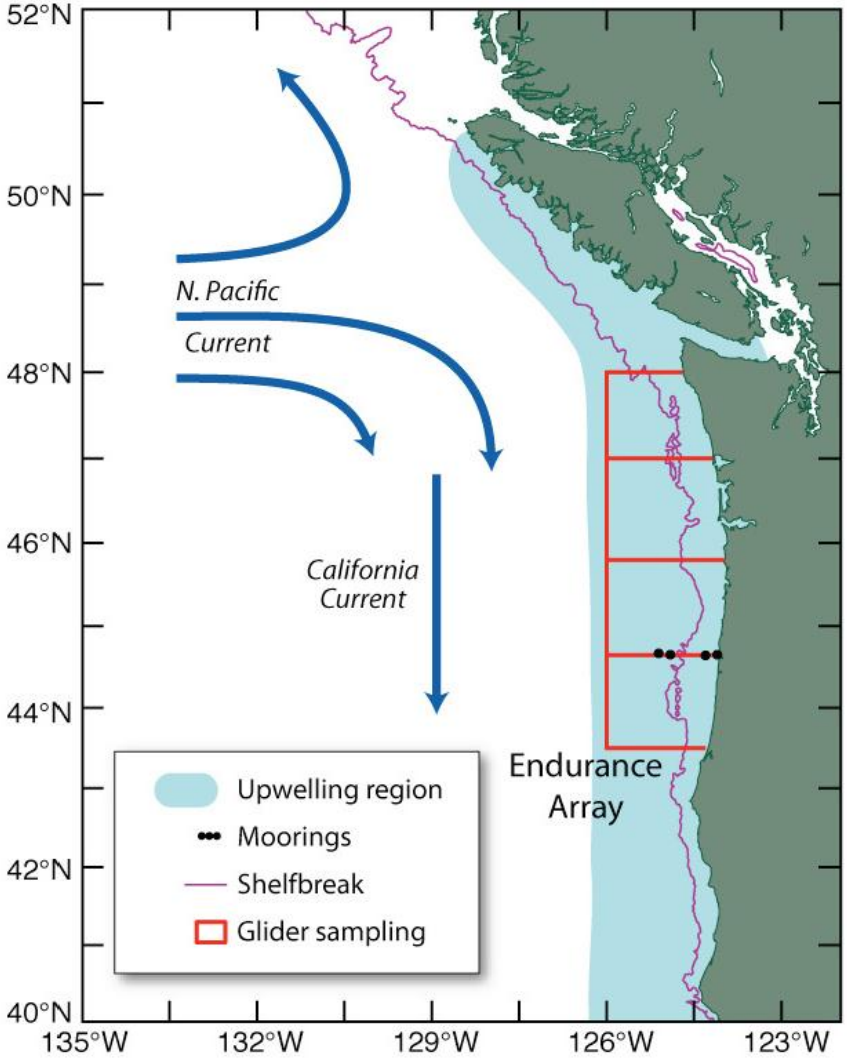
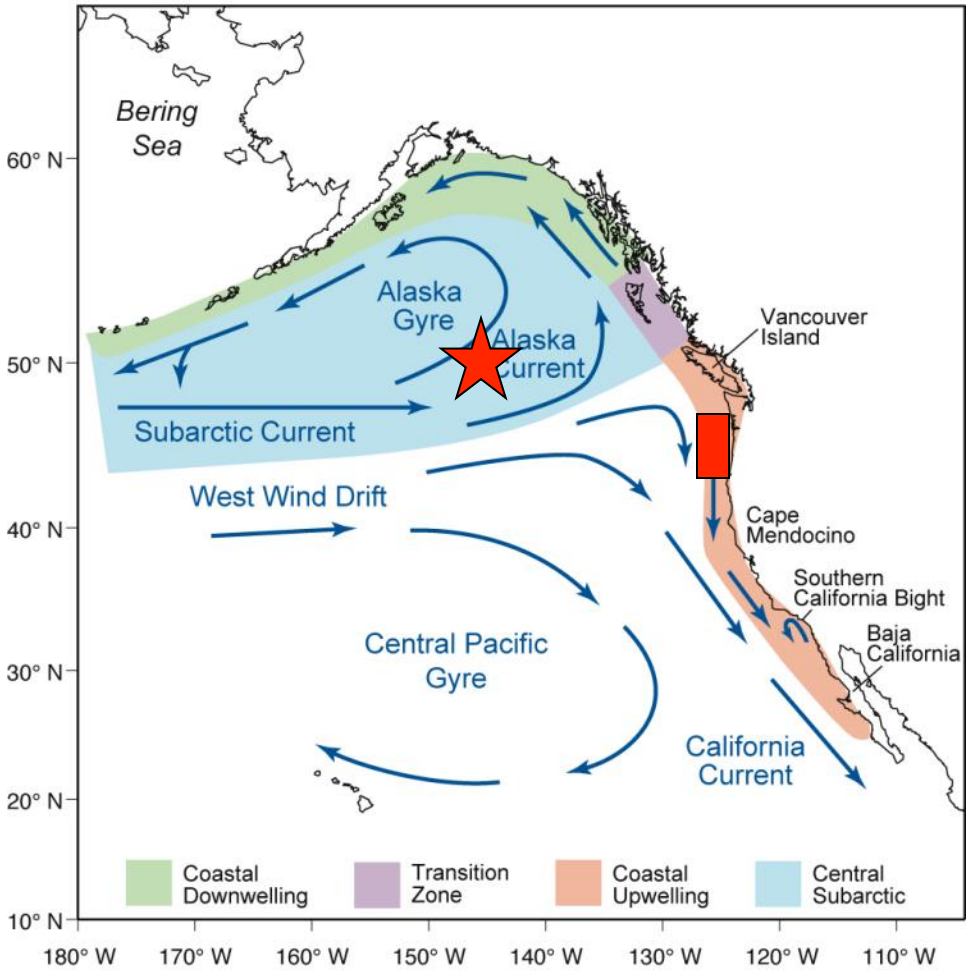
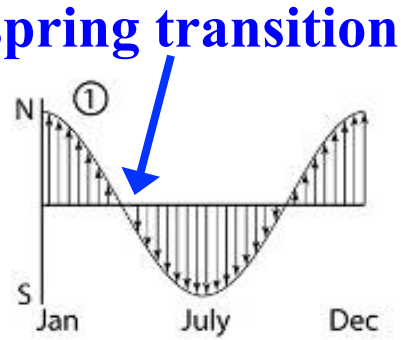
High-latitude climate connection between global and coastal

