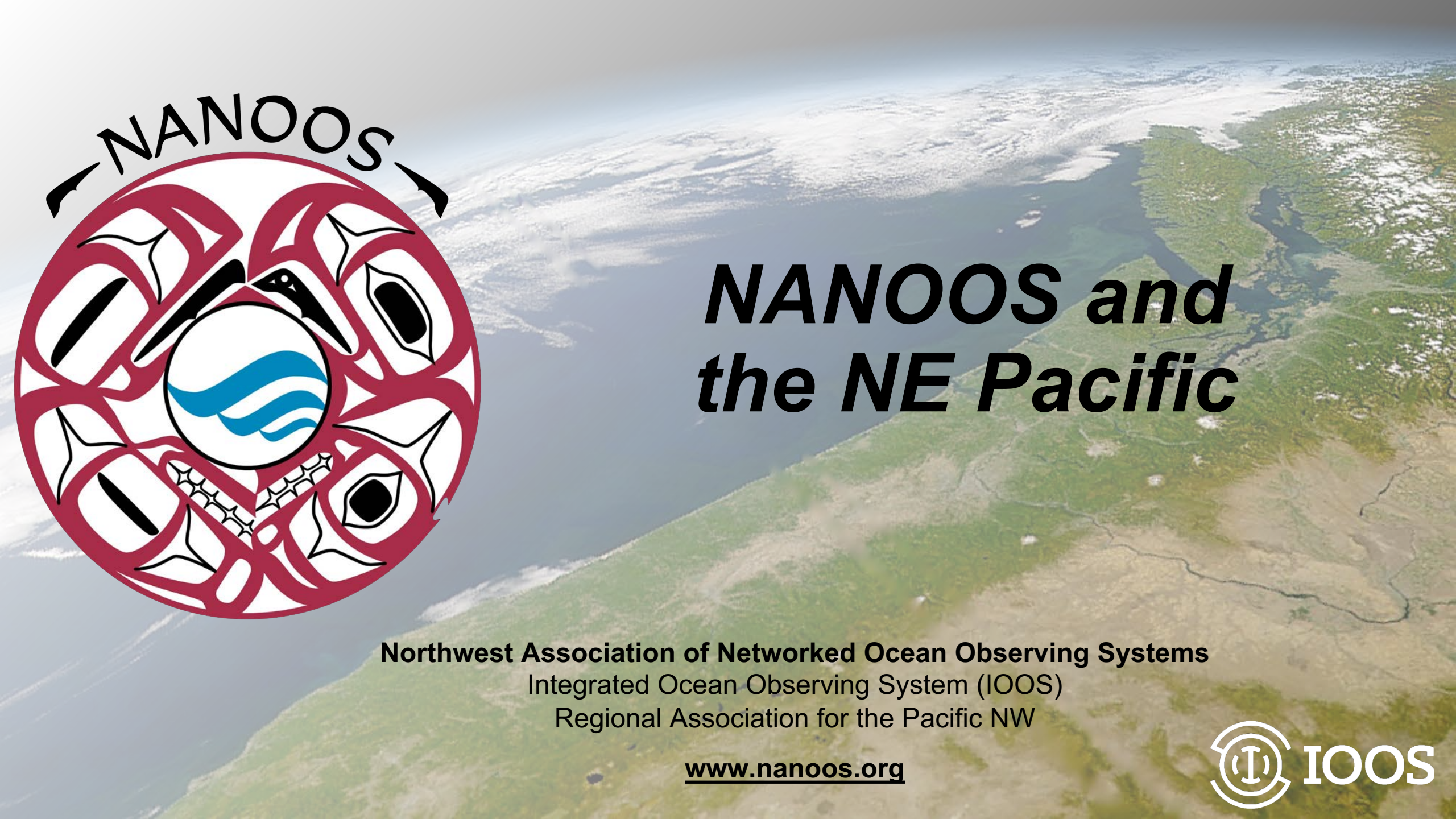


NANOOS and the NE Pacific

Northwest Association of Networked Ocean Observing Systems
Integrated Ocean Observing System (IOOS)
Regional Association for the Pacific NW

www.nanoos.org

IOOS

Coastal ocean:

Northern extent of California Current

Winds, topography, freshwater input, ENSO & other climate cycles

Major inland basins:

Puget Sound-Georgia Basin, Columbia River

Urban centers, nearshore development, climate variation

Coastal estuaries:

Willapa Bay, Grays Harbor, Yaquina Bay, Coos Bay, +20

Resource extraction, development, climate

Shorelines:

Rocky to sandy, dynamic: storms, erosion

Winds, development, climate

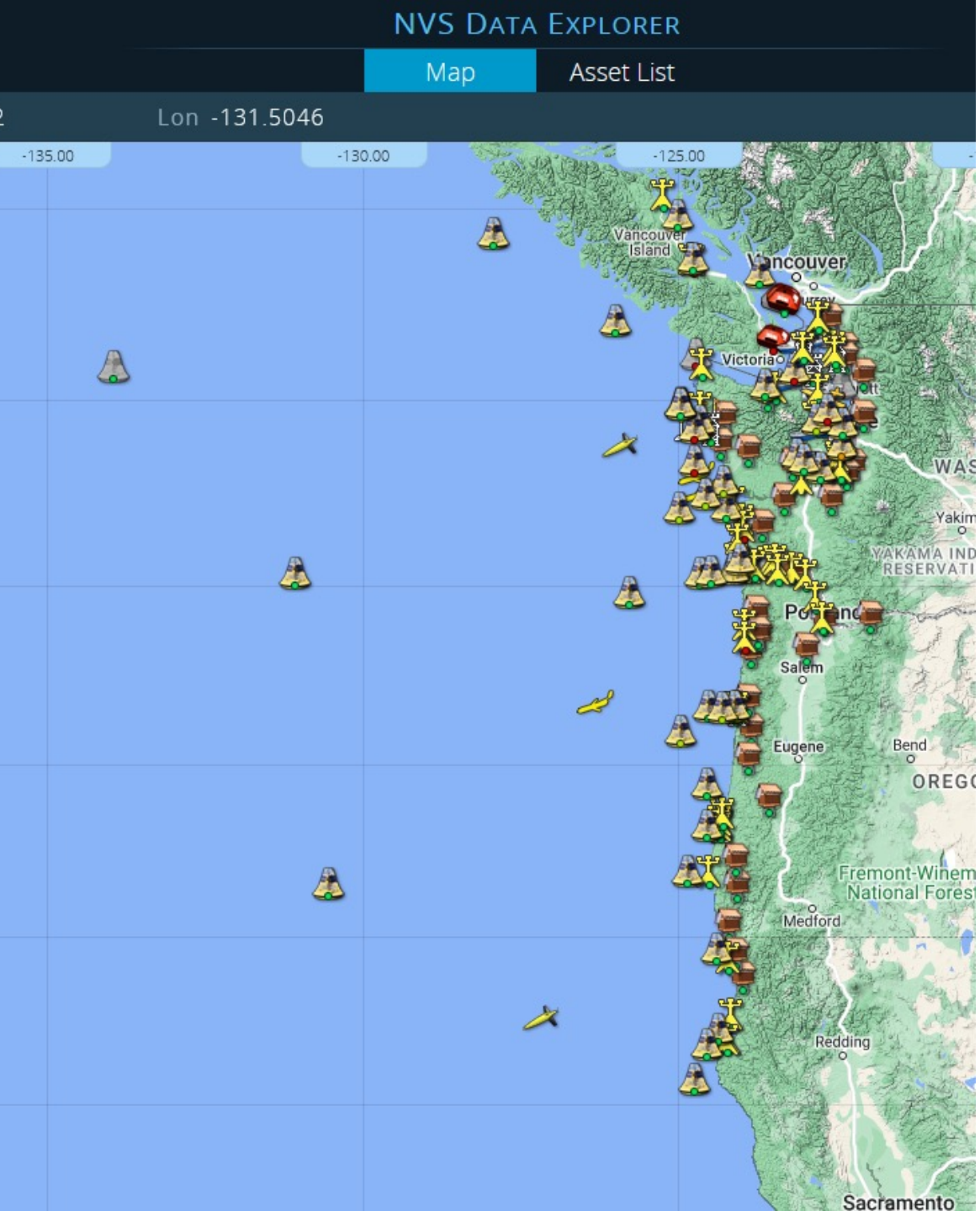
Major rivers:

Columbia River (~75% FW input to Pacific from US west coast)
many rivers (e.g., Fraser, Skagit) via Strait Juan de Fuca

Dredging, water regulation, climate change

NANOOS Region User Groups:

Maritime: shipping, oil transport/spill remediation
Fisheries: salmon, shellfish, crab, groundfish, aquaculture
Environmental management: HABs, hypoxia
Shoreline: erosion, inundation
Hazards: Search and rescue, national security
Educators: formal, informal, research
Marine recreation: boating, surfing, diving



NANOOS NVS Served

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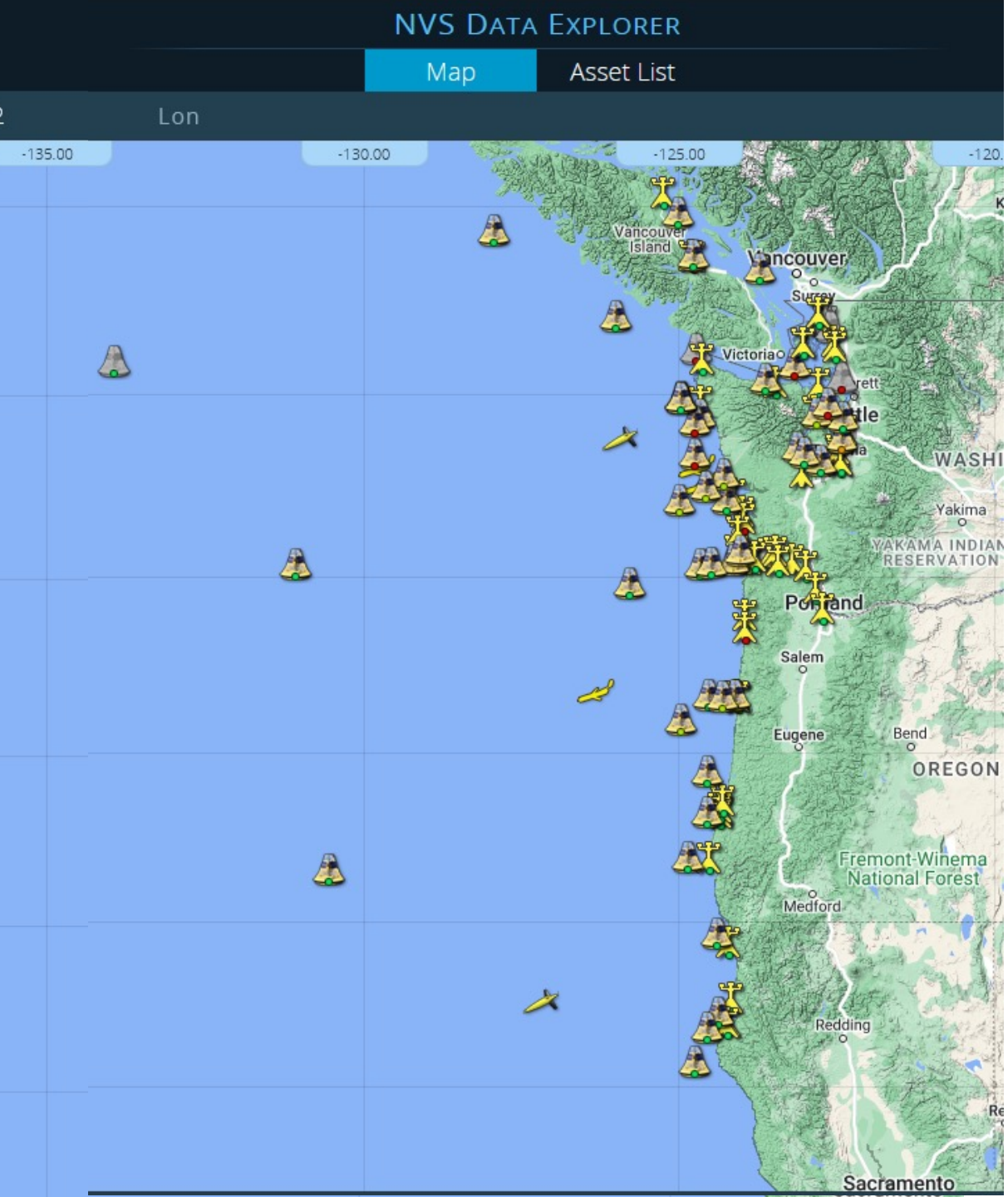

