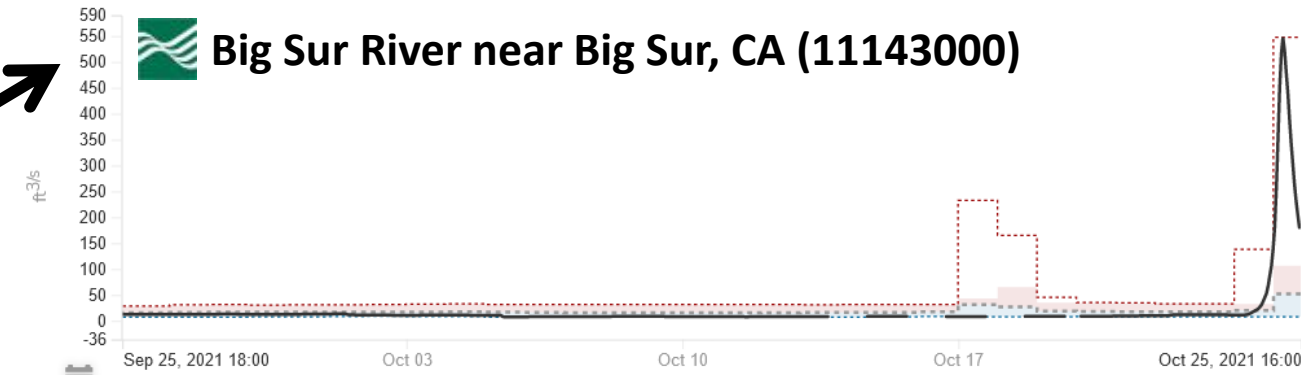
Discharges



https://www.iweathernet.com/total-rainfall-map-24-hours-to-72-hours









SOUTHERN CALIFORNIA
COASTAL OCEAN
OBSERVING SYSTEM


Photo: USCG Petty Officer 3rd Class Alex Gray


Photo: Ringo H.W. Chiu, AP Photo


Photo: USCG Petty Officer 3rd Class Alex Gray

NOAA West Watch Webinar: Southern California

Clarissa Anderson, SCCOOS Executive Director

26-Oct 2021

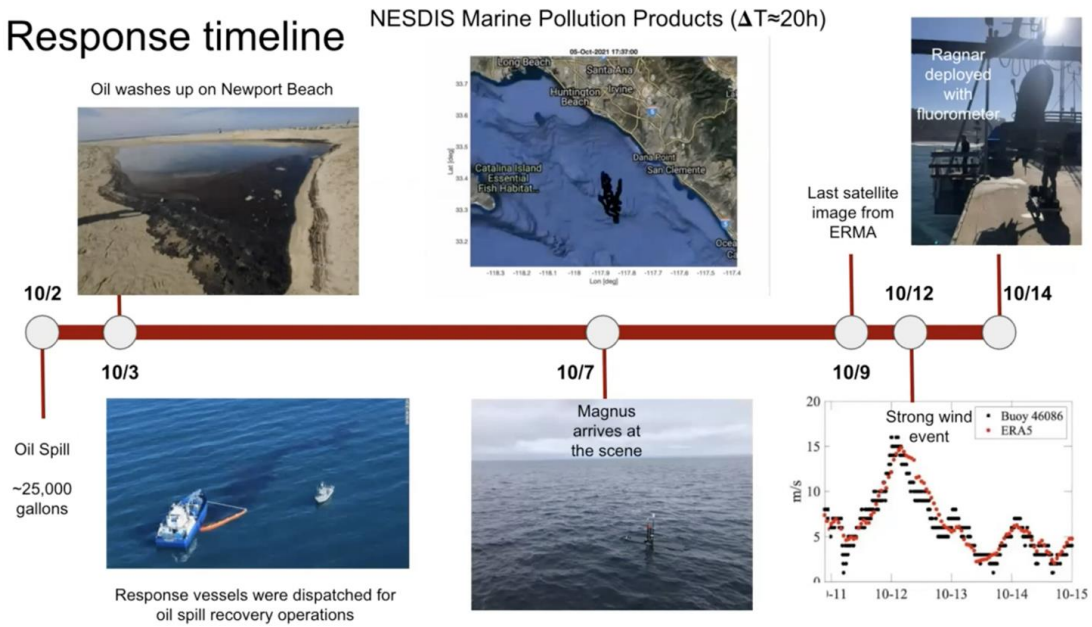
Huntington Beach Oil Spill

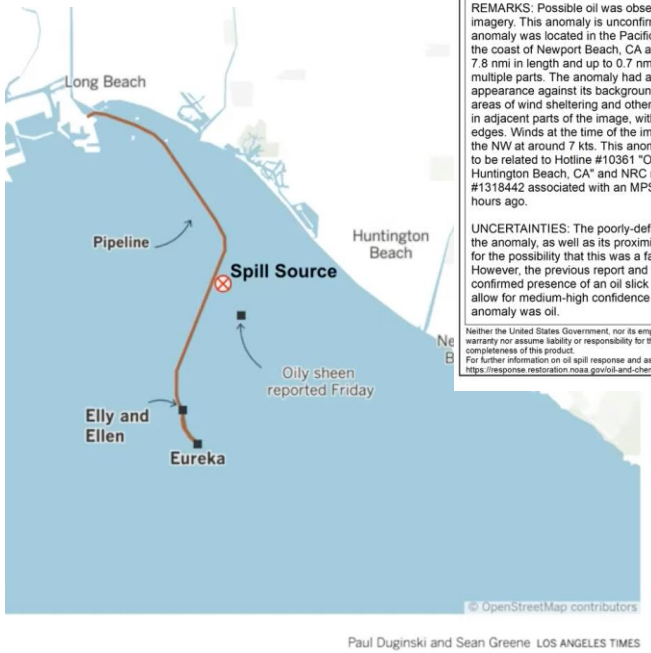
- October 2nd, 2021 oil spill - estimated 25,000 gallons of oil were released from a displaced undersea pipeline off of Huntington Beach; initially thought to be 4-5 x larger.