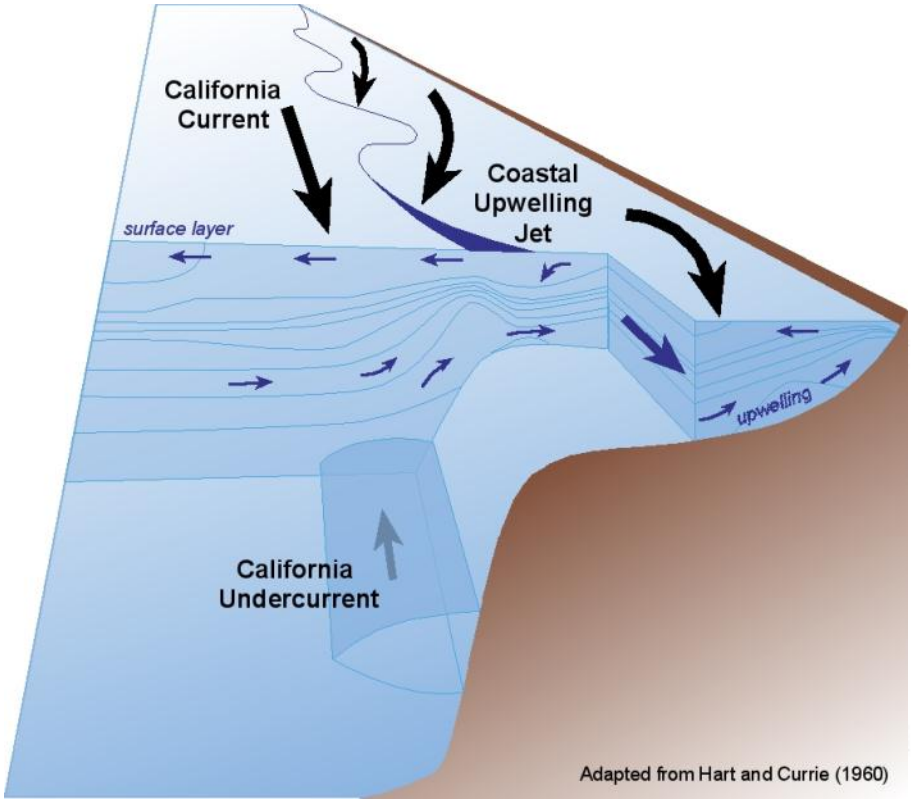


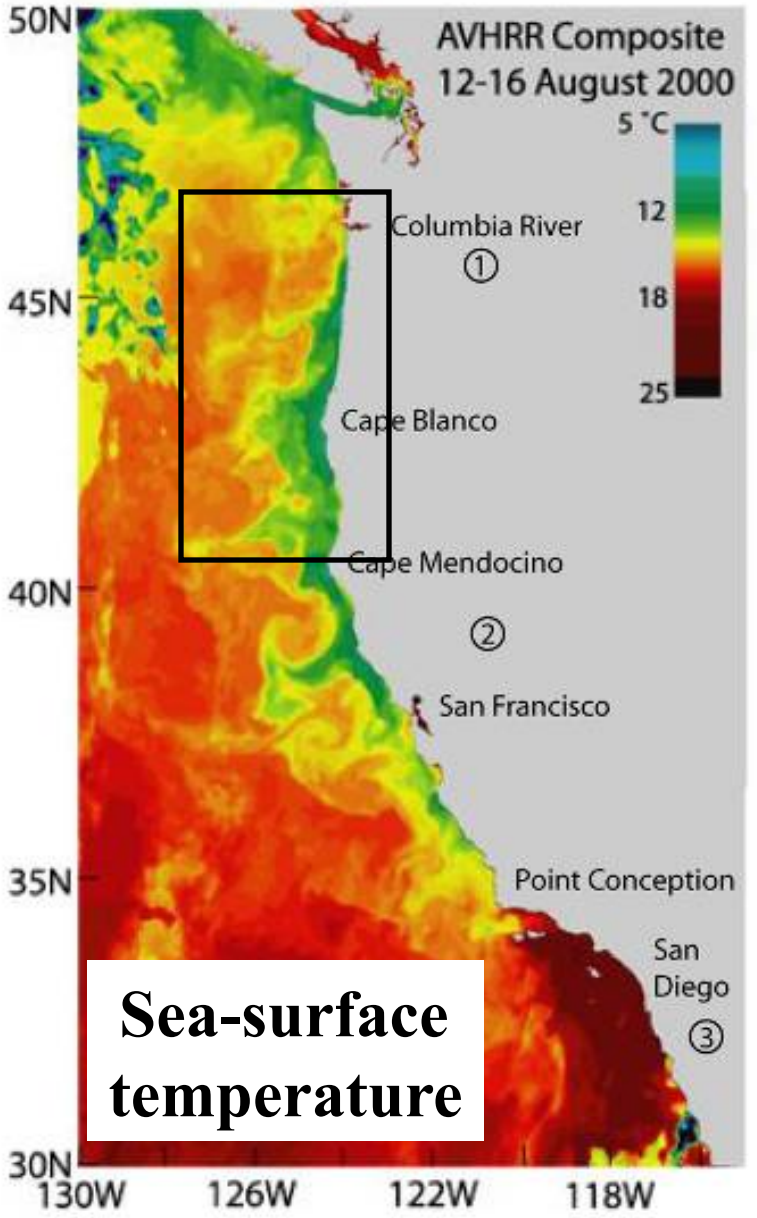


Upwelling supports a productive marine ecosystem in the Northern California Current

Seasonal cycle of winds





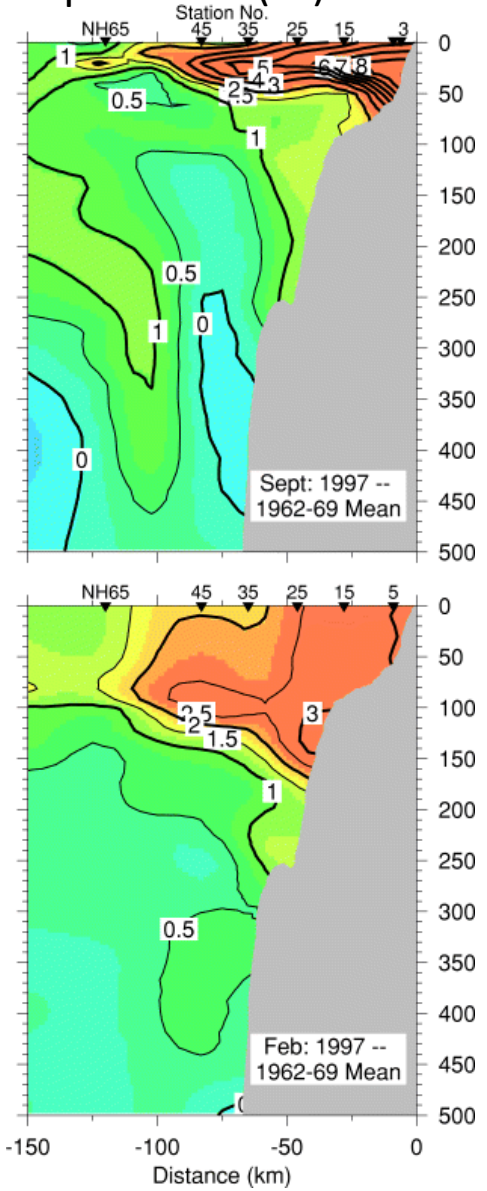


Warm water anomalies, changes in stratification, and changes in the water properties of the upwelling "source" waters (temperature, nutrients, dissolved oxygen) can profoundly influence the marine ecosystem.

