**CLIMATE NARRATIVE, late February 2019**

**WEST COAST OF UNITED STATES AND NORTH PACIFIC**

In night-time AVARR imagery, areas of negative sea surface temperature (SST) anomalies have spread and intensified in the North Pacific (NP) during February. Negative SST anomalies (≥ -2°C) occurred in areas along the US west coast from 37°N to 41°N. Negative anomalies were found offshore of North America from 20°N to 50°N and extending southwest to 10°N, 180 E/W. Weak positive SST anomalies were otherwise pervasive, with larger anomalies (≤ 2°C) observed in the Bering Sea and between 25°N and 45°N in the central and western NP.
http://www.ospo.noaa.gov/Products/ocean/sst/anomaly/
https://coastwatch.pfeg.noaa.gov/elnino/coastal_conditions.html

During February, three large areas (>10,000 km$^2$) of **sea level height anomaly** (SLA) occupied most of the NP. A band across the equator, between 160°E and 120°W extended northeastward to the coast of central America and Mexico. A broad band of negative SLA (≥-20 centimeters) extended from 10°N, 120°E, northeast to 20°N, 160°W. The third anomaly band (≤25 cm) occurred in the western NP, north of 20°N.
http://www.cpc.ncep.noaa.gov/products/analysis_monitoring/ocean/weeklyenso_clim_81-10/wksl_anm.gif

Through February, the coastal bands of **Chorophyll-a** (Chl-a) with surface concentration ≥ 2 mg/m$^3$ dispersed, with the formation of filaments of Chl-a reaching seaward and ocean eddies of lower concentration approaching the coast. These processes produced an irregular coastal Chl-a zone, varying in width of 25 to 300 km, extending from northern Mexico to Canada. Smaller, inshore areas of Chl-a concentration exceeding 6 mg/m$^3$ occurred nearshore.
https://coastwatch.pfeg.noaa.gov/coastwatch/CWBrowserWW180.jsp#

At the **Cape San Martine Data Buoy** (46028), off Central California (35.7°N), the long-term average surface temperature for February is 12.6°-12.8°C, compared to an average of 13.3°C for February 2019. Ten-day averages were 13.6, 13.3 and 12.9°C for the beginning, middle and end of February, respectively, and noted for the other buoys as [13.6, 13.3, 12.9°C]. At the **St. Georges Data Buoy** (46027), 8 nautical miles NW of Crescent City (41.9°N), the long-term and February 2019 SST is 10.6°-10.9°C and 10.9°C, respectively [11.2, 10.9, 10.6°C]. At the **Tillamook Data Buoy** (46089), 85 nautical miles WNW of Tillamook, Oregon (46°N), the long-term and February 2019 SST was 10.0-10.2°C and 10.0°C, respectively [10.4, 9.9, 9.7°C].
https://www.ndbc.noaa.gov/station_page.php?station=46028

The **La Jolla** (32.9°N) **shore station Subtidal Water Temperature (STWT)** varied from 13.4° to 15.9°C during February 2019 with a monthly average of 14.9°C. In Southern **Monterey Bay** (36.6°N), STWT fluctuated between 12.7 and 14.0°C, with a February average of 13.4°C. **Arena Cove** (38.9°N) STWT varied between 10.0 and 12.9°C with a monthly average of 11.9°C. **Neah Bay**, (48.4°N) STWT varied between 5.1 and 9.0°C with a February average of 7.3°C.
https://tidesandcurrents.noaa.gov/stations.html?type=Physical+Oceanography

**EQUITORIAL AND SOUTH PACIFIC (late February)**
Negative SST anomalies became more common across the South Pacific (SP), as mild El Niño conditions intensified along the central and eastern equatorial Pacific. Subsurface ocean temperature anomalies (2°-5°C) persisted at 50-100 m. Much of the SP had neutral to weakly positive SST anomalies, but negative SST anomaly (>-2°C) was found in areas (≥5,000 $km^2$) along the coast of southern Chile, intermittently across the SP, and along the northeastern coast of Australia. Areas of positive SST anomaly (≤2°C) appeared centered near 40°S and between New Zealand and Australia.
http://www.ospo.noaa.gov/Products/ocean/sst/anomaly/
http://www.pc.ncep.noaa.gov/products/analysis_monitoring/ocean/weeklyenso_clim_81-10/wksl_anm.gif

The **NOAA OCEANIC EL NIñO INDEX (ONI)** Index values of 0.8 for NDJ, and 0.8 for DJF are fourth and fifth consecutive El Niño positive values.
http://www.cpc.ncep.noaa.gov/products/analysis_monitoring/lanina/enso_evolution-status-fcsts-web.pdf

**NOAA / NCEI PACIFIC DECADAL OSCILLATION INDEX (PDO)** series had eleven consecutive negative or neutral values, including -0.78, -0.14, -0.29 and -0.55 for November through February 2019. https://www.ncdc.noaa.gov/teleconnections/pdo/

The monthly **PACIFIC / NORTH AMERICAN (PNA) teleconnection Index** computed from western hemisphere atmospheric pressure had neutral to positive monthly values from November 2018 through January 2019, but became strongly negative for February 2019, at -3.49. http://www.cpc.noaa.gov/data/teledoc/pna.shtml

**February ERD Upwelling Index (UI),** was low magnitude throughout the range from 21°N to 60°N. UI anomaly was positive from 42°N poleward.
https://upwell.pfeg.noaa.gov/products/PFELData/upwell/monthly/table.1902

**PRECIPITATION and RUNOFF** (Late February)
February 2019 precipitation remained below average along the Cascade Range of Washington and Oregon, however, many parts of California received more than 200% average February precipitation.
https://cdec.water.ca.gov/reportapp/javareports?name=PRECIPSUM
The **Fraser River**, measured at Hope, BC, was flowing at about at about 26,483 cubic feet per second (cfs) [historical median as cfs, 27,189 cfs]). https://wateroffice.ec.gc.ca
The **Puyallup River** at Puyallup, Washington was flowing at 1,500 cfs [2,000 cfs]. The **Skagit River** near Mount Vernon was flowing at 10,000 [14,000 cfs]. The **Columbia River** at the Dalles 120,000 [130,000 cfs]. The **Rogue River** in Oregon was flowing at 30,000 [6,000 cfs] at Agness. In California, the **Klamath River** near Klamath was transporting at 109,850 [23,300 cfs]. **Sacramento River** transport was 85,100 [32,100 cfs] at Freeport. **San Joaquin River** flow was 15,700 [3,600 cfs] at Vernalis.
https://waterdata.usgs.gov/ca/nwis/current/?type=flow
https://www.cnrfc.noaa.gov/awipsProducts/RNOWRKCLI.php=

**NOTE: Sun Spot Progression** in Solar Cycle 24 appeared to be reaching a minimum during February 2019, sooner than previously predicted.
https://www.swpc.noaa.gov/news/solar-cycle-24-status-and-solar-cycle-25-upcoming-forecast

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