- 4,000-foot section of Amplify Energy owned 17.7 mile-long pipeline was displaced ~105 feet and had a 13-inch split, running parallel to the pipe. Potentially caused by hooked anchor - still under investigation



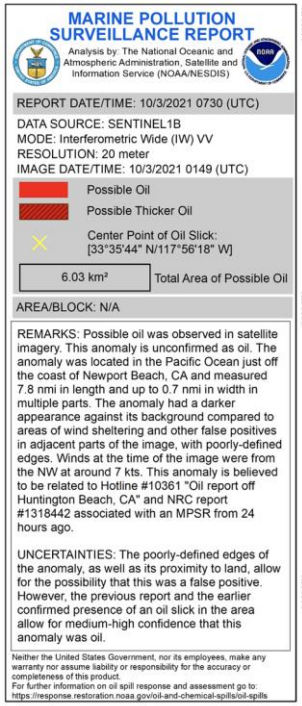
SAN DIEGO COUNTY

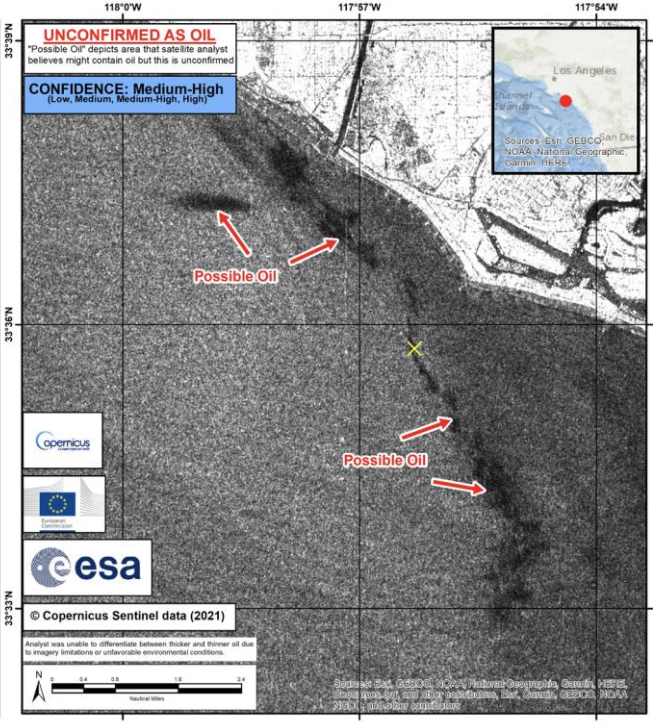
Oil Spill Response Teams Scanning Half of San Diego County Shoreline





Paul Duginski and Sean Greene LOS ANGELES TIMES





SOUTHERN CALIFORNIA COASTAL OCEAN OBSERVING SYSTEM

Huntington Beach Oil Spill Response - Community Effort!