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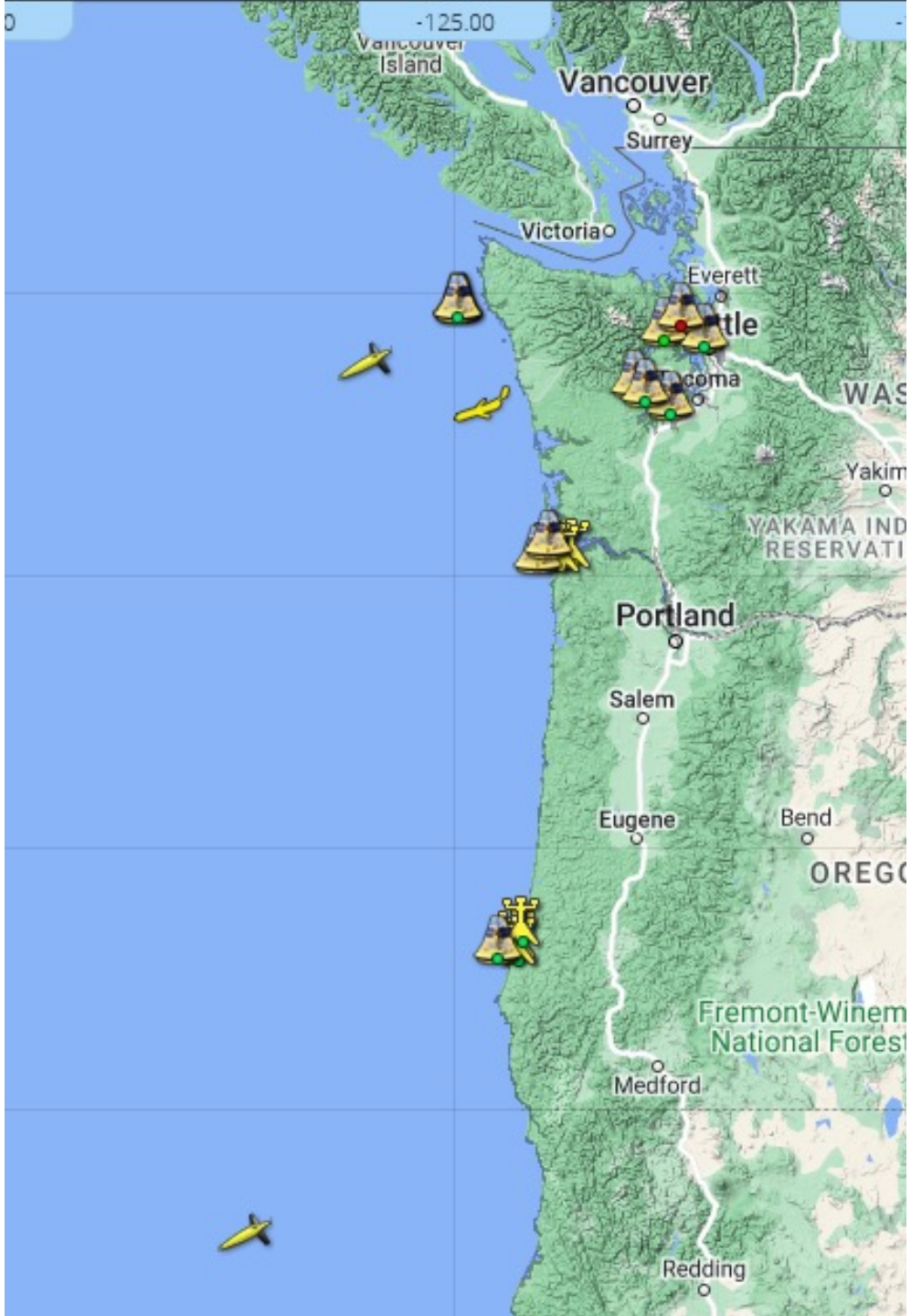


NANOOS Supported

Observations:

Coastal ocean:

WA & OR Shelf buoys and gliders

Major inland basins:

Puget Sound & Columbia River buoys

Coastal estuaries:

Coos Bay/South Slough, and many partners

Shorelines:

WA & OR shoreline change/bathymetry

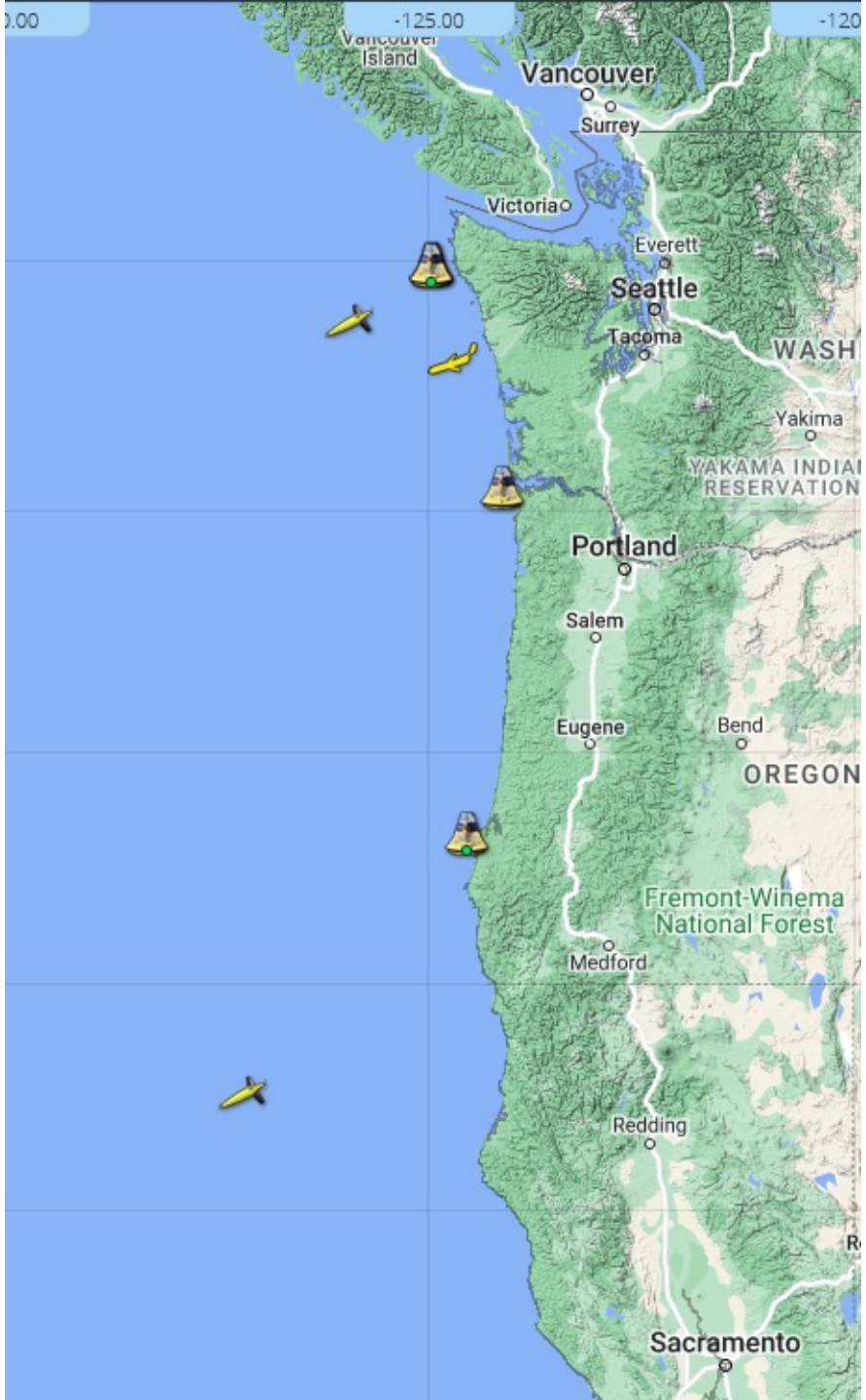
Models:

Forecast:

WCOFS, OSU ROMS, LiveOcean, Columbia

Seasonal:

J-SCOPE



NANOOS Supported

Observations:

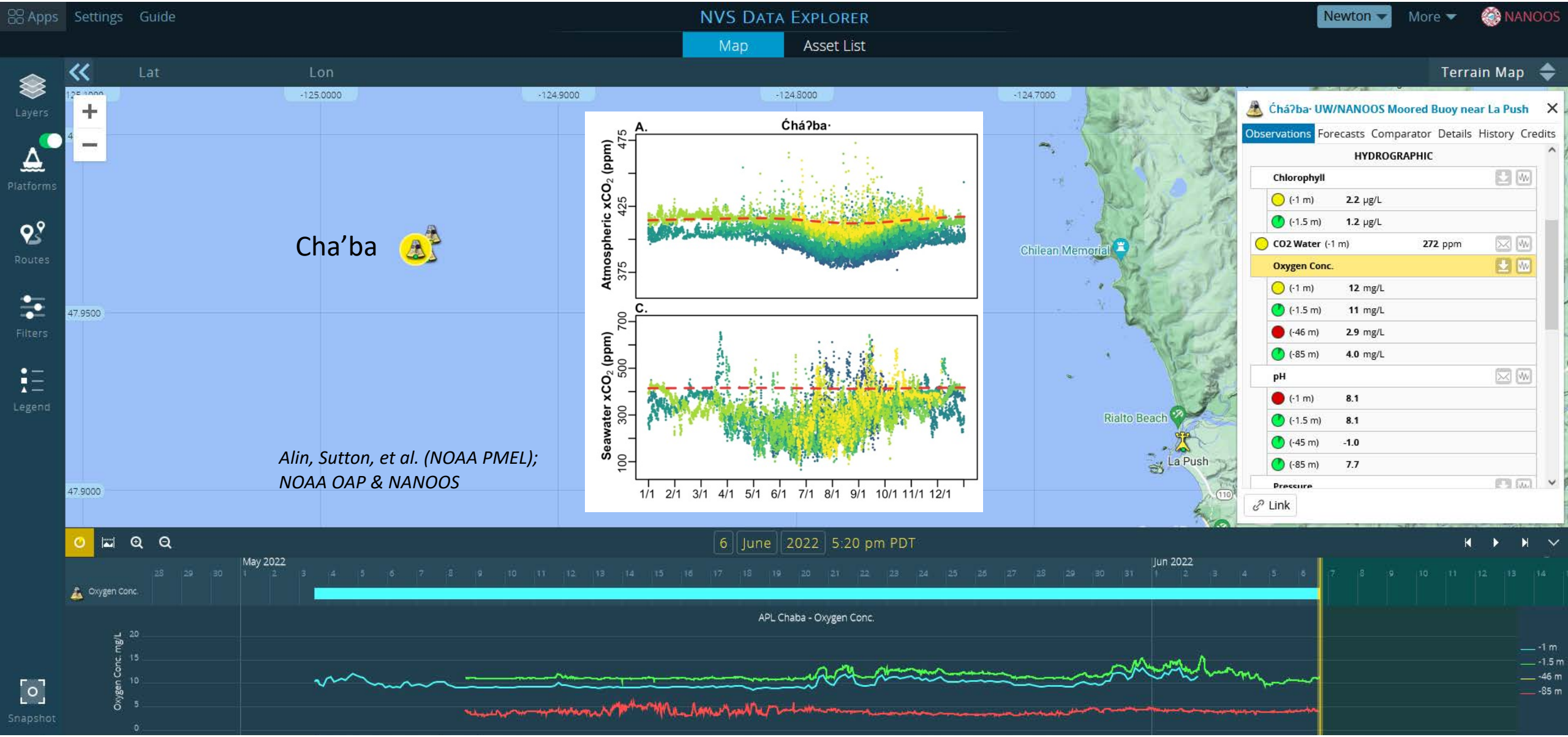
<u>Coastal ocean</u>:

Buoys:

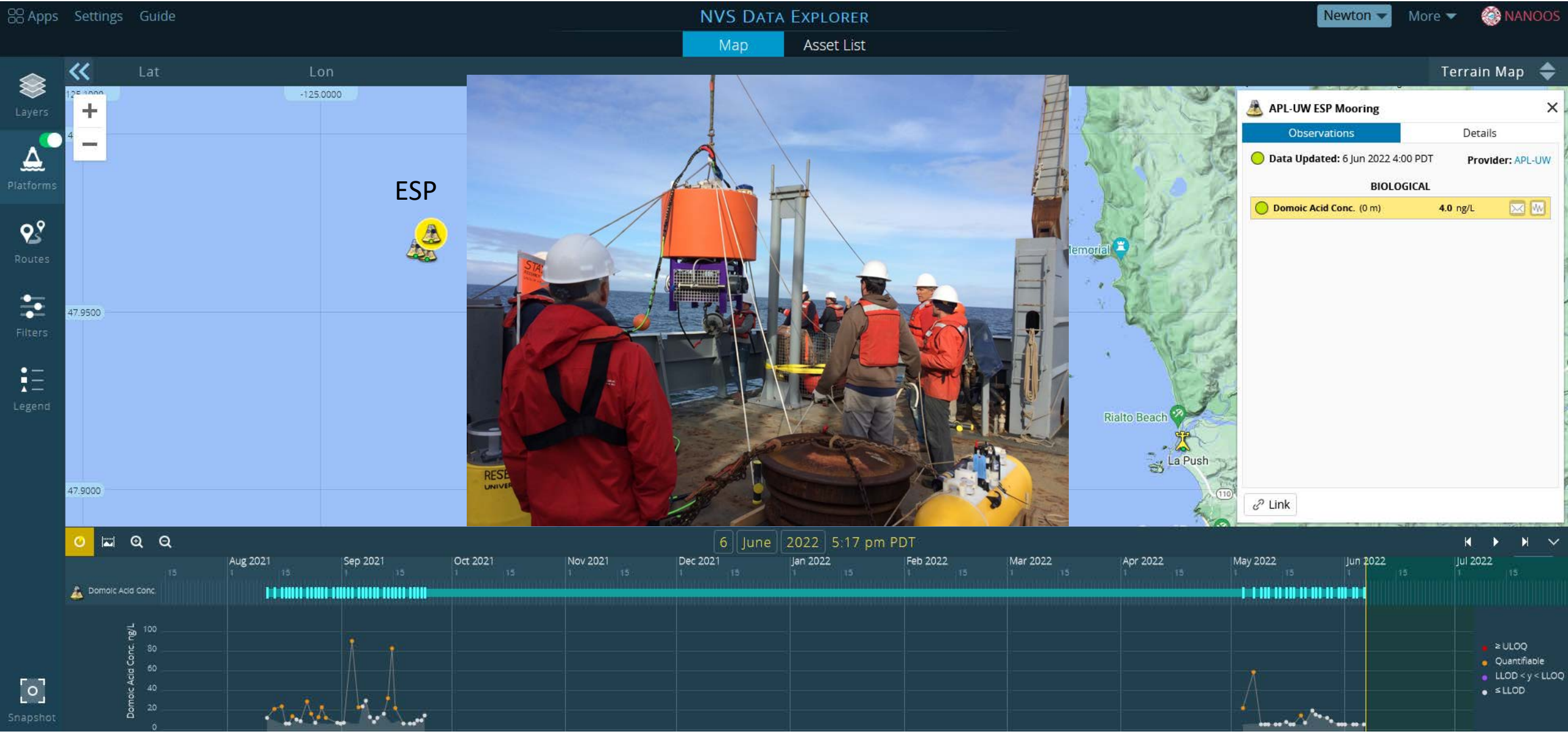
- La Push (Manalang/Mickett, UW)
- Saturn 02 (Seaton, CRITFC)
- CB-06 (Kosro/Hales, OSU)