Example:

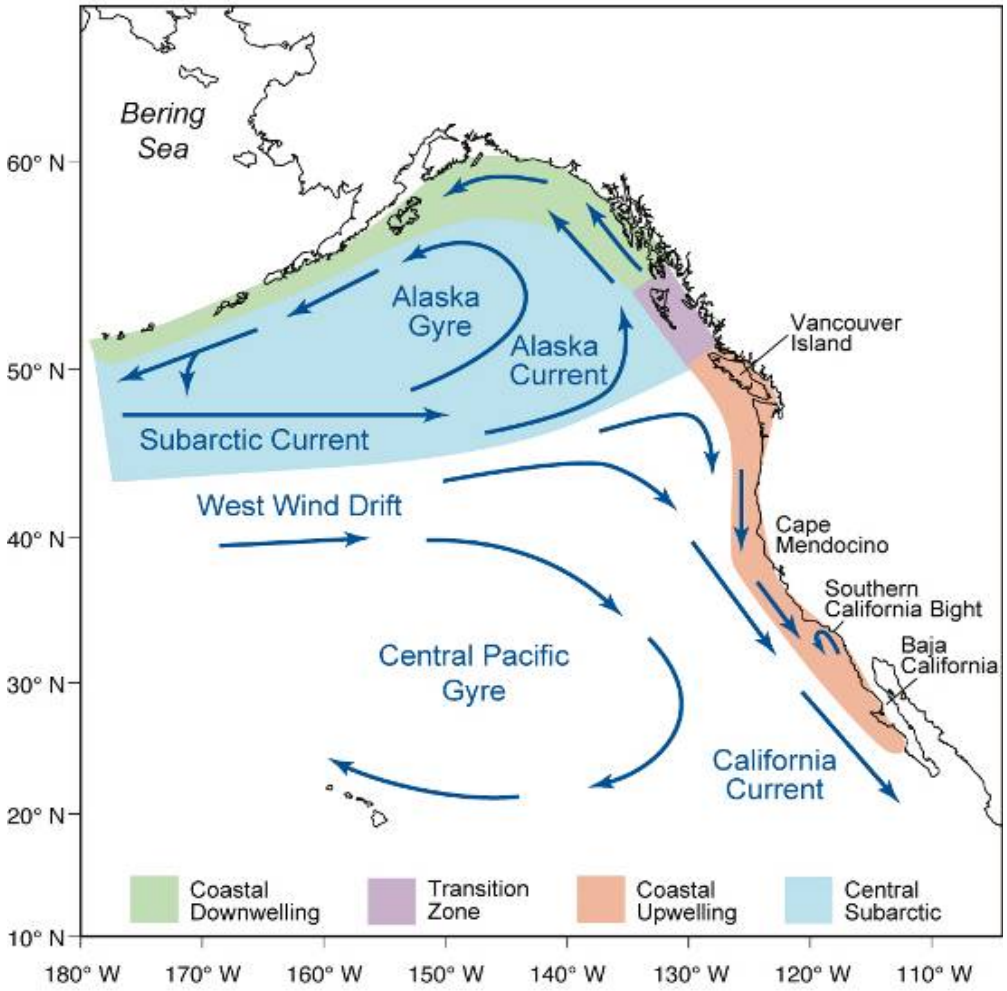
1997-1998 El Niño

Newport Hydrographic Line
44° 39'N
Temperature (°C) Anomaly

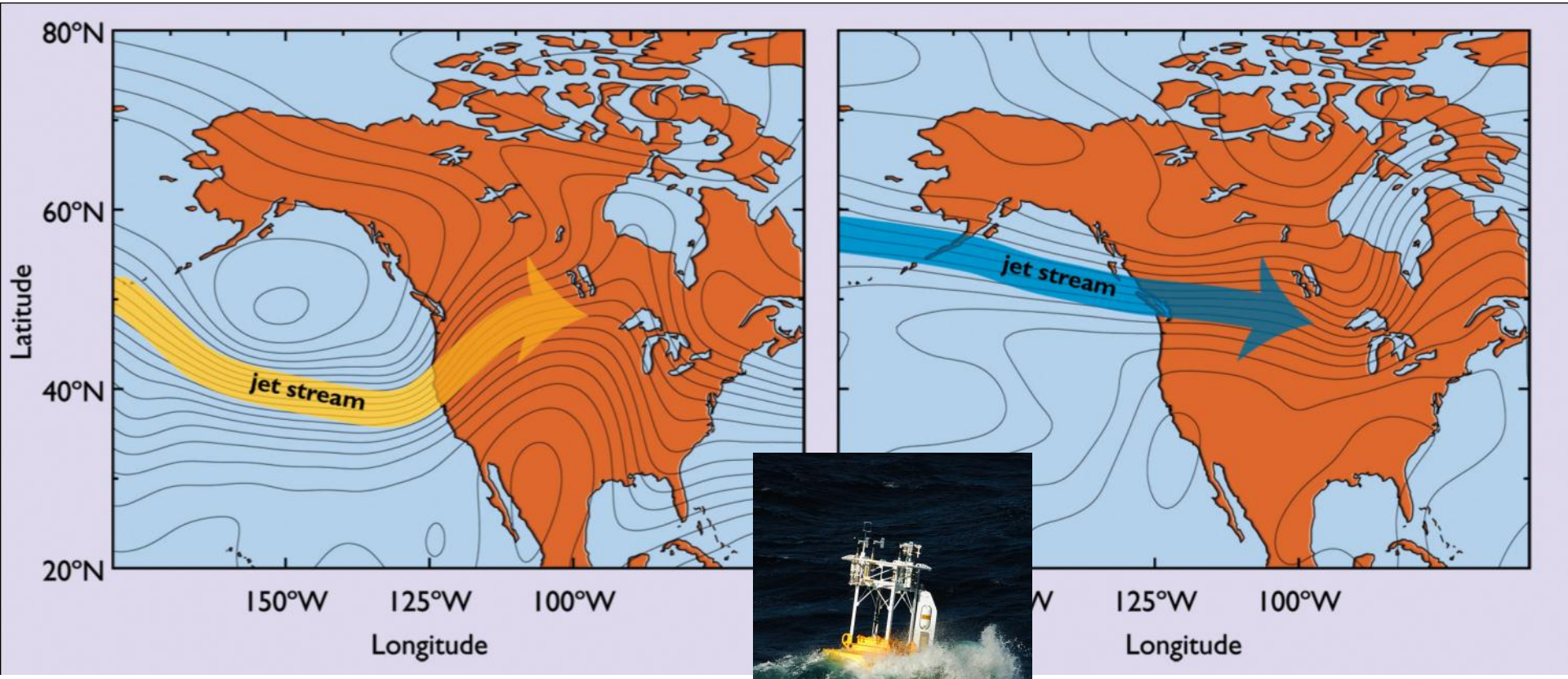