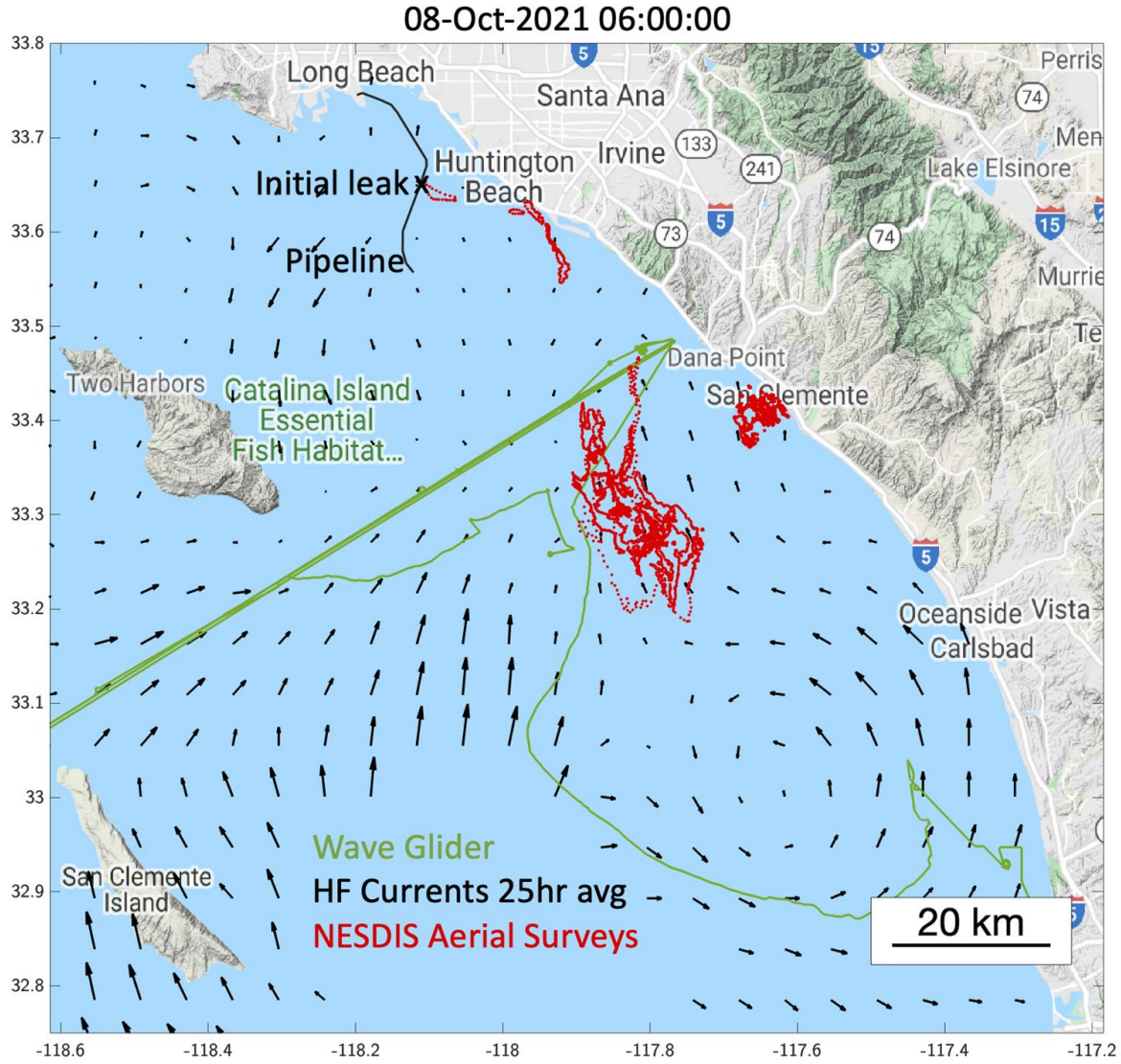


Oct. 3, 2021 - Unified command established to respond to the oil spill. Photo credit: USCG.

Huntington Beach Oil Spill Response - Community Effort!

1. Aircrafts and drones dispatched for overflight assessments - NASA, USCG, Orange County Sheriff
2. Divers and Remotely Operated Vehicles survey the pipeline for potential leaks and damage - Amplify Energy
3. Boats conducting oil recovery operations - USCG
4. Containment Booms deployed - designed to restrict the flow of free-floating oil
5. Shoreline Cleanup Assessment Teams dispatched - crewmembers and volunteers
6. Satellite imagery - NOAA OR&R and NASA JPL
7. Modeling oil trajectory - SCCOOS and SIO CORDC HF Radars provided real-time surface currents, Boeing Liquid Robotics wave glider provided real-time wind and USACE and CA State-funded CDIP wave buoys provided wind data.
8. Animal recovery - The Oiled Wildlife Care Network, UC Davis and The Pacific Marine Mammal Center
9. Community Air Monitoring - South Coast Air Quality Management District, in coordination with the U.S. EPA the OC Health Care Agency, and a contracted environmental consulting firm
10. Boat decontamination sites set up for the public