Gliders:

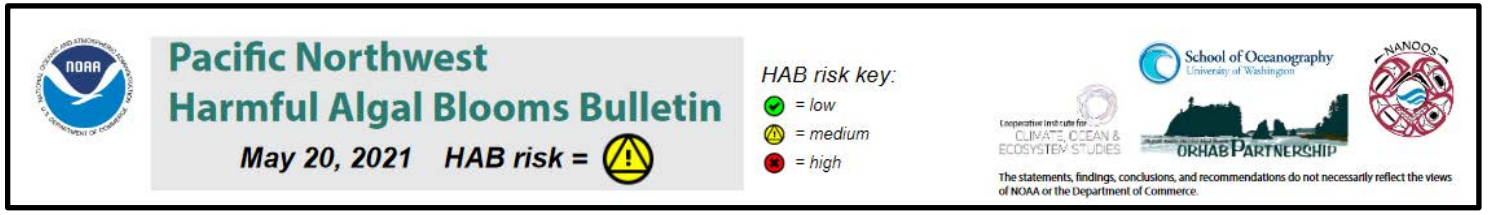
- La Push (Lee, UW)
- Columbia (Seaton/Barth, CRITFC/OSU)
- Trinidad (Barth, OSU)

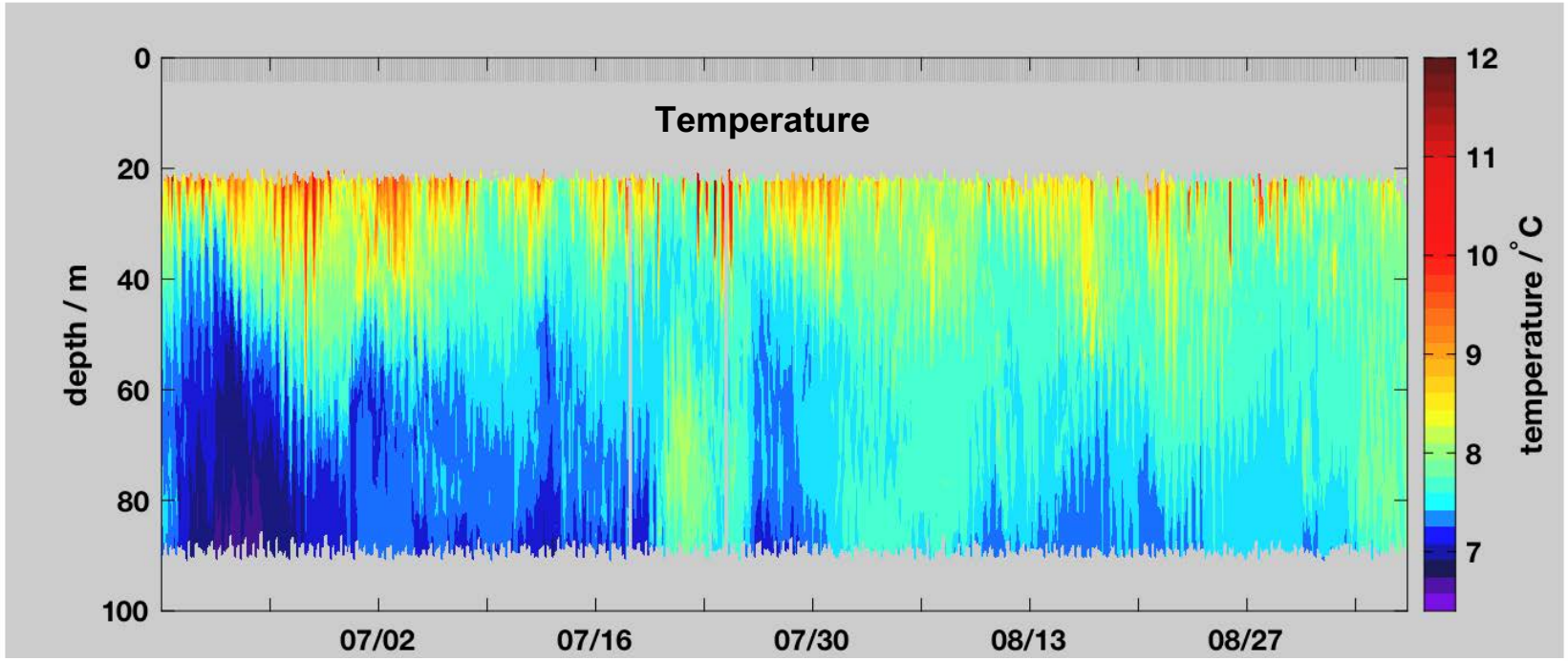


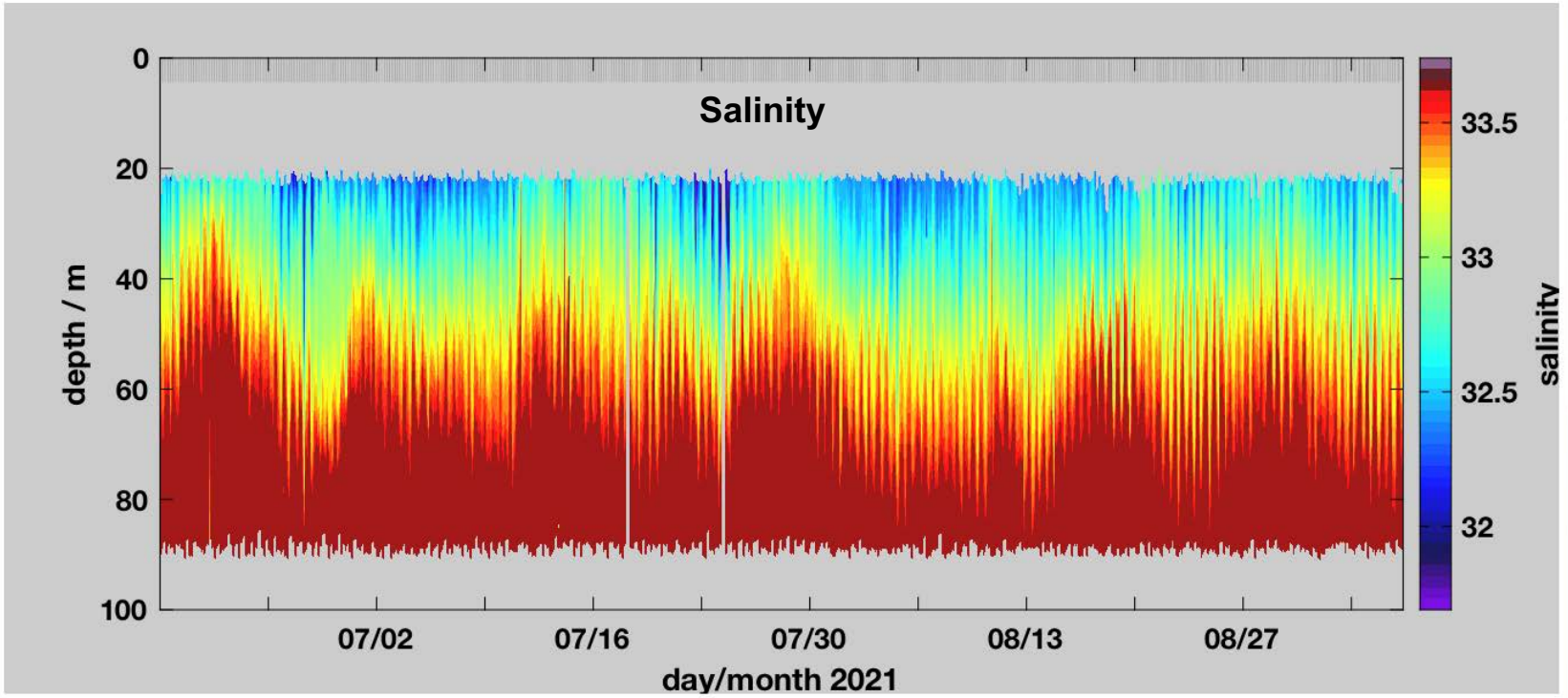
Manalang & Mickett (UW); NOAA OAP & NANOOS



Moore (NOAA) & Mickett (UW); NOAA NCCOS & NANOOS







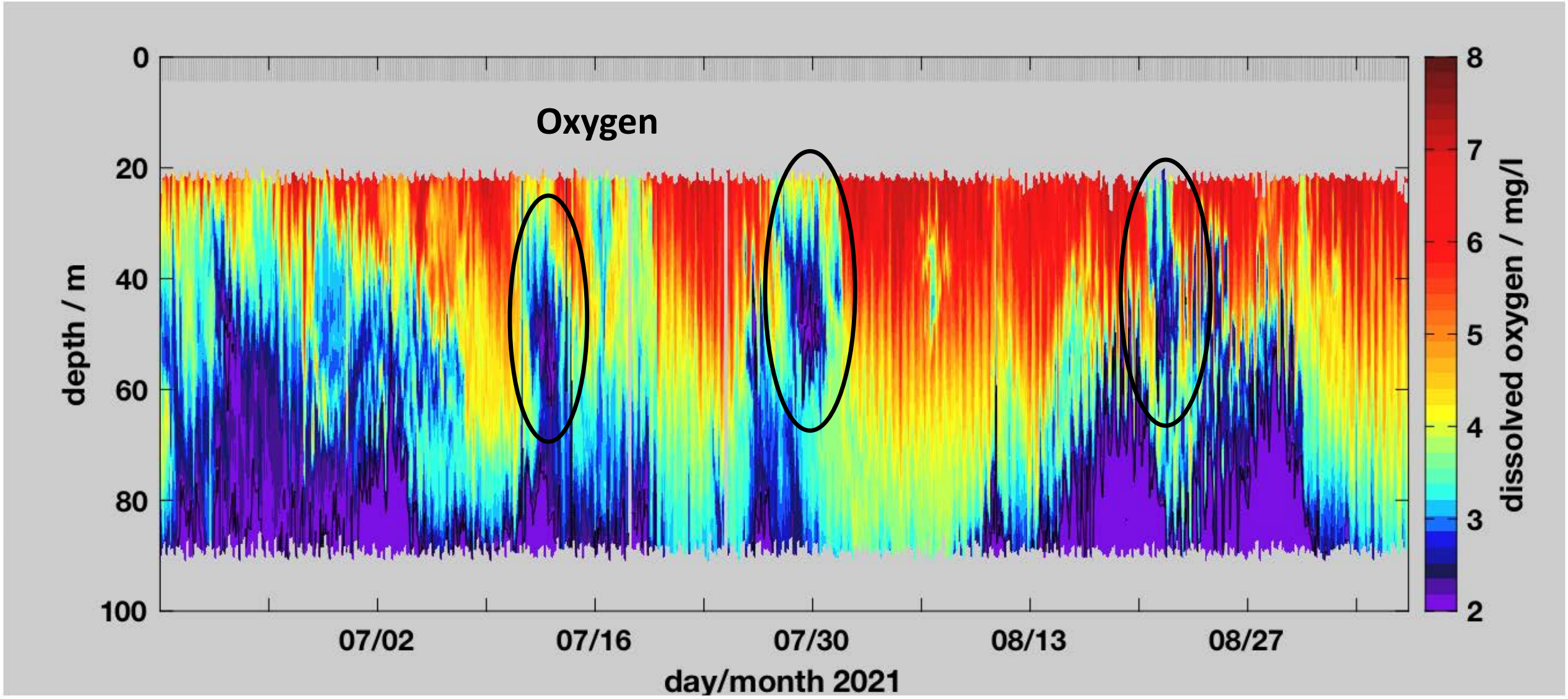
NEMO sub-surface profiling mooring

Manalang, Mickett, UW; NANOOS

"Internal waves off the WA shelf"