Huyer et al. (2002)

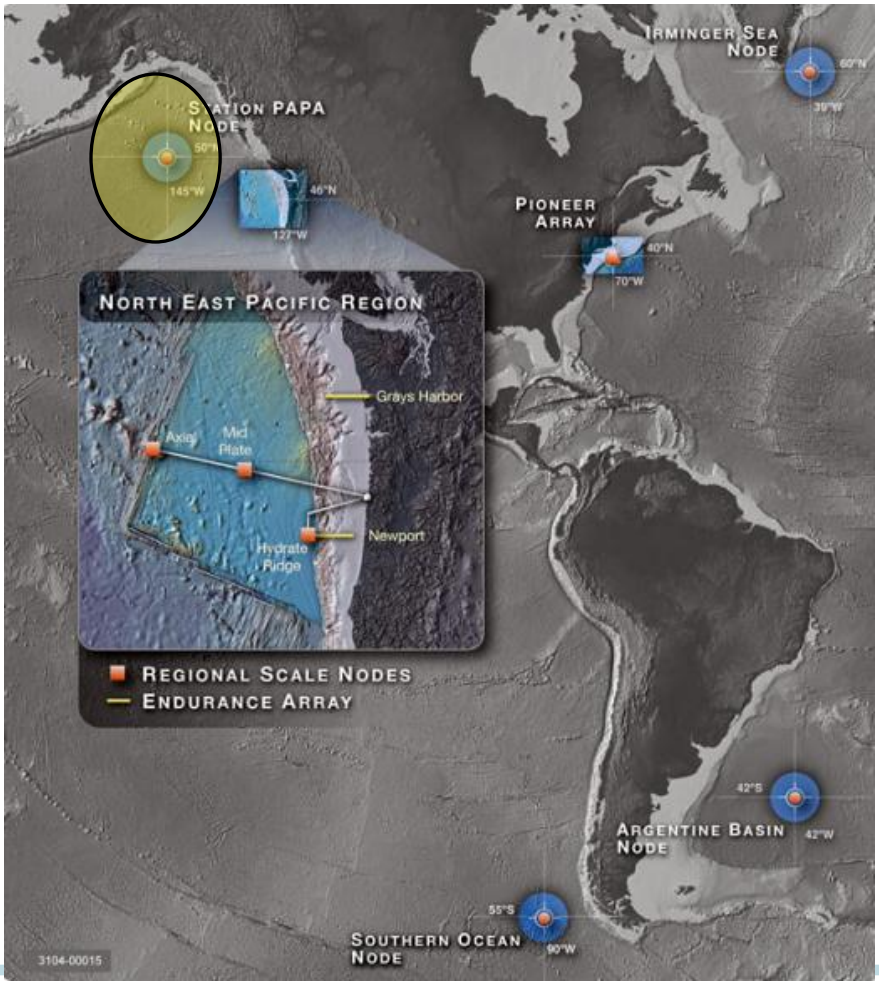
Waters upwelled off Oregon come from far away, transported by ocean currents …