Huntington Beach Oil Spill Response



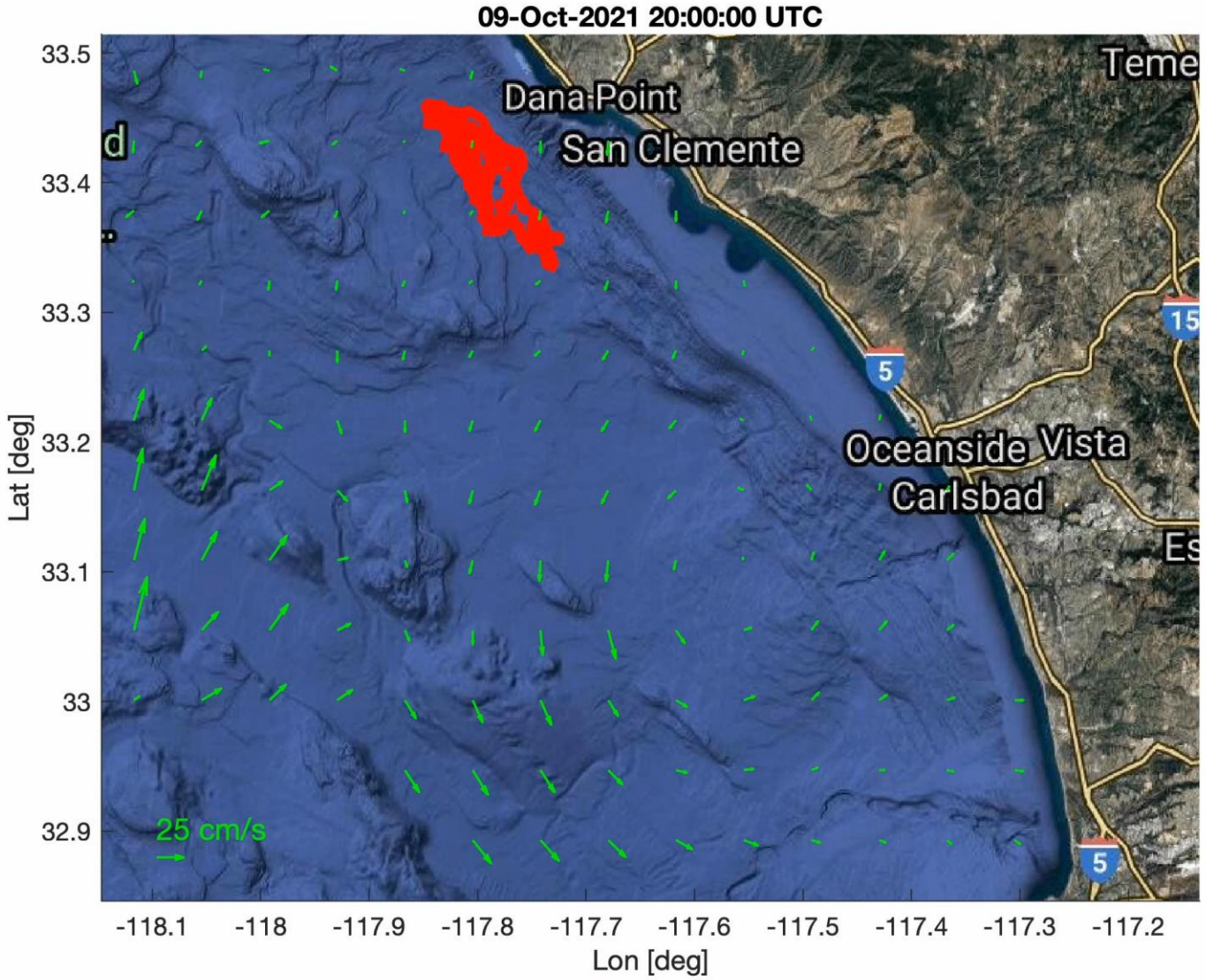
- Accurate winds are needed to help windage computations for the GNOME trajectory forecasts supporting the clean up efforts
- CORDC team at SIO diverted two Boeing Liquid Robotics wavegliders equipped with a Scripps METOC sensing payload and one with a hydrocarbon fluorometer to the offshore location of the oil from the Huntington Beach Spill. This decision was made internally by Scripps after Amy MacFadyen at OR&R had expressed a need for improved winds at the oil location.

Boeing Liquid Robotics Wave Glider

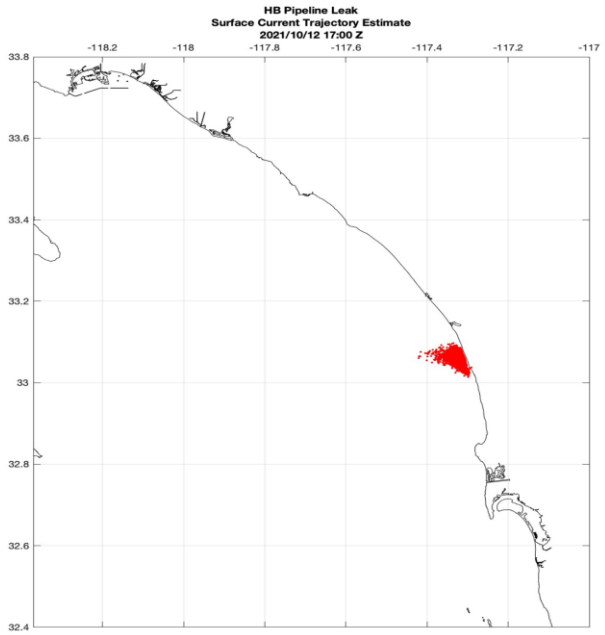


S. Merrifield and E. Terrill, SIO

Huntington Beach Oil Spill Response



- Animation of the trajectory simulation starting from the 10/9/21 RADARSAT-2 pass through 10/12/21
- The random walk model uses **HFR surface currents** with winds from the wave glider and estimated the oil will reach just offshore of Encinitas.