Alford et al., 2012 Oceanography

NEMO sub-surface profiling mooring

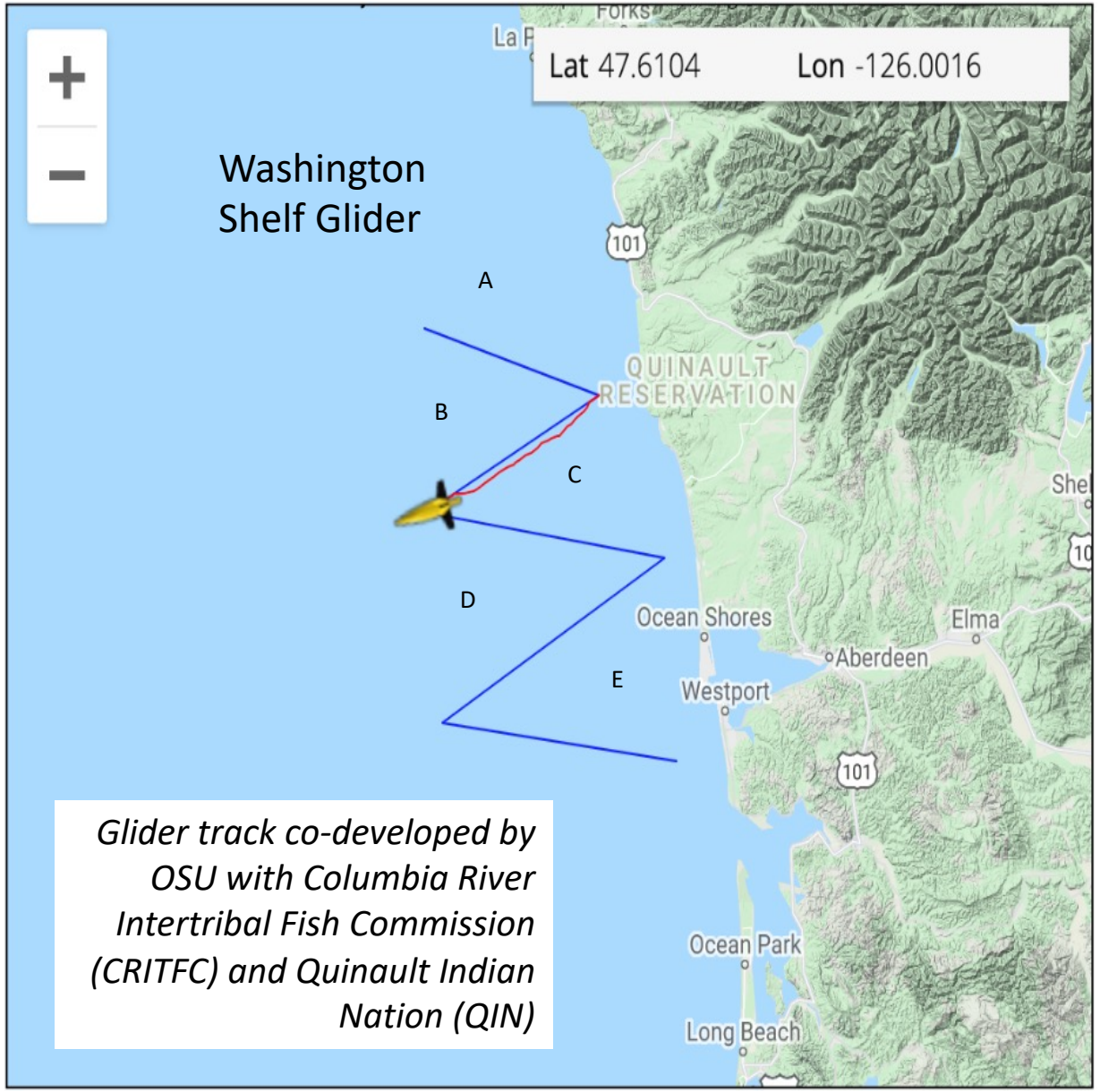


Mickett, UW; NANOOS

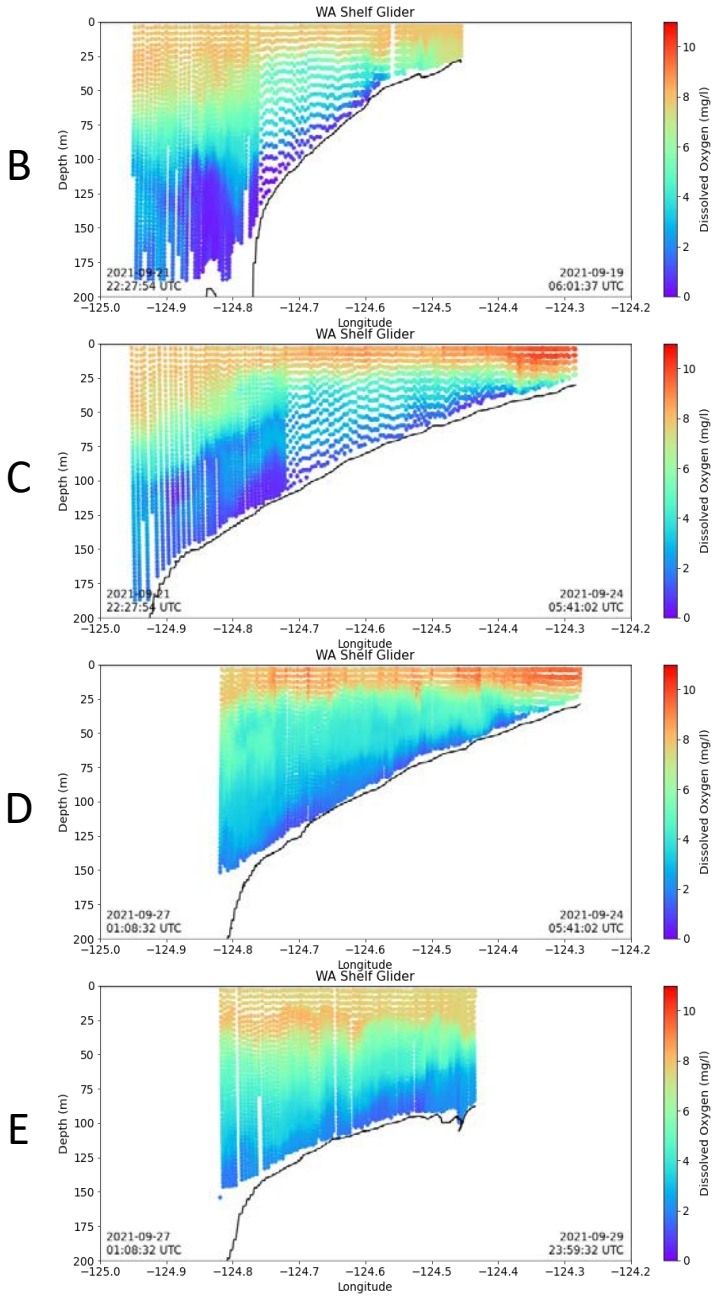
Data Explorer
Tsunami Evacuation Zones
Boaters
Tuna Fishers
Seacast
Surfers
Beach View
Shellfish Growers
Climatology
Beach and Shoreline Changes
Maritime Operations
Cruises
High Frequency Radar
Comment
Help
Overview

Gliders

NEW
Washington Shelf Glider
Trinidad Head Glider
La Push Glider
OOI Newport Deep Glider
OOI Grays Harbor Shallow Glider



Glider track co-developed by OSU with Columbia River Intertribal Fish Commission (CRITFC) and Quinault Indian Nation (QIN)



Barth, OSU, Seaton, CRITFC; NANOOS

Apps Settings

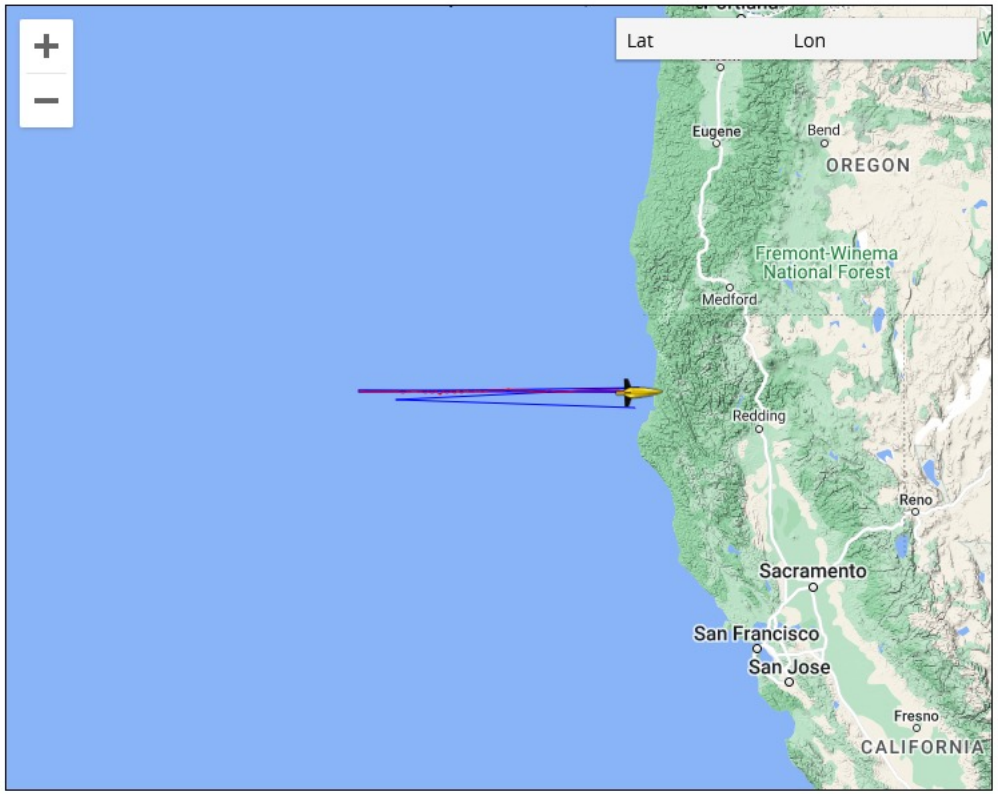
NVS Trinidad Head Glider

Newton More NANOOS

Plots Annual Plots

Missions 2021 November - Ongoing Type: Seaglider Provider: Oregon State University Contact: Jack Barth

Temperature Salinity Density Dissolved Oxygen Fluorescence CDOM Backscatter



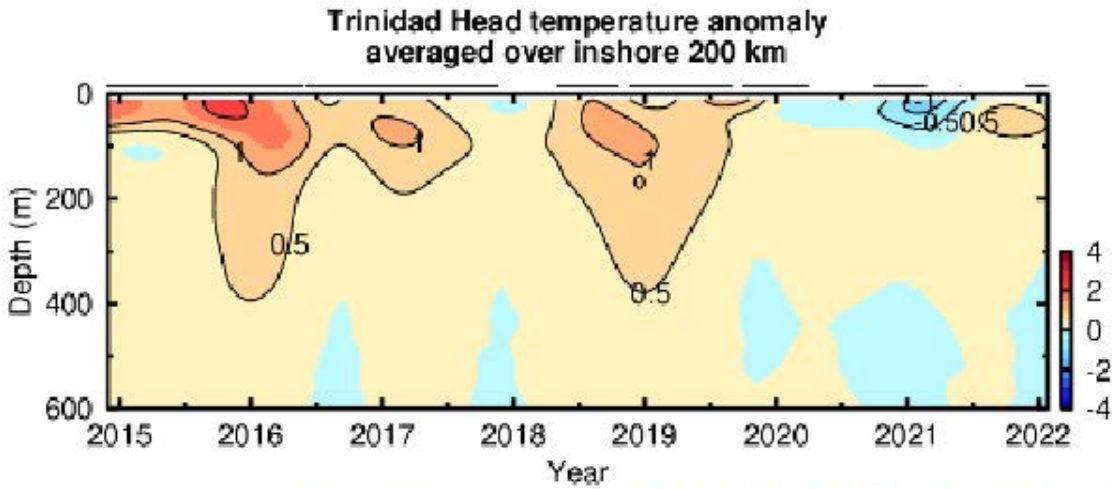


Figure 1: *Temperature anomaly from the Trinidad Head, CA (41° 3.5'N) glider line. Horizontal lines above the panel indicate when the TH-Line glider was in the water.*