Ocean currents are driven by the wind … and the upper-ocean is stirred by strong storms

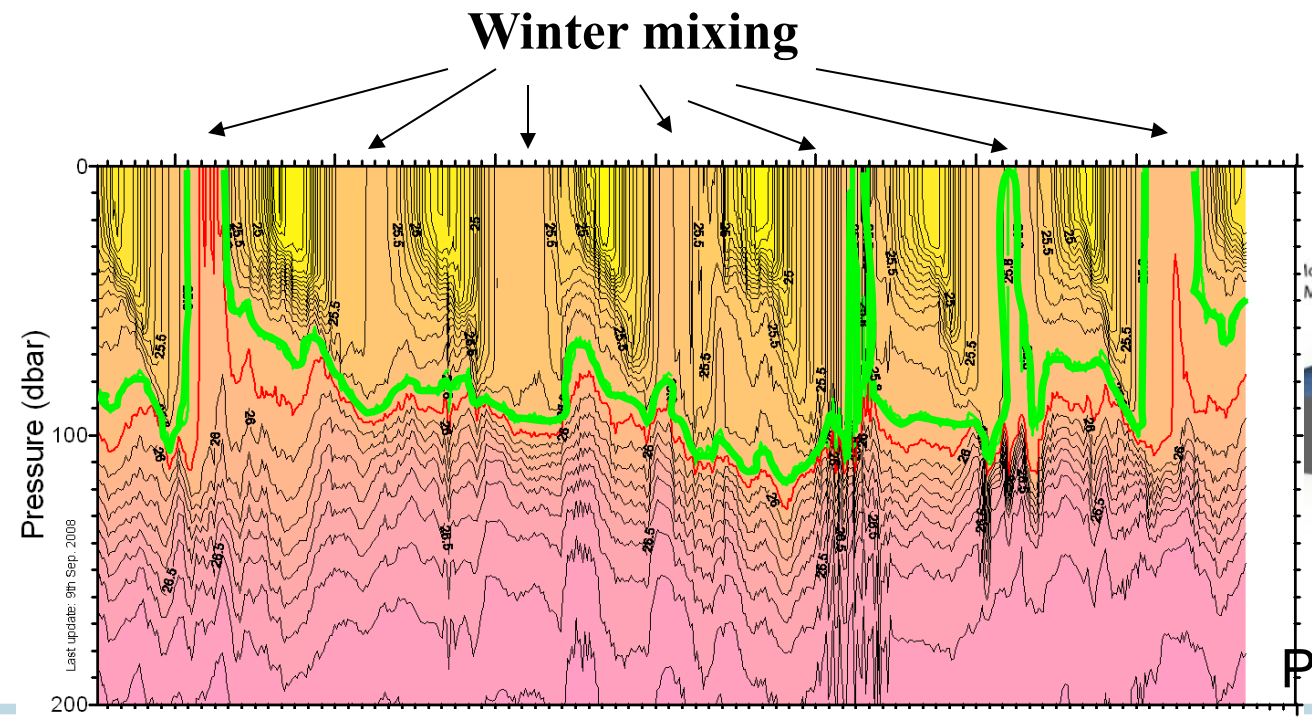


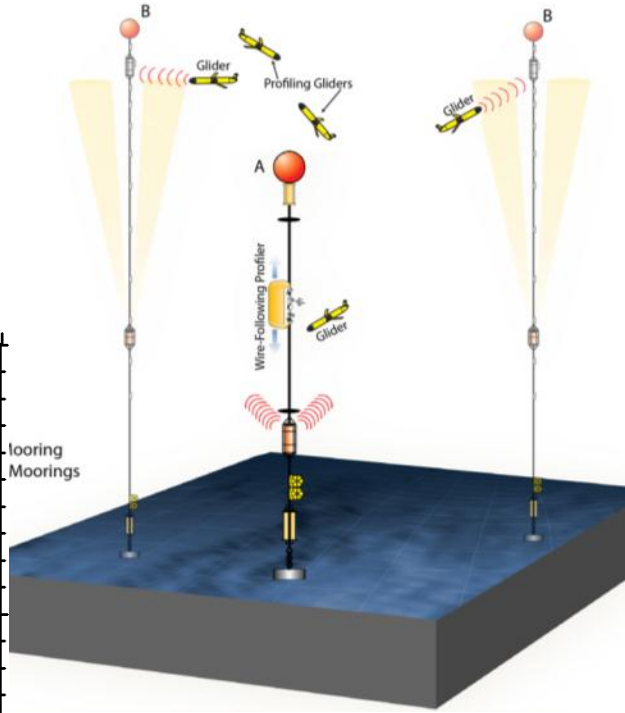
High-latitude winds and upper-ocean properties are measured at the OOI Gulf of Alaska station PAPA



Wind-driven mixing in the Gulf of Alaska sets upper-ocean properties (temperature, salinity, nutrients, dissolved oxygen)

Big changes year-to-year!