M. Otero, SIO

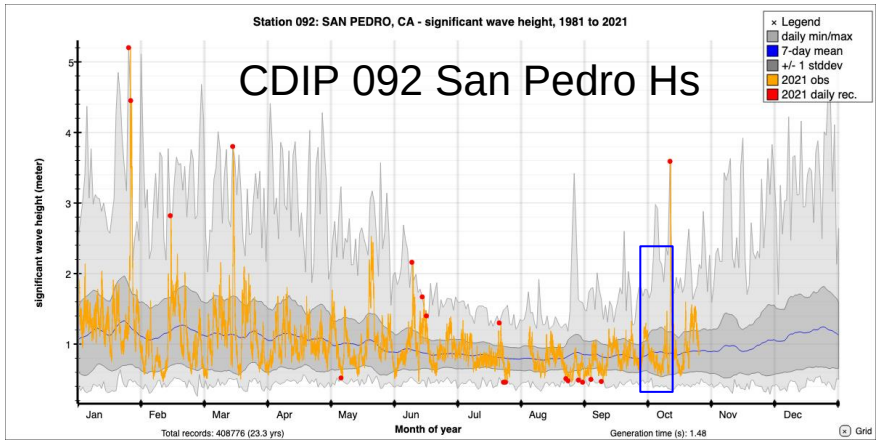
Coastal Data Information Program (CDIP)

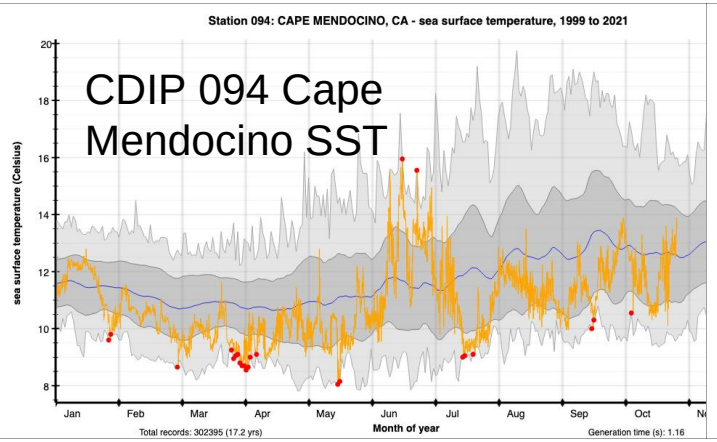
California wave activity in 2021 has been following the long term climate trend.

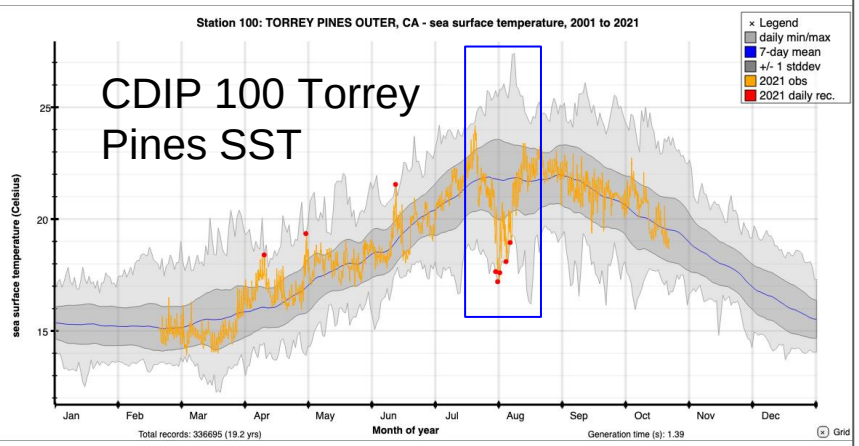
- Waves were not a factor during the early stage of the oil spill, due to low energy (e.g. CDIP 092).
- Bomb cyclone currently impacting PNW stations
  - - 10.7 m (35 ft) max Hs and 14.1 m (46 ft) largest individual wave measured at CDIP 179 Astoria Canyon, OR

