

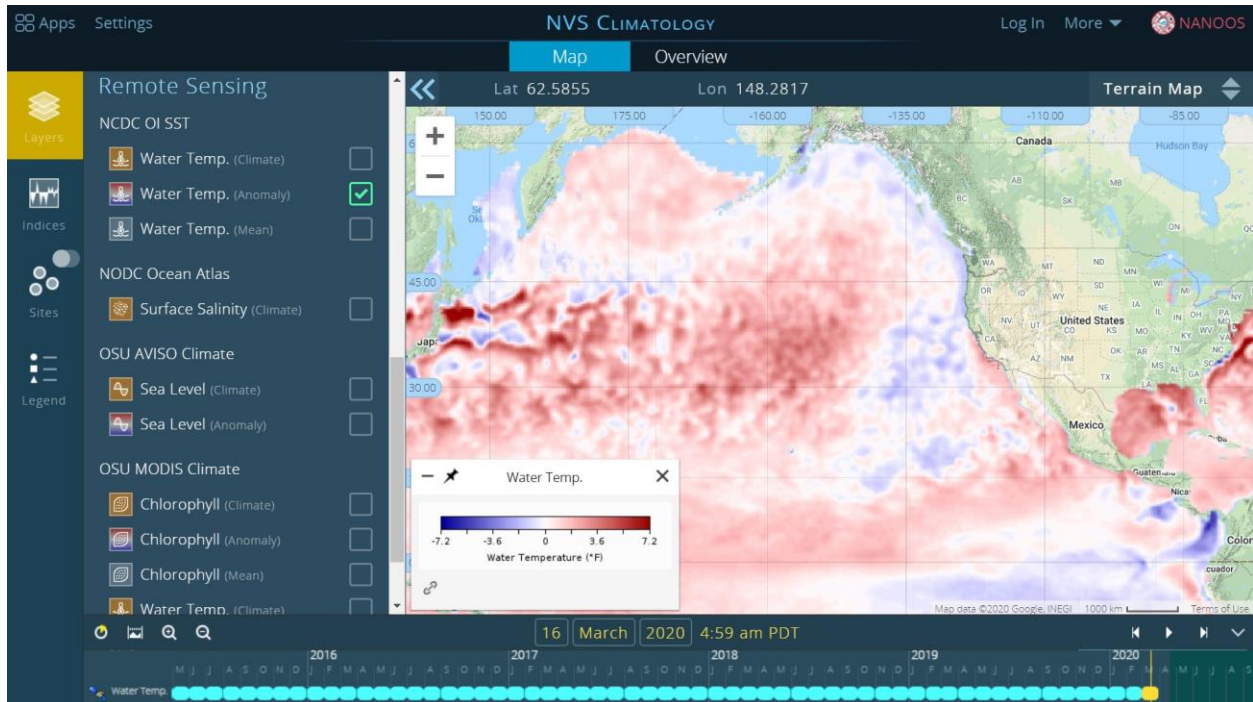
## How typical are current conditions?

NANOOS provides many sources of information for those wanting to track oceanographic conditions throughout the NE Pacific Ocean to be able to understand if the current conditions are typical or not. The **NVS Climatology App** was made for this purpose; by using this app people can easily compare present observations with data from previous years, thus gaining information on how typical or abnormal the current values are for variables like surface water temperature, chlorophyll, sea level, among others. NANOOS features data from both satellites and buoys, presenting these data relative to the typical conditions (= climatology) so one can visualize the current departure from those conditions (= anomaly). Here we provide information on how to use this app to view anomalies for the open ocean, coastal waters, and Pacific Northwest estuaries.