Barth, OSU

Download Data
Glider DAC

Prev 28 April 2022 6:00 am Next

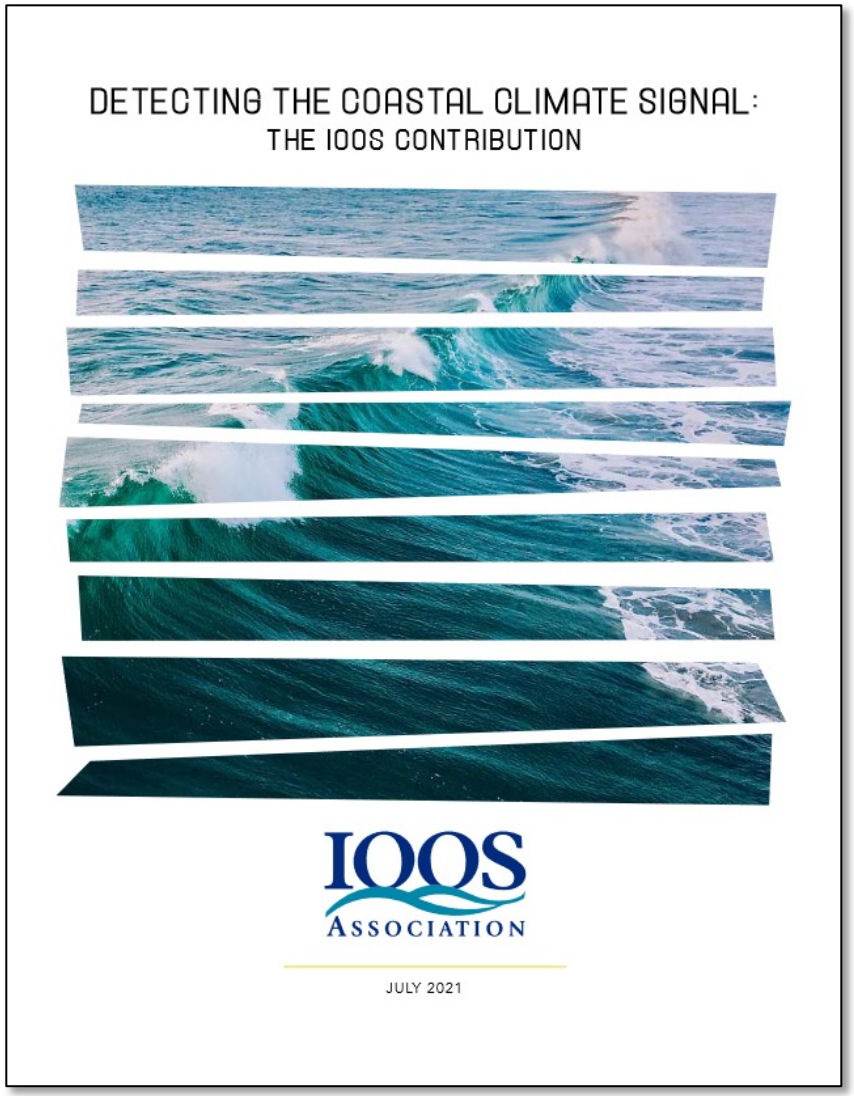
Dec 2021 Jan 2022 Feb 2022 Mar 2022 Apr 2022 May 2022 Jun 2022

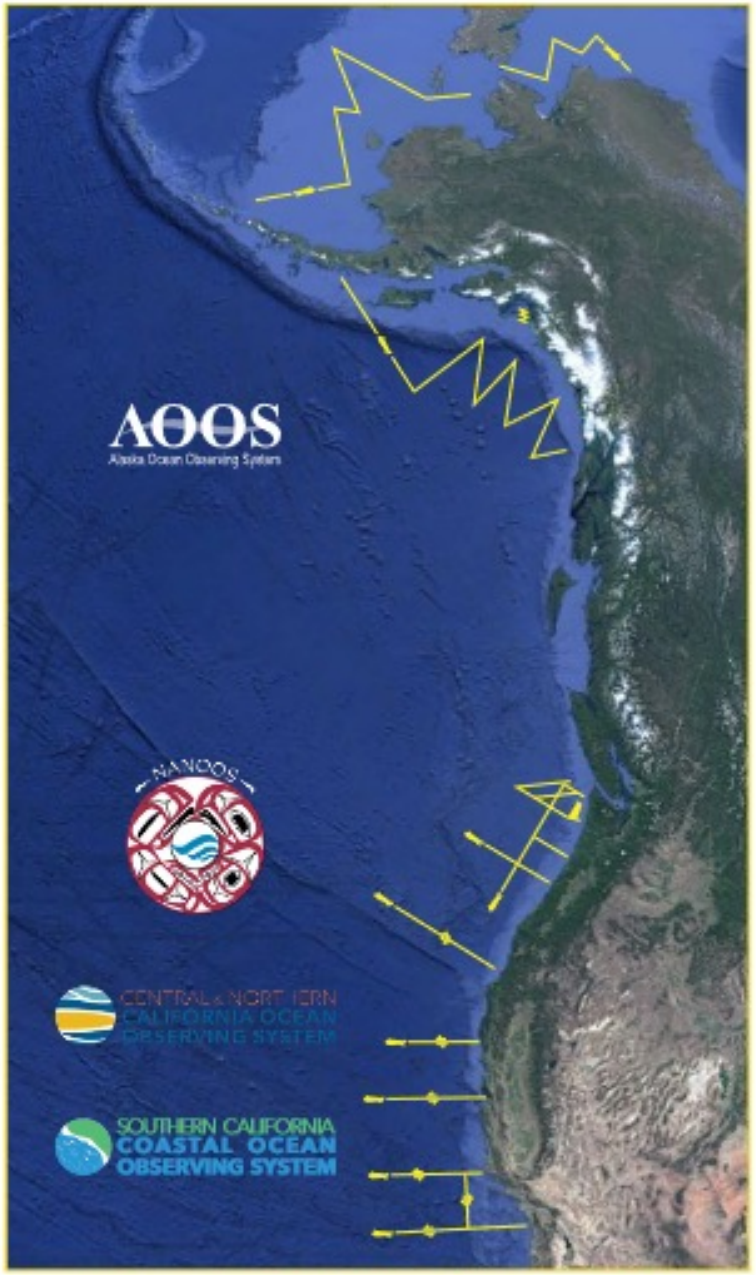
2021 November - Ongoing

Barth, OSU; NANOOS & CeNCOOS

IOOS
Integrated Ocean Observing System

- Detecting the Coastal Climate Signal:
  The IOOS Contribution





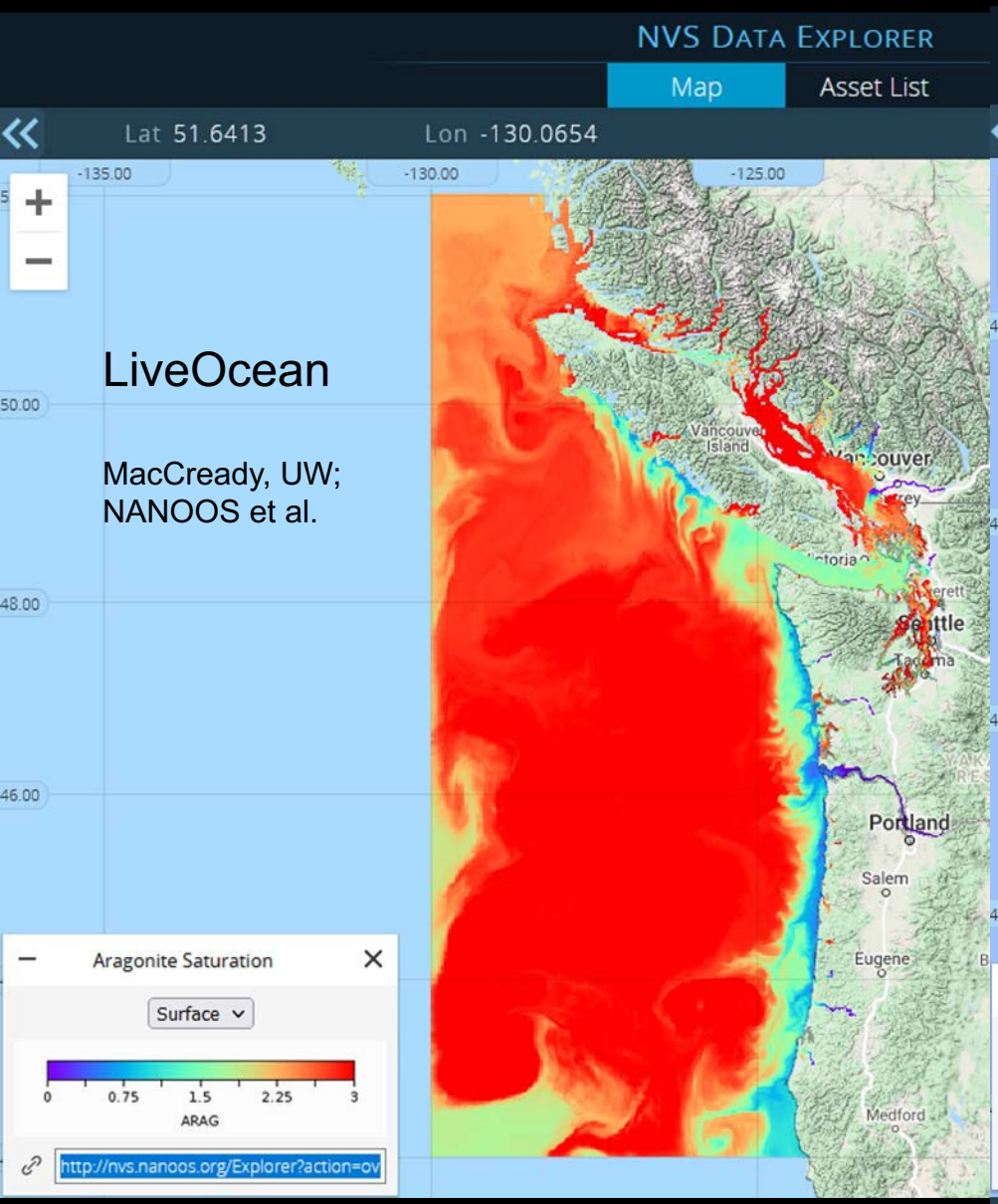
Network of glider tracks along the U.S. West Coast and Alaska from IOOS investments and our partners, including the National Science Foundation and others. Some gliders are optimized to run both offshore and in nearshore waters to monitor conditions that may lead to climate impacts.