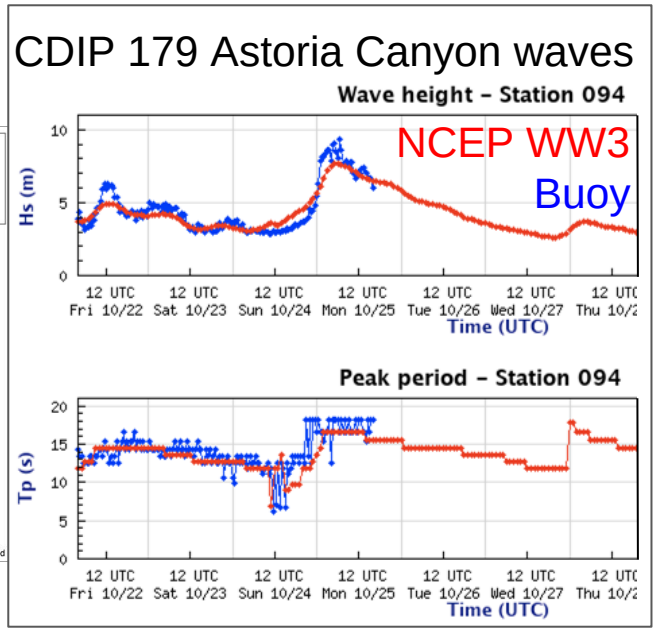
California sea surface temperatures (SST) also following the climate trend.

- Notable mid-summer cooling in SD and LA (e.g. CDIP 100).
- SST in LA/LB remains mostly below average since July.
- The two northernmost CA stations were also cooler (e.g. CDIP 094).