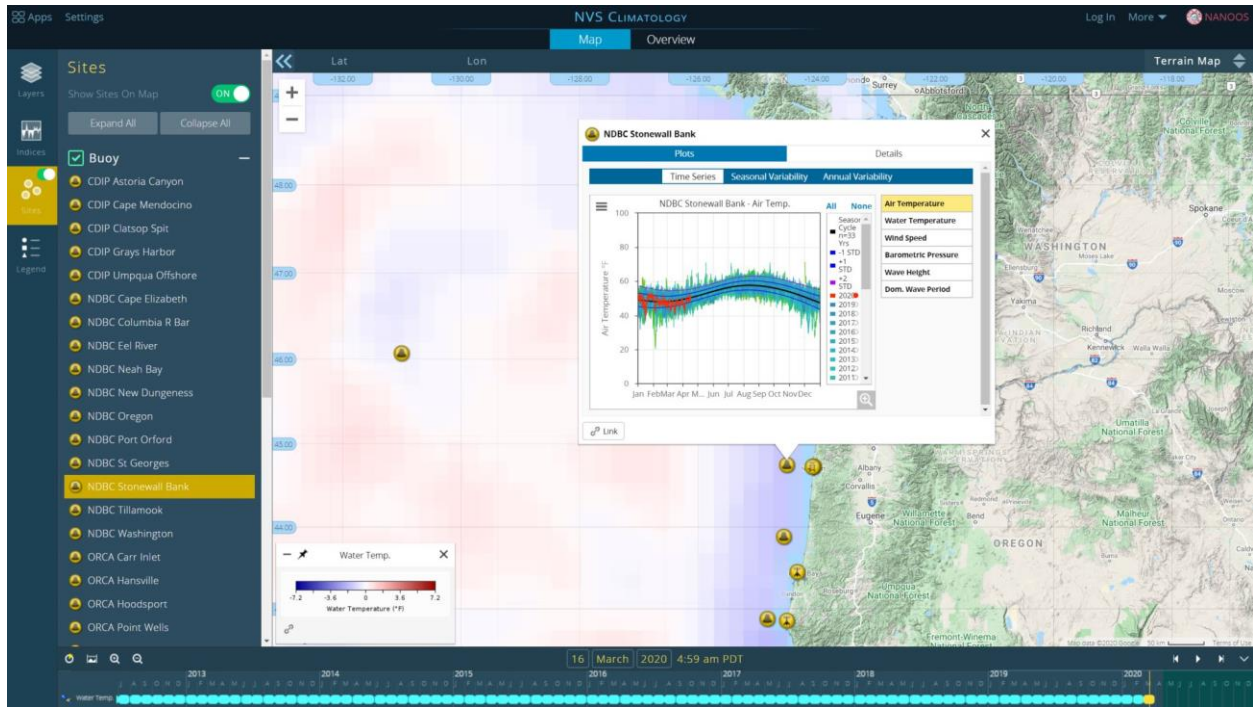
### Using the [NVS Climatology App](#):

A satellite view shows a wide expanse of the ocean. These are great tools for seeing large-scale phenomena like El Niño-La Niña or Marine Heatwaves (MHWs), which are associated with sea surface temperature anomalies. For scientific information about the 2014-2016 sea surface temperature anomalies in the NE Pacific, see the report from [Pacific Anomalies workshops](#).

To view satellite-measured sea-surface water temperature anomalies, select either “NCDC OI” or “OSU MODIS” Water Temp. (Anomaly) under Satellite Remote Sensing. Temperature departures from normal (anomalies) show warmer than average waters as red. You can zoom in and out on the map and use the timeline at the bottom to compare months and years. Click the day, month, or year (yellow font) for easy comparison. The satellites are operated by NOAA (NCDC OI) and NASA (MODIS) with analysis by Oregon State University, a NANOOS partner.

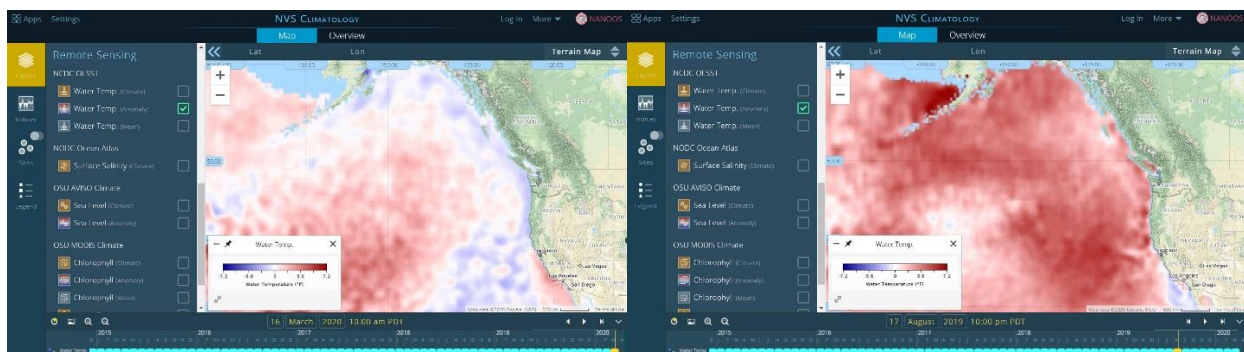


Another useful view from the Climatology App is the anomalies in real-time data from buoys, fixed shore platforms, and land stations. Viewers can see a comparison of the real-time data to historical data and means. By selecting a specific site, the pop-up screen allows users to compare real-time conditions such as water temperature, wind speed, air temperature, etc. to the ~40-y records at these locations. Data from the current year are shown as a red line. Measurements spanning the entire record are in light blue and light green, the historical mean in black, with +/- 1 standard deviation in dark blue and + 2 standard deviations in purple. Also, one can select data from any year in the record to visualize in red.