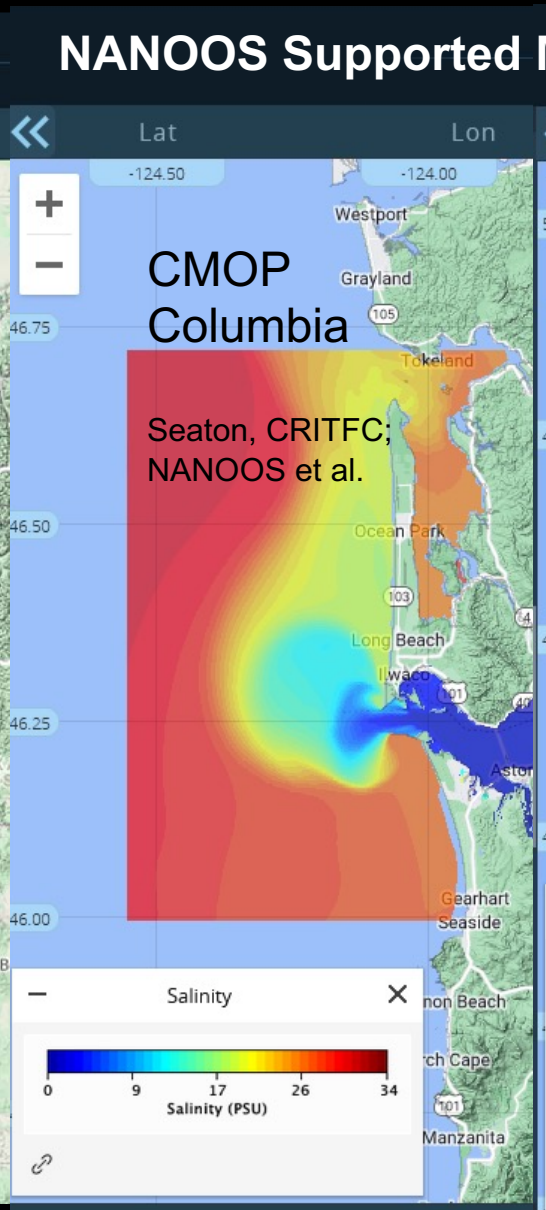
NANOOS

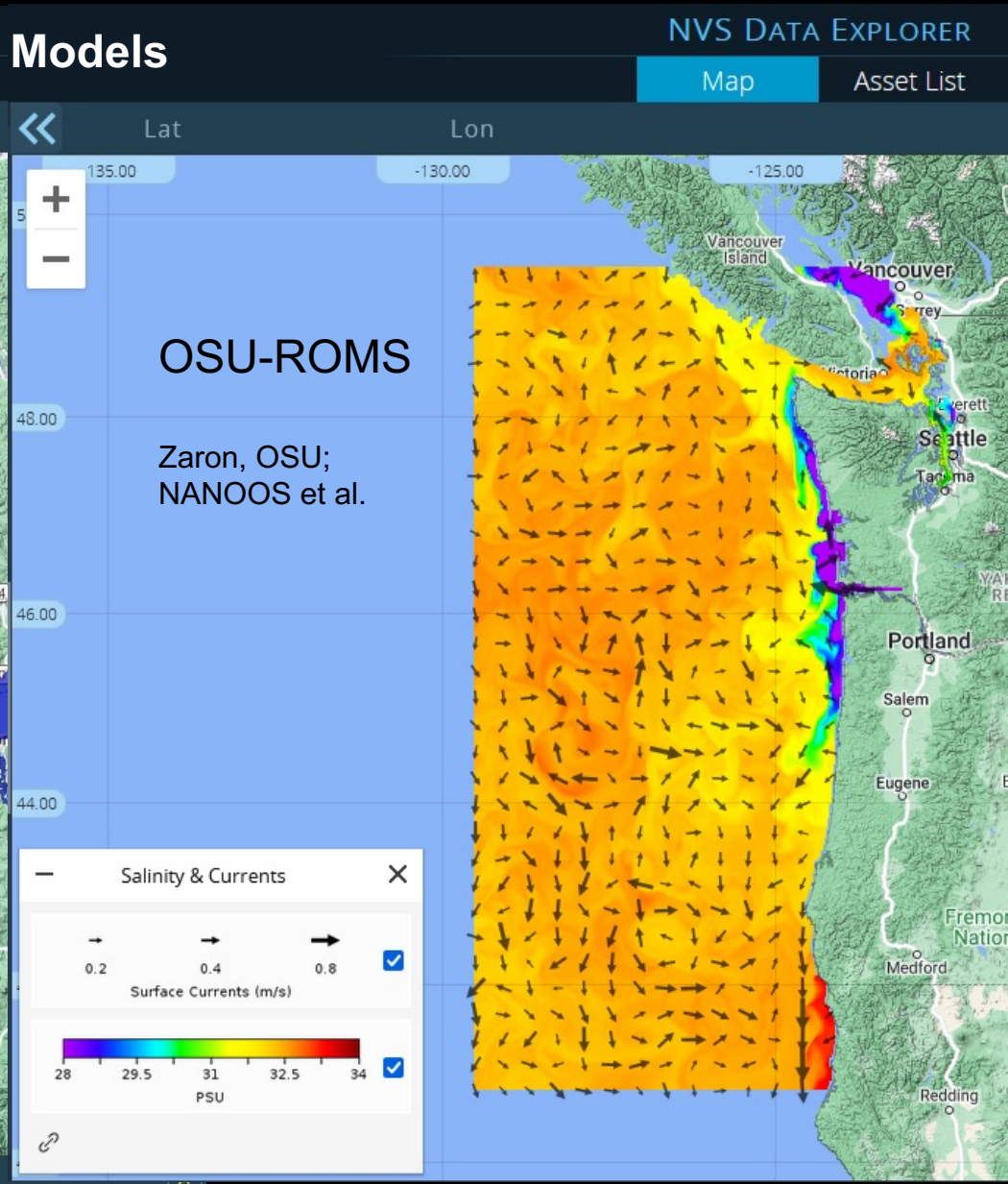
Northwest Association of Networked Ocean Observing Systems

IOOS

NANOOS Supported Models

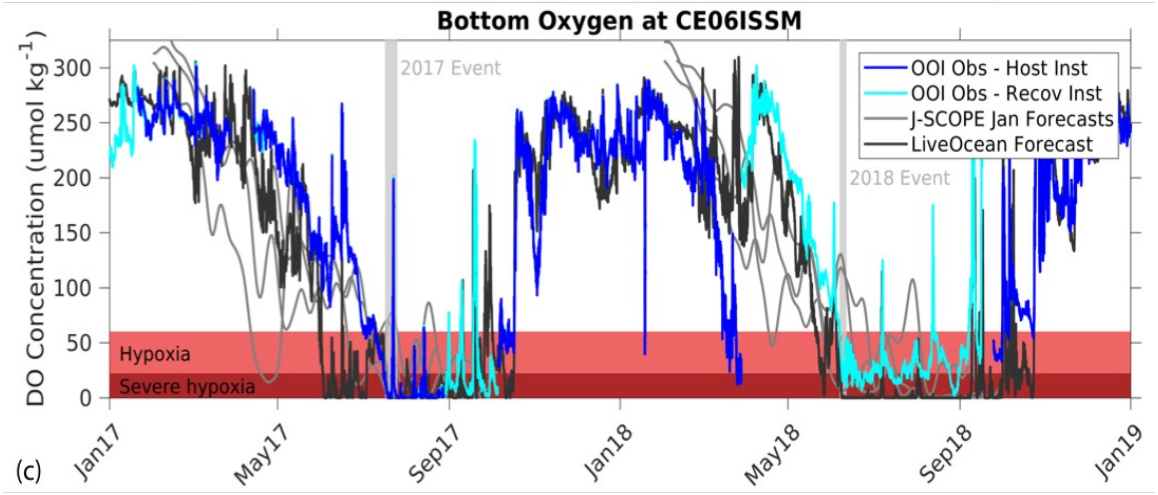






Seasonal J-SCOPE projections:

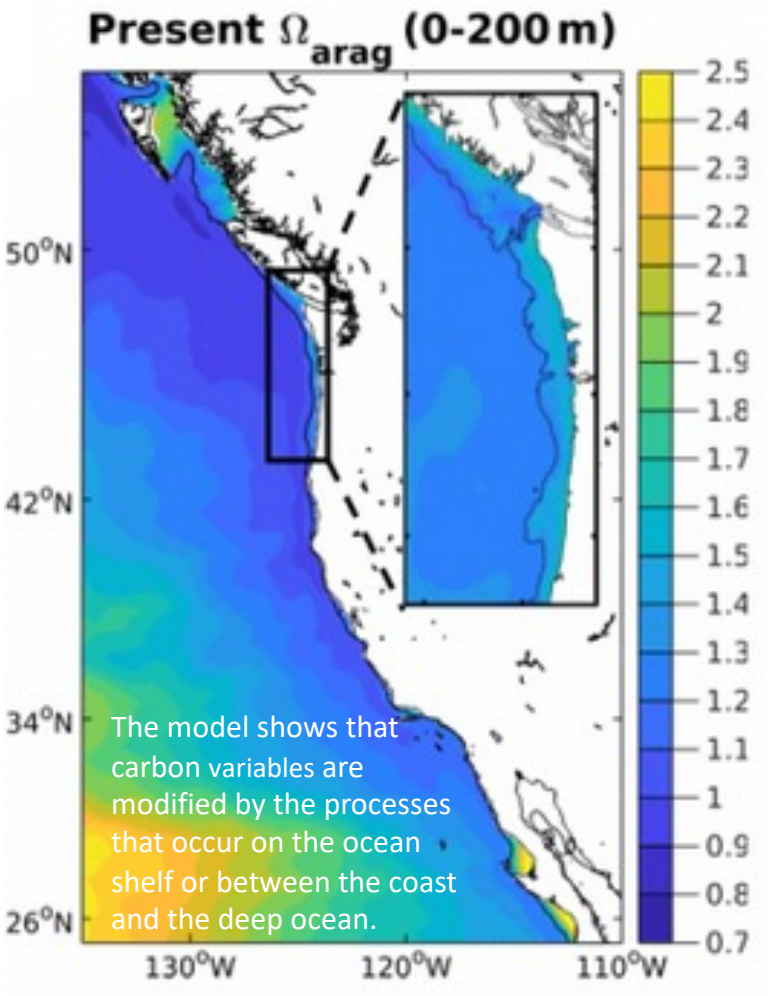
- January forecasts predict the onset of hypoxia ~10 days earlier than observed
- April forecasts predict the onset of hypoxia 1 day later than observed



Siedlecki, U Conn, J-SCOPE; NANOOS

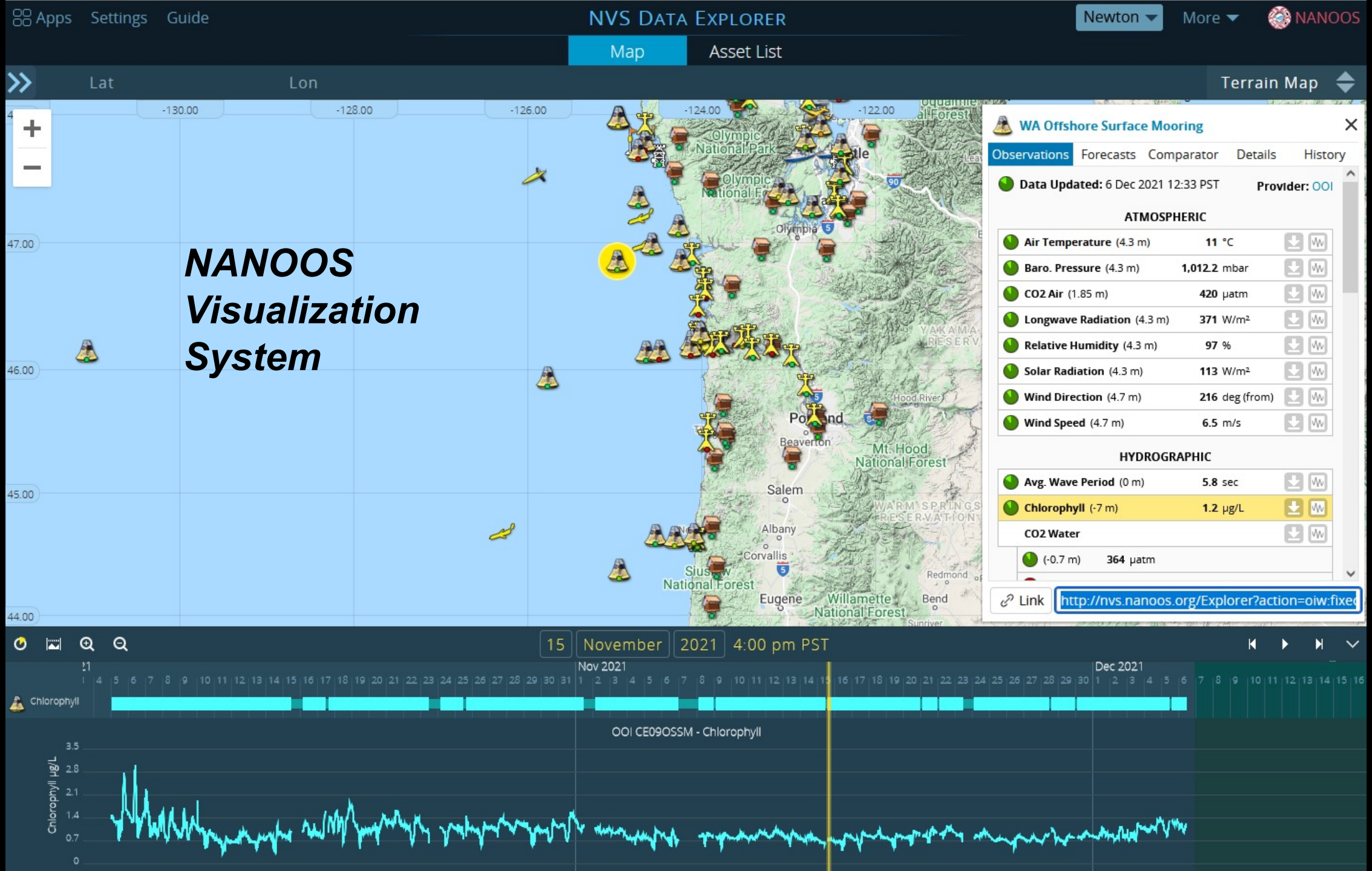
Quinault Indian Nation took management action based on observations and J-SCOPE forecasts to close the 2018 fishery early due to hypoxia.

Down-scaled end of century projections:



Siedlecki et al. 2021. Coastal processes modify projections of some climate-driven stressors in the California Current System. *Biogeosciences*, 18, 2871–2890. https://doi.org/10.5194/bg-18-2871-2021