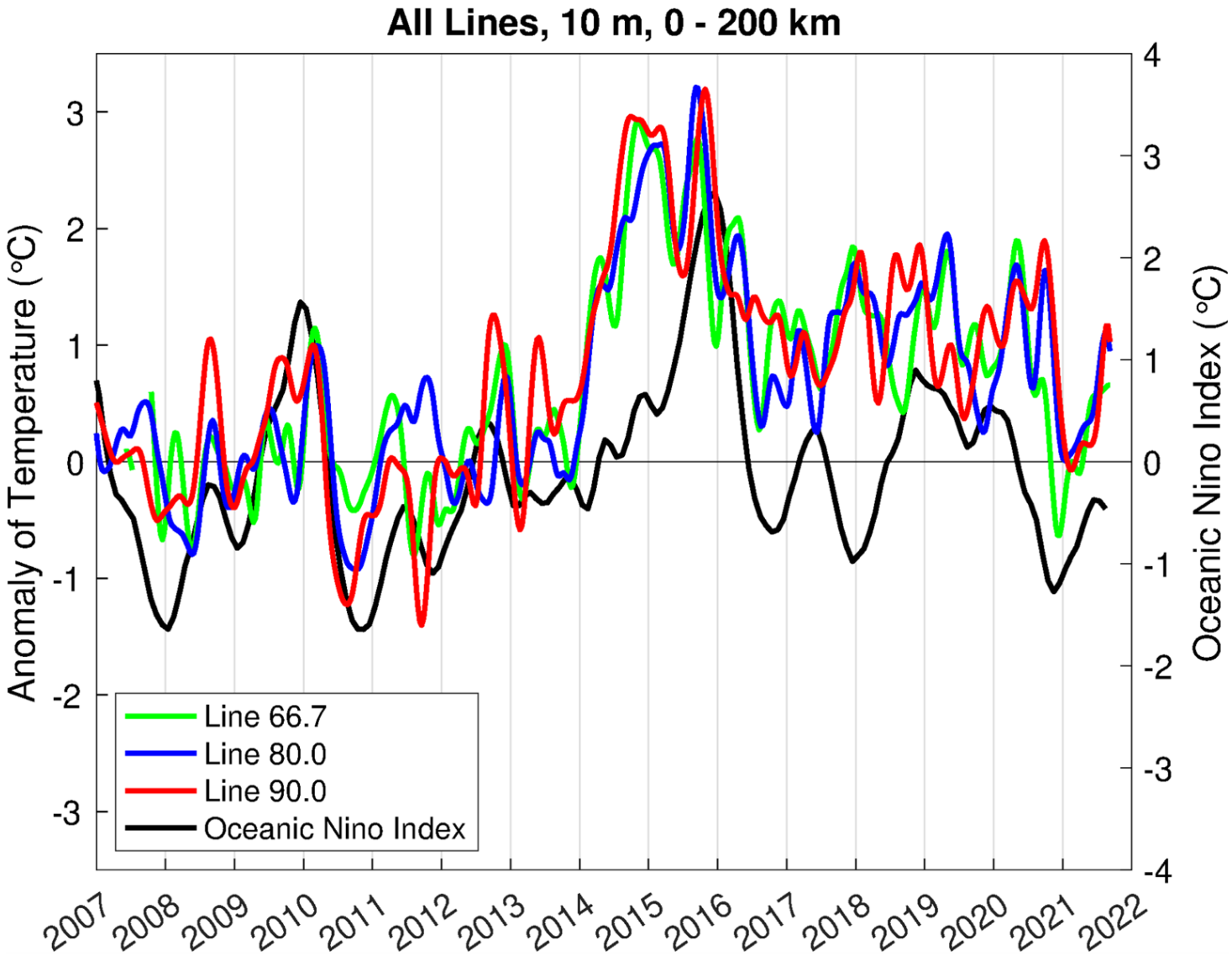


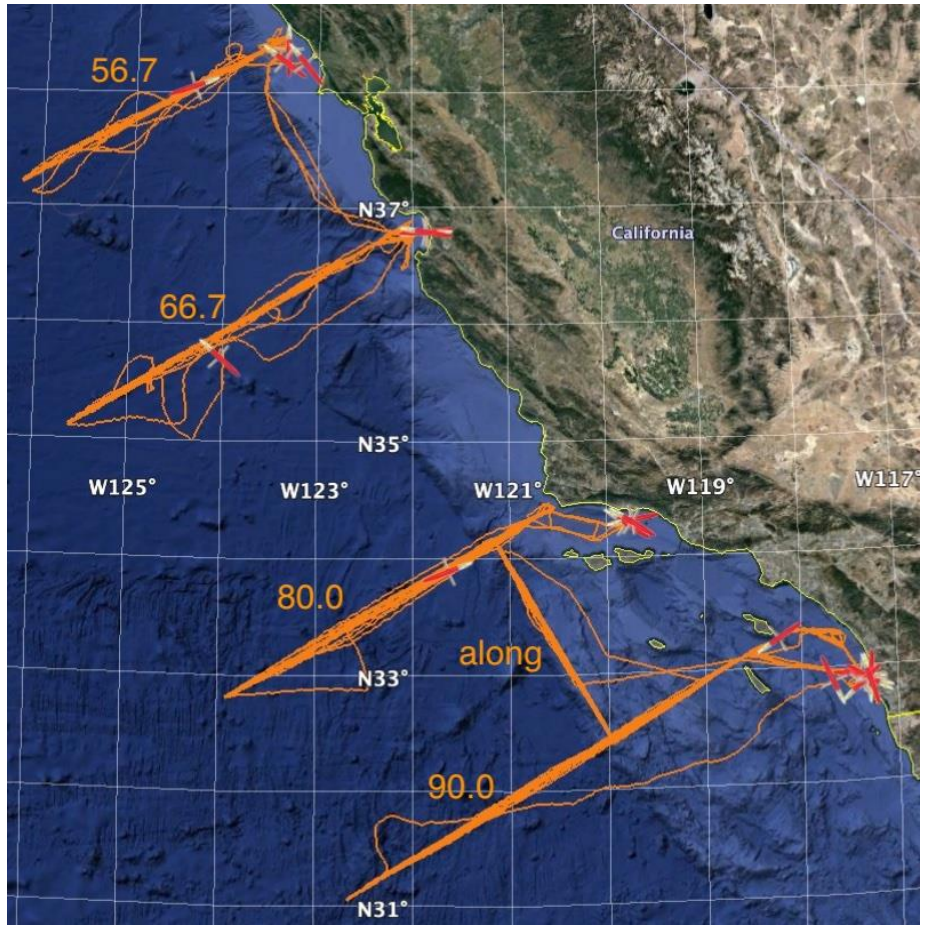
cdip.ucsd.edu

J. Behrens, SIO

California Underwater Glider Network



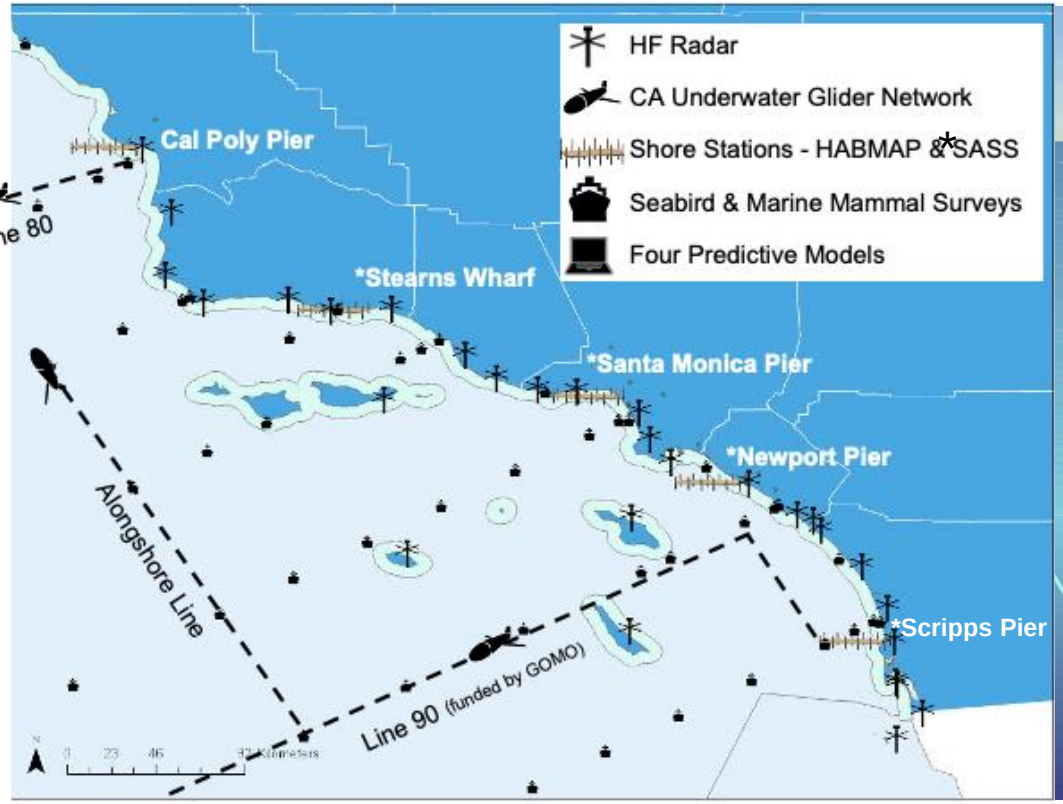


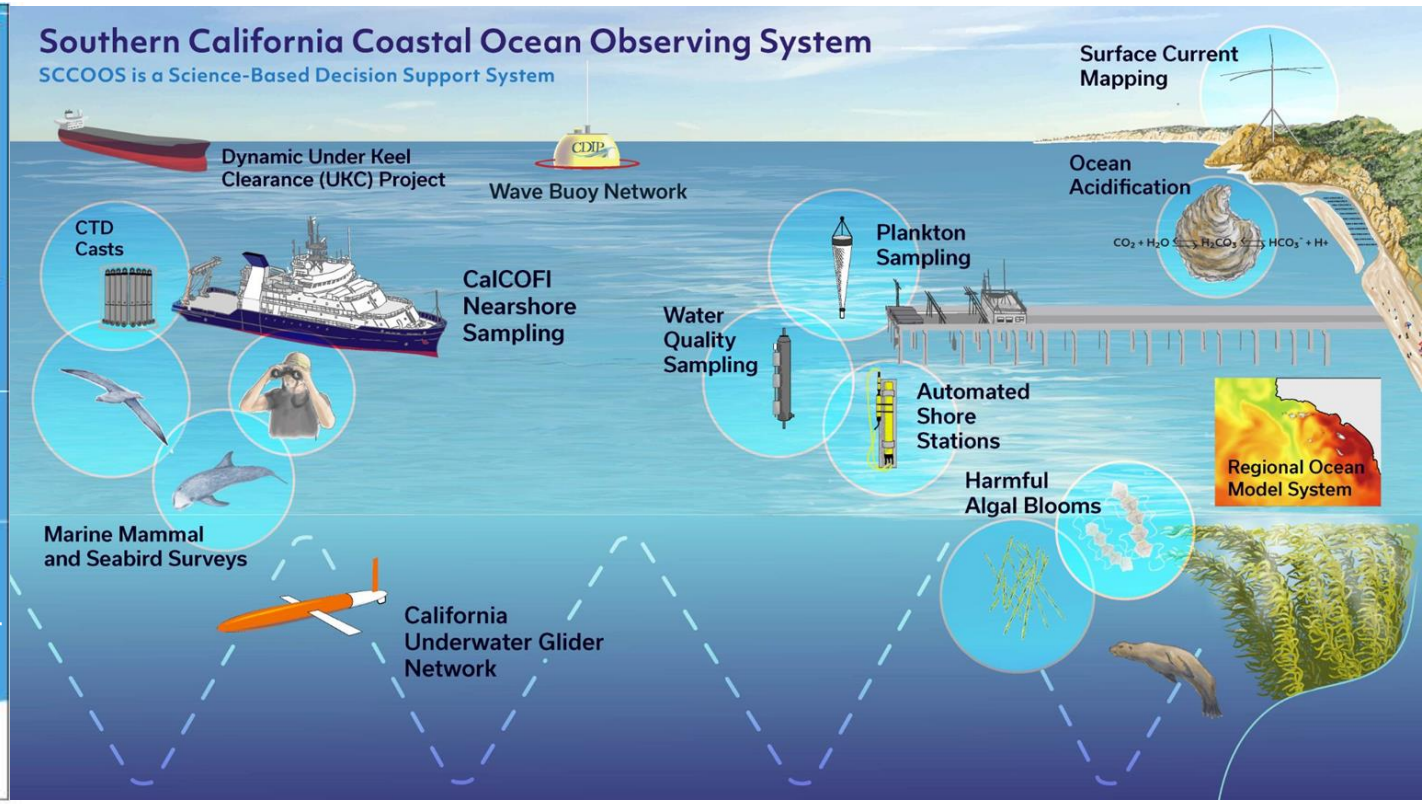


DOI: 10.21238/S8SPRAY7292

D. Rudnick, SIO

SOUTHERN CALIFORNIA COASTAL OCEAN OBSERVING SYSTEM





Questions?

info@sccoos.org

IOOS Integrated Ocean Observing System



Photo: Tahoe Rim Trail, October 7, 2021
Credit: Dan McEvoy

Next NOAA West Watch:

January 27, 2022

Thanks!