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The eastern boundary upwelling system off the west coast of North America is more acidic than the open ocean. High NO_3, high pCO_2 conditions exist in the Salish Sea driven by upwelling of low O_2, high NO_3 and high pCO_2 water from the California Undercurrent (CU). Similar conditions exist in San Francisco Bay. Scientists from NOAA and the USGS collected a time series of data for temperature, salinity, oxygen and pCO_2 from March 2013 to June 2015 at the Exploratorium Wired Pier in San Francisco. pCO_2 ranged from 550 to 1000 μatm and was always higher than atmospheric values. There was an inverse relationship between salinity, O_2 and pCO_2. pCO_2 increased when O_2 decreased and salinity increased. These properties are due to upwelling from the CU. The main process is natural aerobic respiration in the region where the CU originates, which is the oxygen minimum zone in the eastern tropical North Pacific. The properties in San Francisco Bay can be compared with properties in the CU south and north of San Francisco Bay, collected during Wecoma Cruise W0705A. These sections show that the core of the CU is located at the shelf break at depths of 175m to 250m. This water was last at the sea surface at approximately 50°S; 150°W in the west-central South Pacific and reached the US west coast via the Pacific Equatorial Water (PEW). As the CU flows poleward along North America, it mixes laterally with colder, fresher, younger Pacific Subarctic Upper Water (PSUW) which outcrops in the NW North Pacific (near 50°N, 170°E). The contribution of the low O_2 PEW southern end-member decreases poleward and off the central California coast the CU has nominal contributions of 50% PEW and 50% PSUW. The anthropogenic “ocean acidification” contribution to DIC in the source waters of the California Undercurrent is presently ≤ 20% of the total increase in DIC, but it will increase in importance in the future. The remaining increase in DIC is due to natural aerobic respiration.