https://oceanacidification.uw.edu/blog/2021/05/17/california-current-system/


Apps
Settings
Guide
NVS Data Explorer
Newton
More
NANOOS
Map
Asset List
Lat
Lon
Terrain Map
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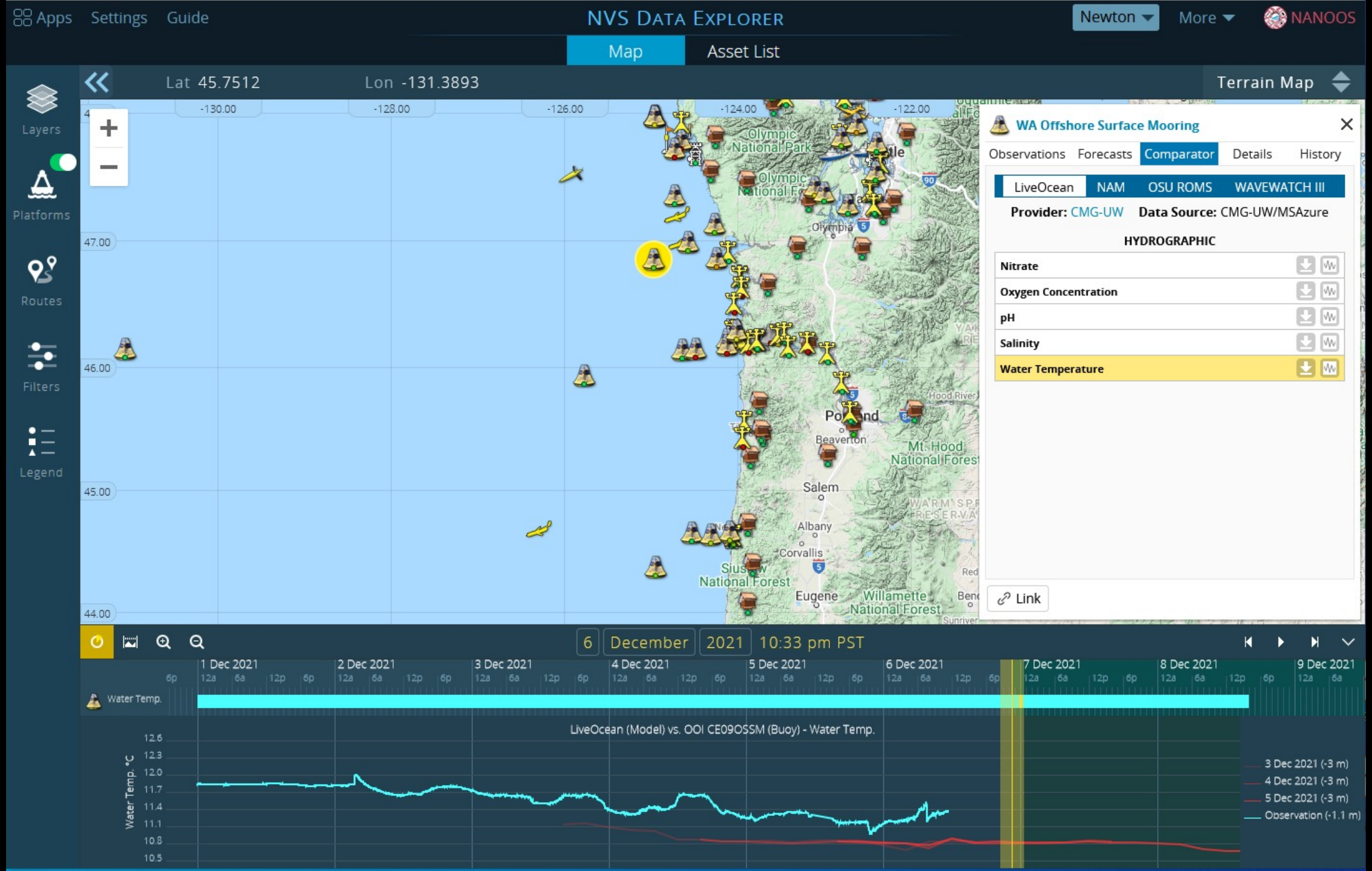
-124.00
-122.00
47.00
46.00
45.00
44.00
NANOOS Visualization System
WA Offshore Surface Mooring
Observations
Forecasts
Comparator
Details
History
Data Updated: 6 Dec 2021 12:33 PST
Provider: OOI
ATMOSPHERIC
Air Temperature (4.3 m) 11 °C
Baro. Pressure (4.3 m) 1,012.2 mbar
CO2 Air (1.85 m) 420 µatm
Longwave Radiation (4.3 m) 371 W/m²
Relative Humidity (4.3 m) 97 %
Solar Radiation (4.3 m) 113 W/m²
Wind Direction (4.7 m) 216 deg (from)
Wind Speed (4.7 m) 6.5 m/s
HYDROGRAPHIC
Avg. Wave Period (0 m) 5.8 sec
Chlorophyll (-7 m) 1.2 µg/L
CO2 Water
(-0.7 m) 364 µatm
Link
http://nvs.nanoos.org/Explorer?action=oiw:fixed
Olympic National Park
Olympia
Portland
Beaverton
Hood River
Mt. Hood National Forest
Salem
Albany
Corvallis
Eugene
Willamette National Forest
Bend
Redmond
15 November 2021 4:00 pm PST
Nov 2021
Dec 2021
Chlorophyll
OOI CE09OSSM - Chlorophyll
Chlorophyll [µg/l]
3.5
2.8
2.1
1.4
0.7
0


Apps
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NVS Data Explorer
Newton
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Terrain Map
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Platforms
Routes
Filters
Legend
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44.00
Olympic National Park
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Beaverton
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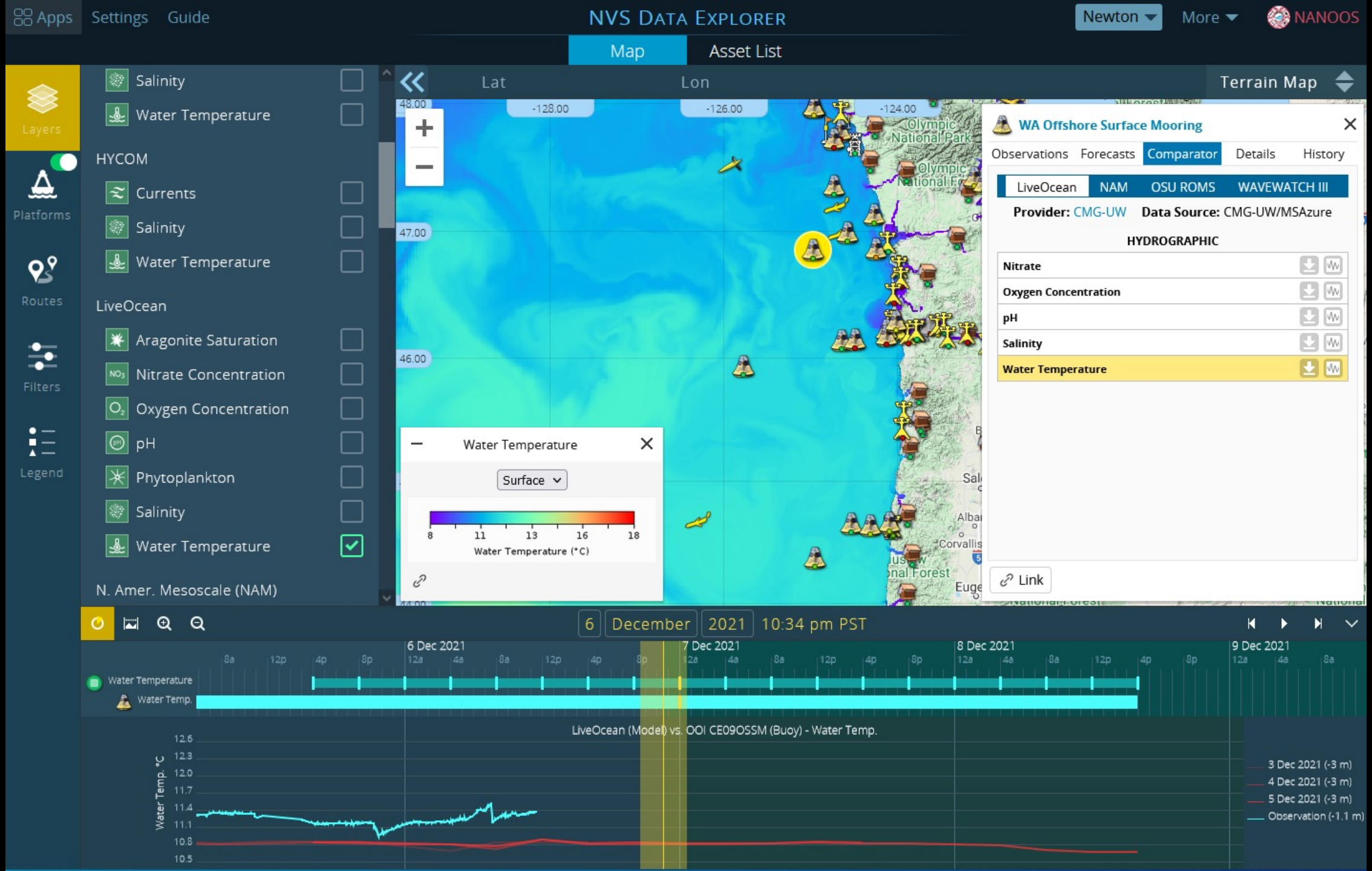
Eugene
Mt. Hood National Forest
Willamette National Forest
WA Offshore Surface Mooring
Observations
Forecasts
Comparator
Details
History
LiveOcean
NAM
OSU ROMS
WAVEWATCH III
Provider: CMG-UW
Data Source: CMG-UW/MSAzure
HYDROGRAPHIC
Nitrate
Oxygen Concentration
pH
Salinity
Water Temperature
Link
6
December
2021
10:33 pm PST
1 Dec 2021
2 Dec 2021
3 Dec 2021
4 Dec 2021
5 Dec 2021
6 Dec 2021
7 Dec 2021
8 Dec 2021
9 Dec 2021
Water Temp.
LiveOcean (Model) vs. OOI CE09OSSM (Buoy) - Water Temp.
Water Temp. °C
12.6
12.3
12.0
11.7
11.4
11.1
10.8
10.5
3 Dec 2021 (-3 m)
4 Dec 2021 (-3 m)
5 Dec 2021 (-3 m)
Observation (-1.1 m)


Apps
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Routes
Filters
Legend
Salinity
Water Temperature
HYCOM
Currents
Salinity
Water Temperature
LiveOcean
Aragonite Saturation
Nitrate Concentration
Oxygen Concentration
pH
Phytoplankton
Salinity
Water Temperature
N. Amer. Mesoscale (NAM)
Lat
Lon
Terrain Map
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-124.00
48.00
47.00
46.00
Olympic National Park
Water Temperature
Surface
8
11
13
16
18
Water Temperature (°C)
WA Offshore Surface Mooring
Observations
Forecasts
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Details
History
LiveOcean
NAM
OSU ROMS
WAVEWATCH III
Provider: CMG-UW
Data Source: CMG-UW/MSAzure
HYDROGRAPHIC
Nitrate
Oxygen Concentration
pH
Salinity
Water Temperature
Link
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December
2021
10:34 pm PST
6 Dec 2021
7 Dec 2021
8 Dec 2021
9 Dec 2021
Water Temperature
Water Temp.
LiveOcean (Model) vs. OOI CE09OSSM (Buoy) - Water Temp.
Water Temp. °C
12.6
12.3
12.0
11.7
11.4
11.1
10.8
10.5
3 Dec 2021 (-3 m)
4 Dec 2021 (-3 m)
5 Dec 2021 (-3 m)
Observation (-1.1 m)


Apps
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NANOOS
Map
Asset List
Layers
Platforms
Routes
Filters
Legend
Water Temp. (Climate)
Water Temp. (Anomaly)
Water Temp. (Mean)
NODC Ocean Atlas
Surface Salinity (Climate)
OSU AVISO Climate
Sea Level (Climate)
Sea Level (Anomaly)
OSU MODIS Climate
Chlorophyll (Climate)
Chlorophyll (Anomaly)
Chlorophyll (Mean)
Water Temp. (Climate)
Water Temp. (Anomaly)
Water Temp. (Mean)
Lat
Lon
Terrain Map
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47.00
46.00
Olympic National Park
Water Temp.
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2
4
Water Temperature (°C)
WA Offshore Surface Mooring
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Forecasts
Comparator
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Provider: OOI
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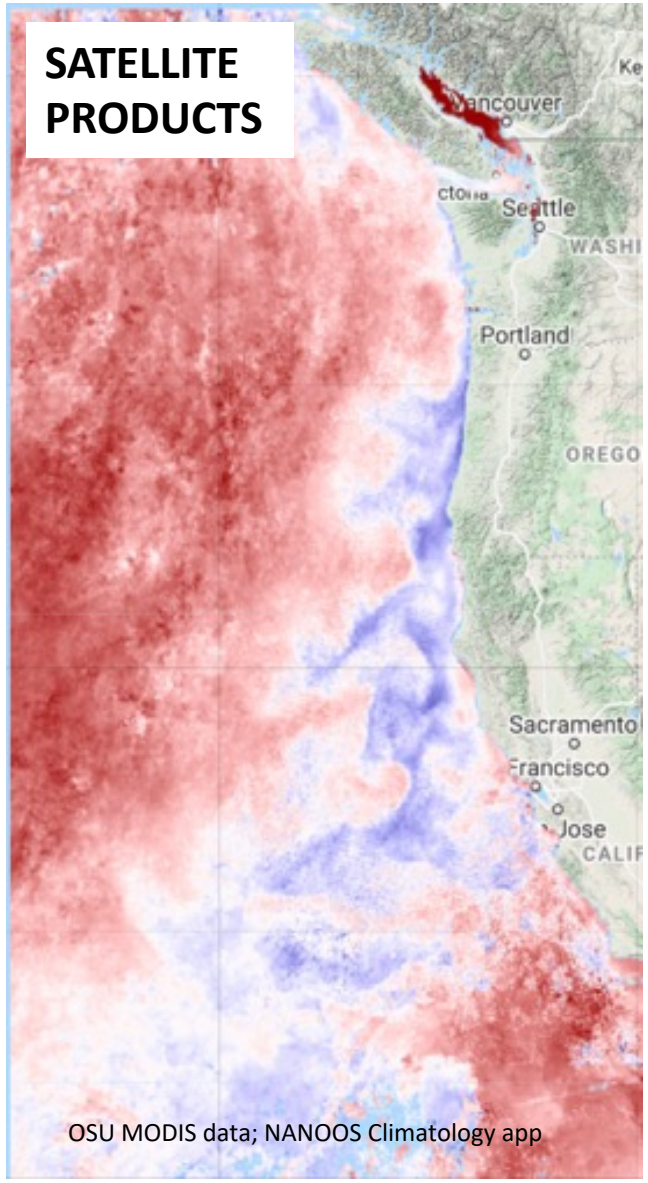
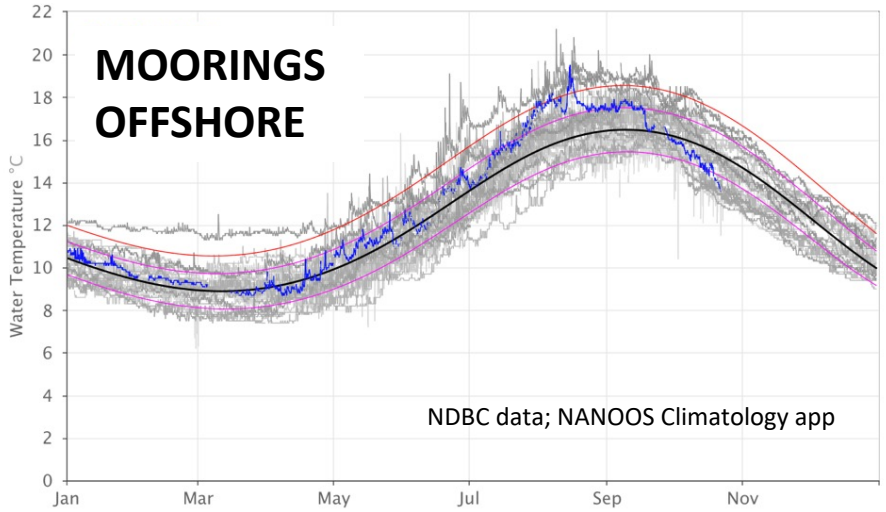
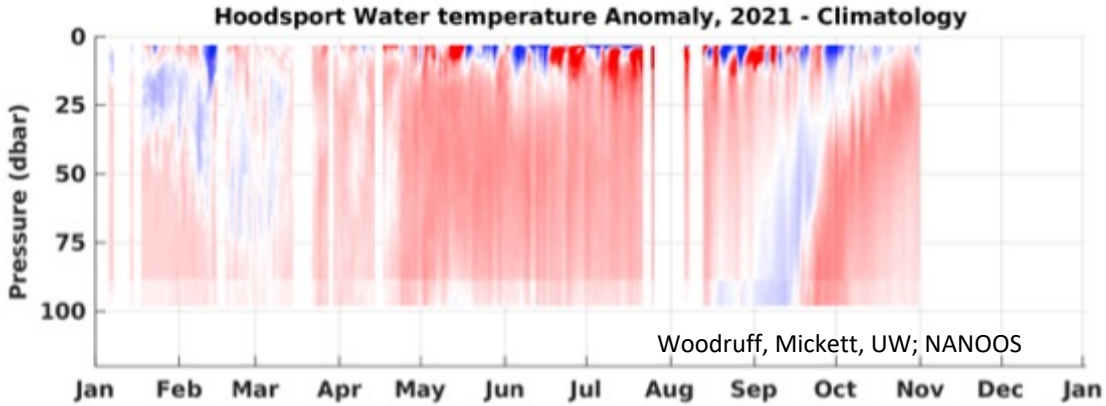
Link
15 November 2021 4:00 pm PST
Nov 2021
Dec 2021
Water Temp.
Air Temp.
OOI CE09OSSM - Air Temp.
Air Temp. °C
16
14
12
10
8
6