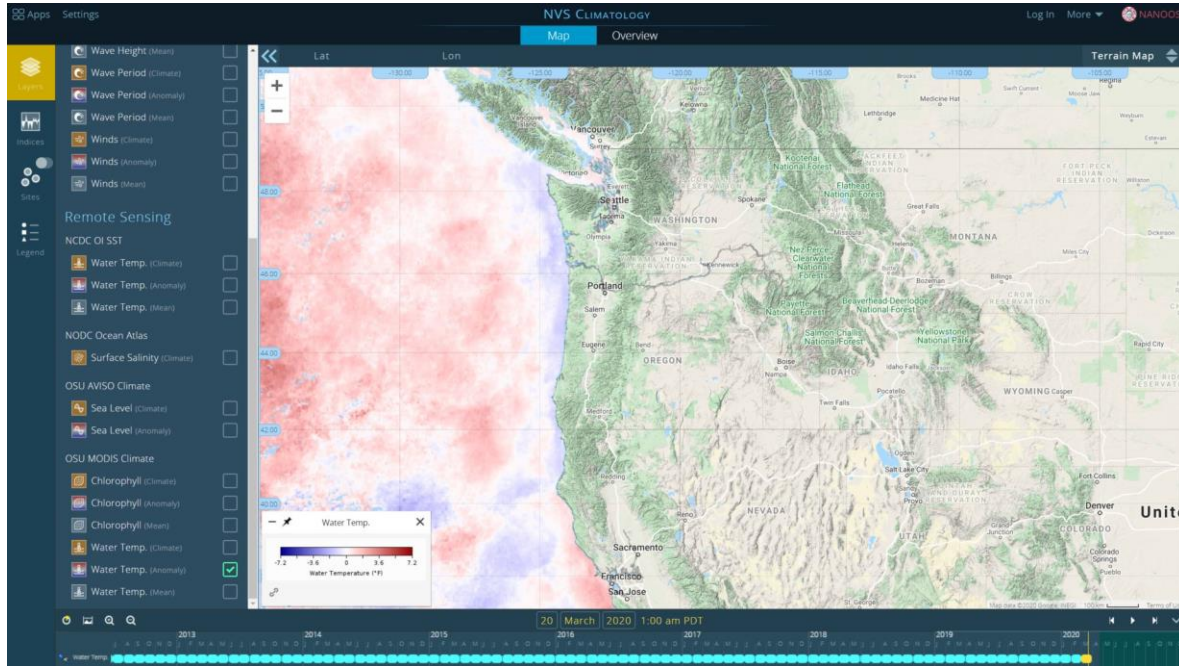


**What are the current water temperature conditions in the NANOOS region?**

Using the satellite data from the NVS Climatology App, one can see that during March 2020, a portion of offshore NE Pacific surface temperatures are warmer than average, as shown from the NCDC OI satellite imagery below left, but that the waters near the coast are cooler or close to average. In contrast, the March 2020 conditions are very different from August 2019 (below right) when warmer than average water associated with a MHW that persisted in the NE Pacific during summer. Changing the date, you can compare these conditions to those of the so-named “blob” marine heatwave that persisted in the NE Pacific from late 2013 throughout 2015, as reported in the [Pacific Anomalies workshops](#).