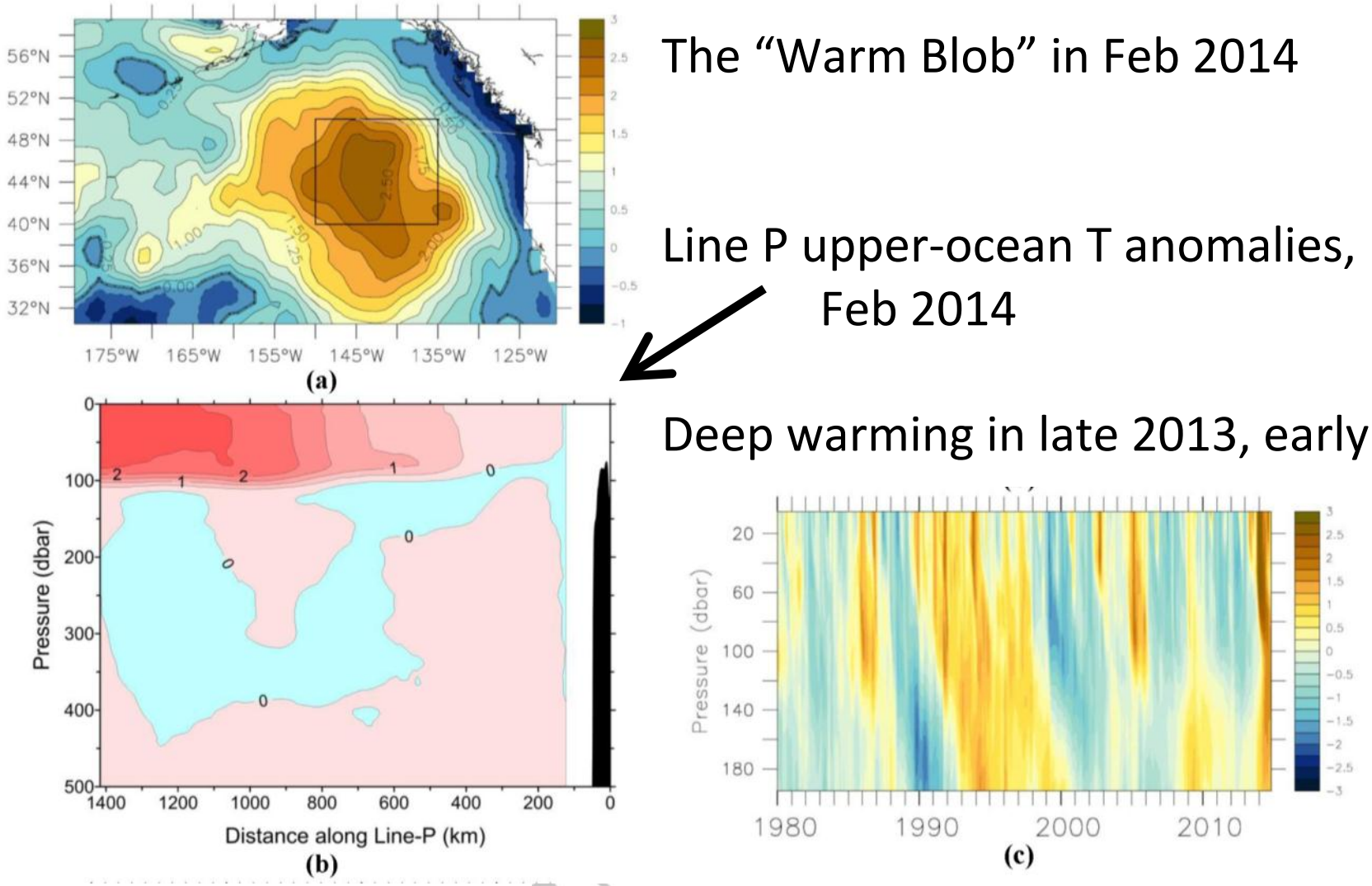


Plot by H. Freeland (IOS)

The “Warm Blob” in Feb 2014