Marine Heat Waves and the Coasts





MOORINGS ESTUARINE

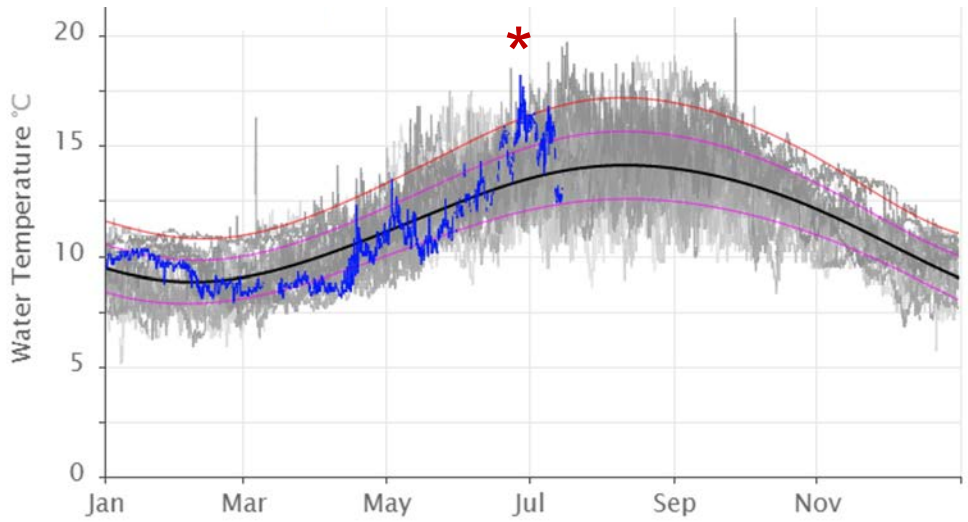


IOOS

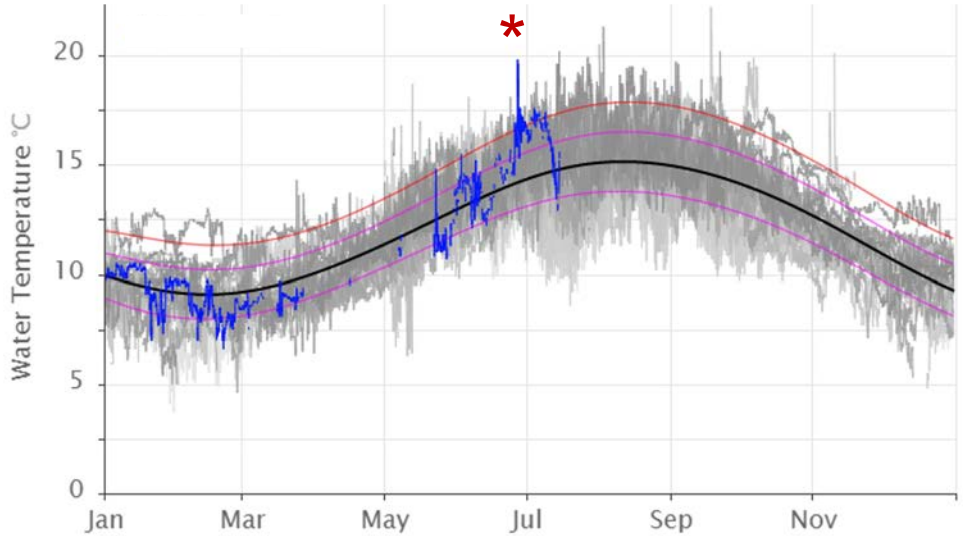
NANOOS: www.nanoos.org Climatology app

Sea Surface Temperature

NDBC Cape Elizabeth ● 34 yrs

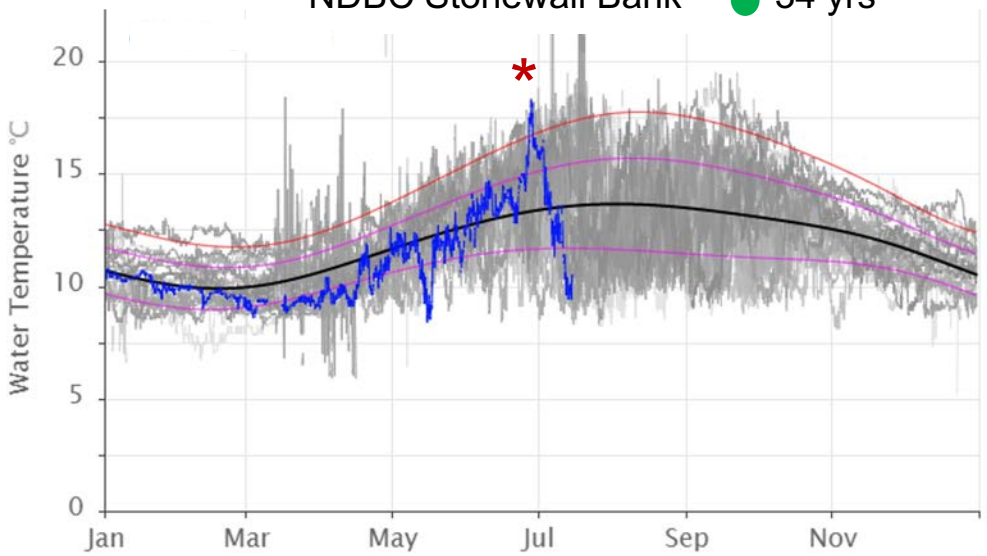


NDBC Columbia River Bar ● 37 yrs

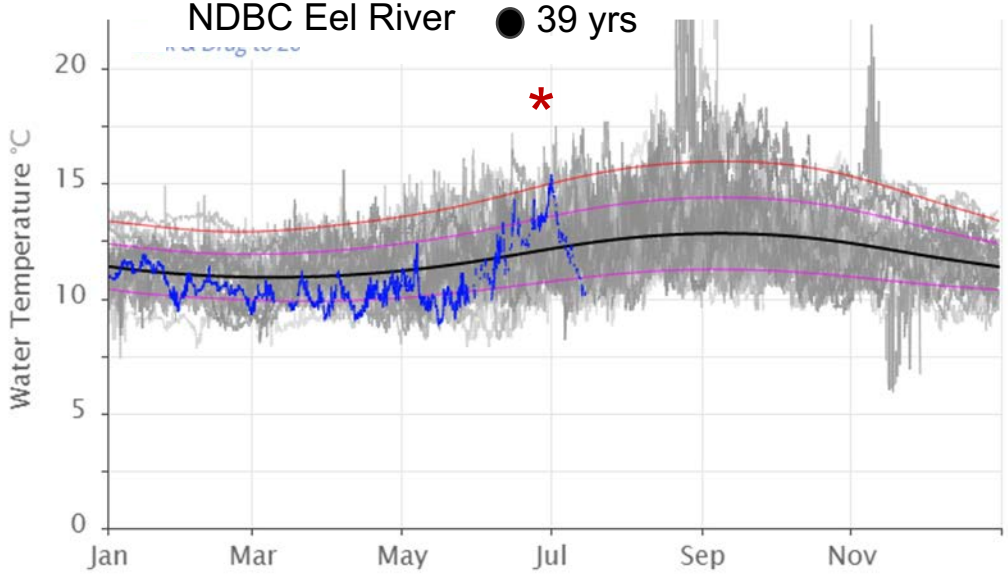


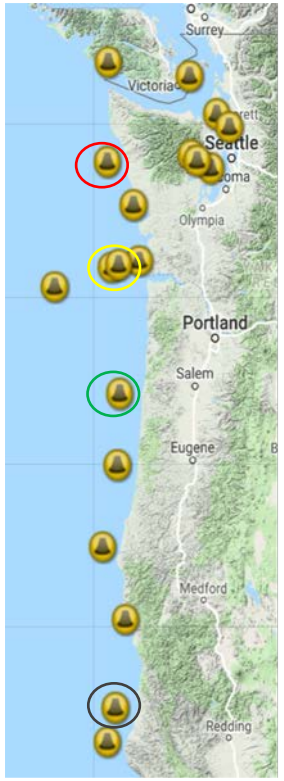
Seasonal Cycle n=34 Yrs
-1 STD
+1 STD
+2 STD
2021

NDBC Stonewall Bank ● 34 yrs

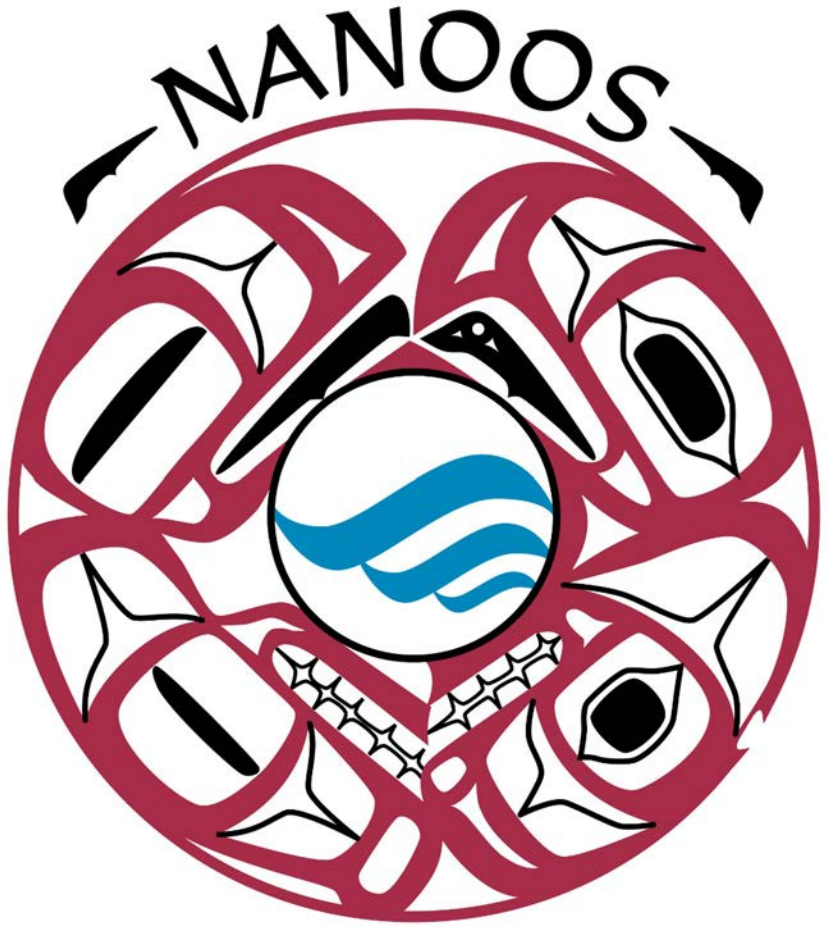


NDBC Eel River ● 39 yrs





* PNW heat dome



QUESTIONS ?