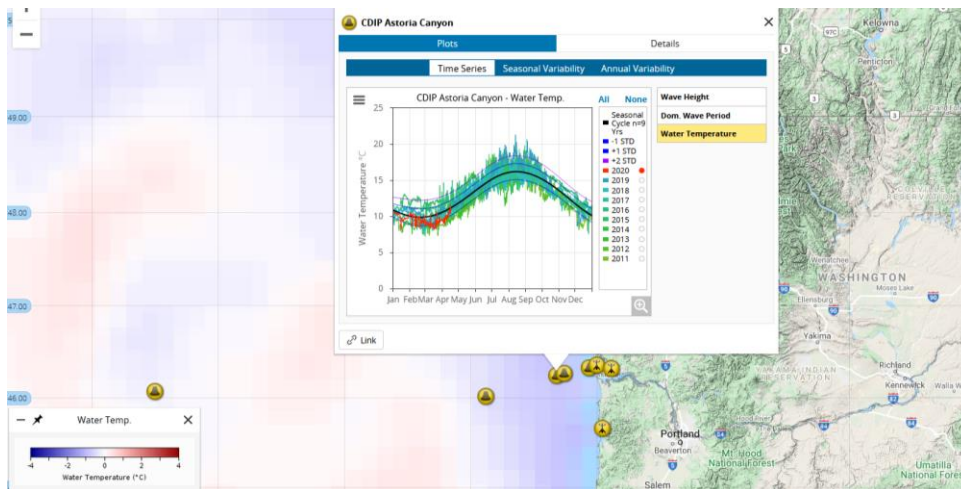


While the “NCDC OI SST” satellite projection shows sea surface temperatures on a global scale (user zoom-able), switching the view to the “OSU MODIS Climate” projection allows one to see higher-resolution imagery off the Pacific Northwest coast. With the added resolution of this projection, one clearly sees anomalously warmer surface temperatures offshore, yet colder than average waters along the continental shelf during March 2020.



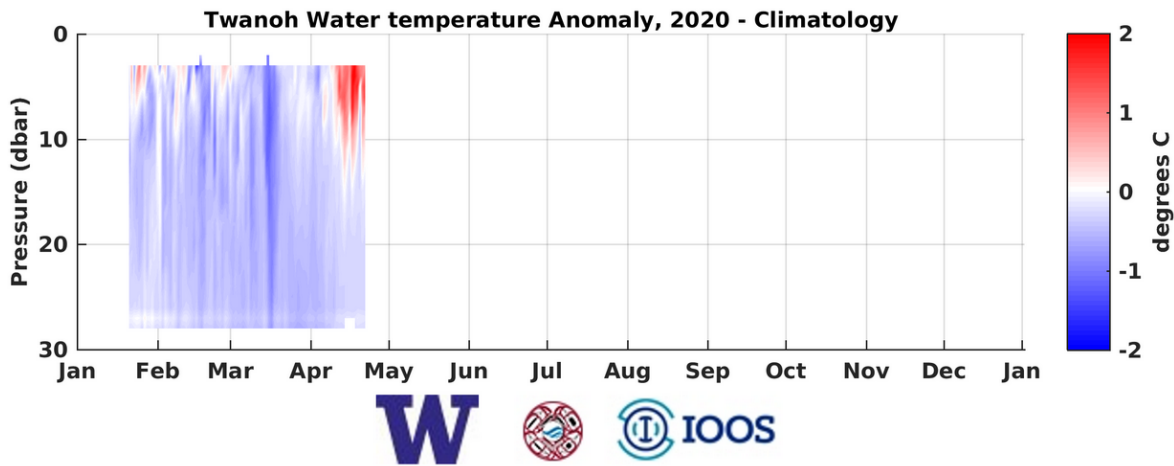
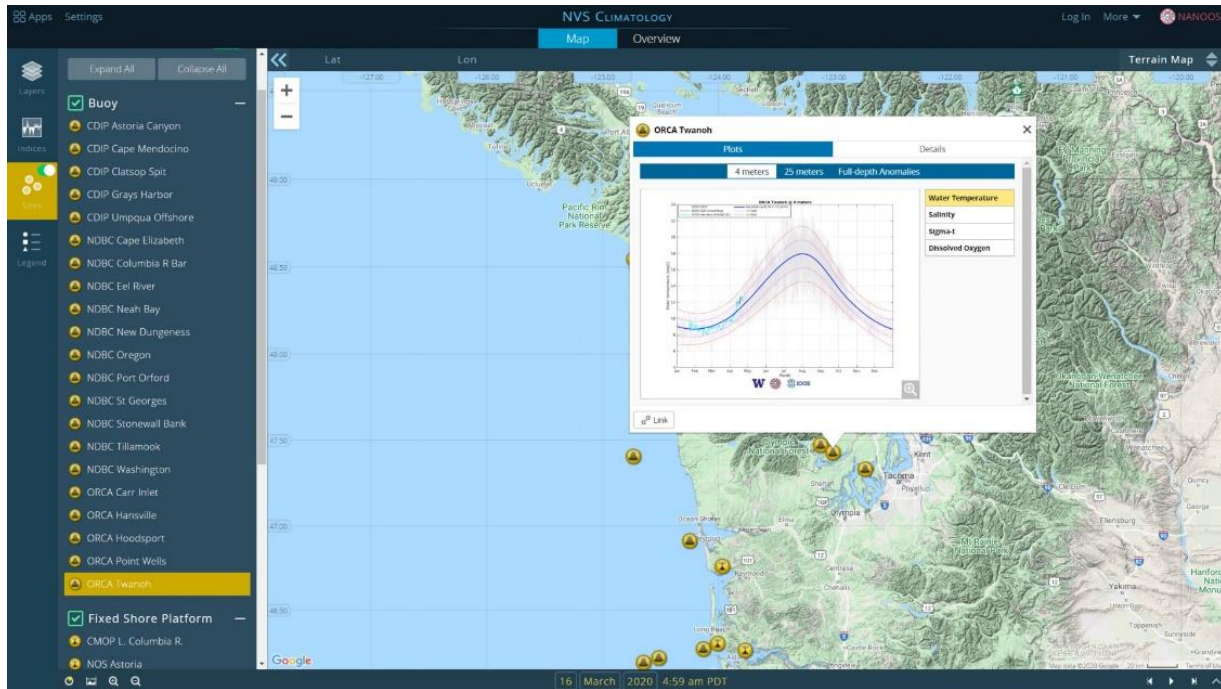
### Do buoy and satellite data agree?

To confirm the satellite observations of cooler waters along the coastal margin in March 2020, one can access measurements from buoy data. For example, the CDIP Astoria Canyon buoy, located off the mouth of the Columbia River, indicates cooler than average water temperatures during March 2020. The buoy data are consistent with the NCDC OI and OSU MODIS satellite water temperature anomaly imagery, as shown. Check out other buoys up and down the coast.



## What are the conditions in estuaries?

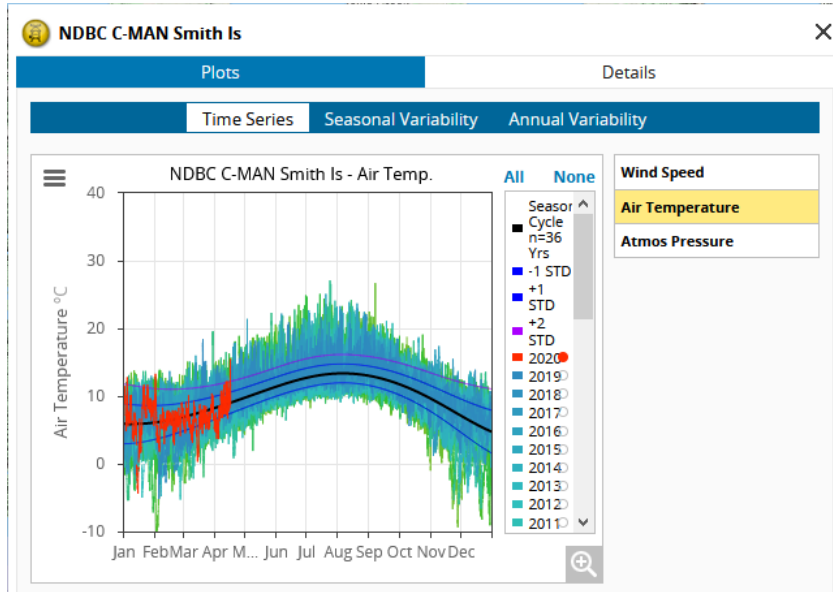
For Puget Sound, you may select one of the five profiling Oceanic Remote Chemical Analyzer (ORCA) buoys moored throughout the estuary. These buoys also indicate oxygen and salinity values. ORCA buoys are operated by the University of Washington, a NANOOS partner, with partial NANOOS support. As these are profiling buoys, one can select the “Full-depth Anomalies” to visualize these views.



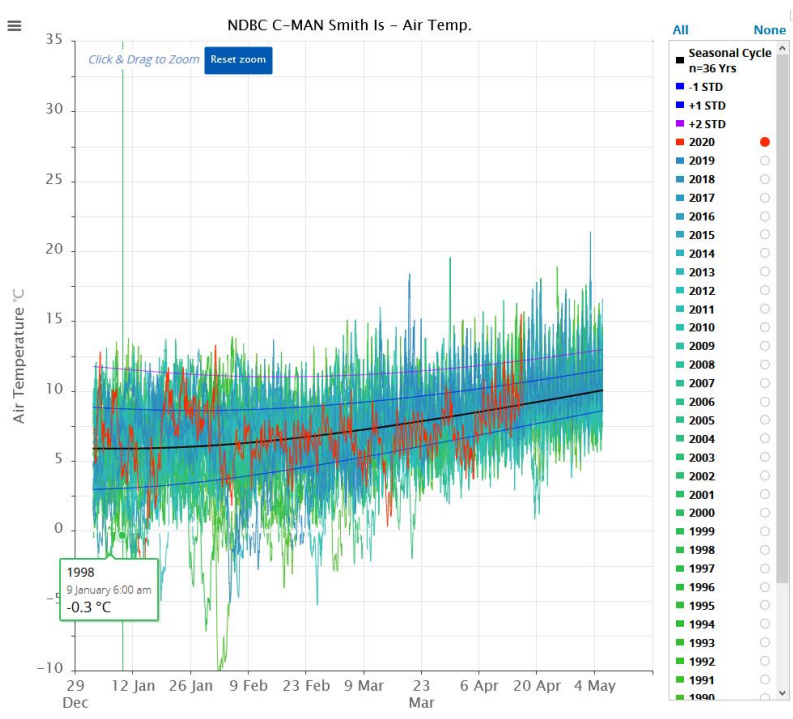
For the Columbia River and many other estuaries in Washington and Oregon, select the NOS platforms to see water temperatures. NOS platforms also measure water level and meteorological variables.

**What other variables can be seen similarly to temperature anomalies?**

CDIP buoys measure wave height and wave period. NOS platforms measure water level and meteorological variables. NDBS land stations measure wind speed, atmospheric pressure, and air temperature.

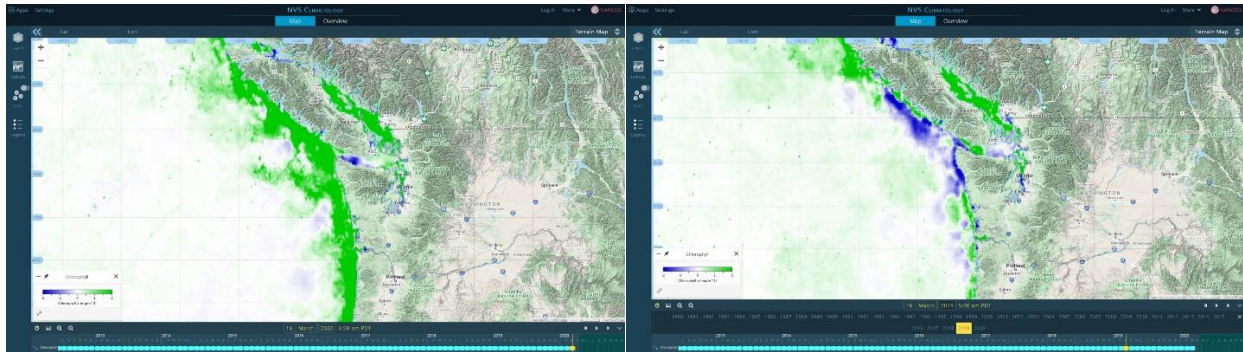


After expanding the view by clicking on the magnifying glass in the lower right corner, one can click and drag to zoom in on a portion of the data record. Change the year, change the zoom, mouse over the data to see values.



### ***How does chlorophyll look in the NANOOS region?***

From the OSU MODIS satellite data, one can also see average (climate) and anomalous chlorophyll concentrations. By using the timeline at the bottom of the NVS screen, one can see that current chlorophyll concentrations are noticeably higher in spring 2020 than they were at the same time last year, particularly off the coast of Washington. This year's higher chlorophyll concentrations may be the result of a variety of factors, including sunlight or low turbulent mixing from winds/waves, etc. Checking back over time, one can see patterns and compare data types to better understand ocean dynamics.



### ***What else can be tracked in the NVS Climatology app?***

Remote sensing data for average surface salinity values on a global scale are available from 1981 – present from the NODC Ocean Atlas. Climate and Anomaly data for sea level are also provided from the OSU AVISO Climate satellite. Model outputs include global hindcast data for wave height and wave period, as well as wind speed and direction.

### ***Any questions?***

Contact us at [http://www.nanoos.org/contact\\_us/contact\\_us.php](http://www.nanoos.org/contact_us/contact_us.php)