Line P upper-ocean T anomalies, Feb 2014

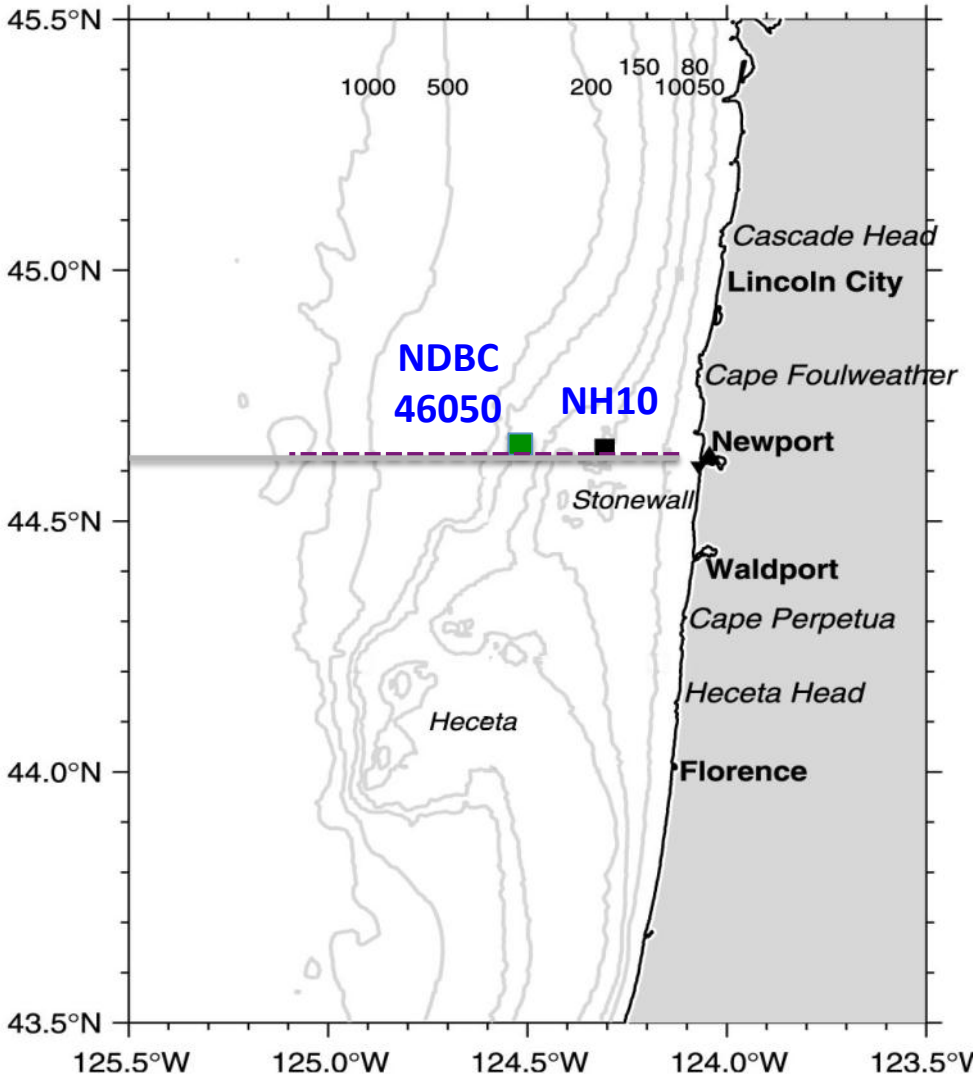
Deep warming in late 2013, early 2014

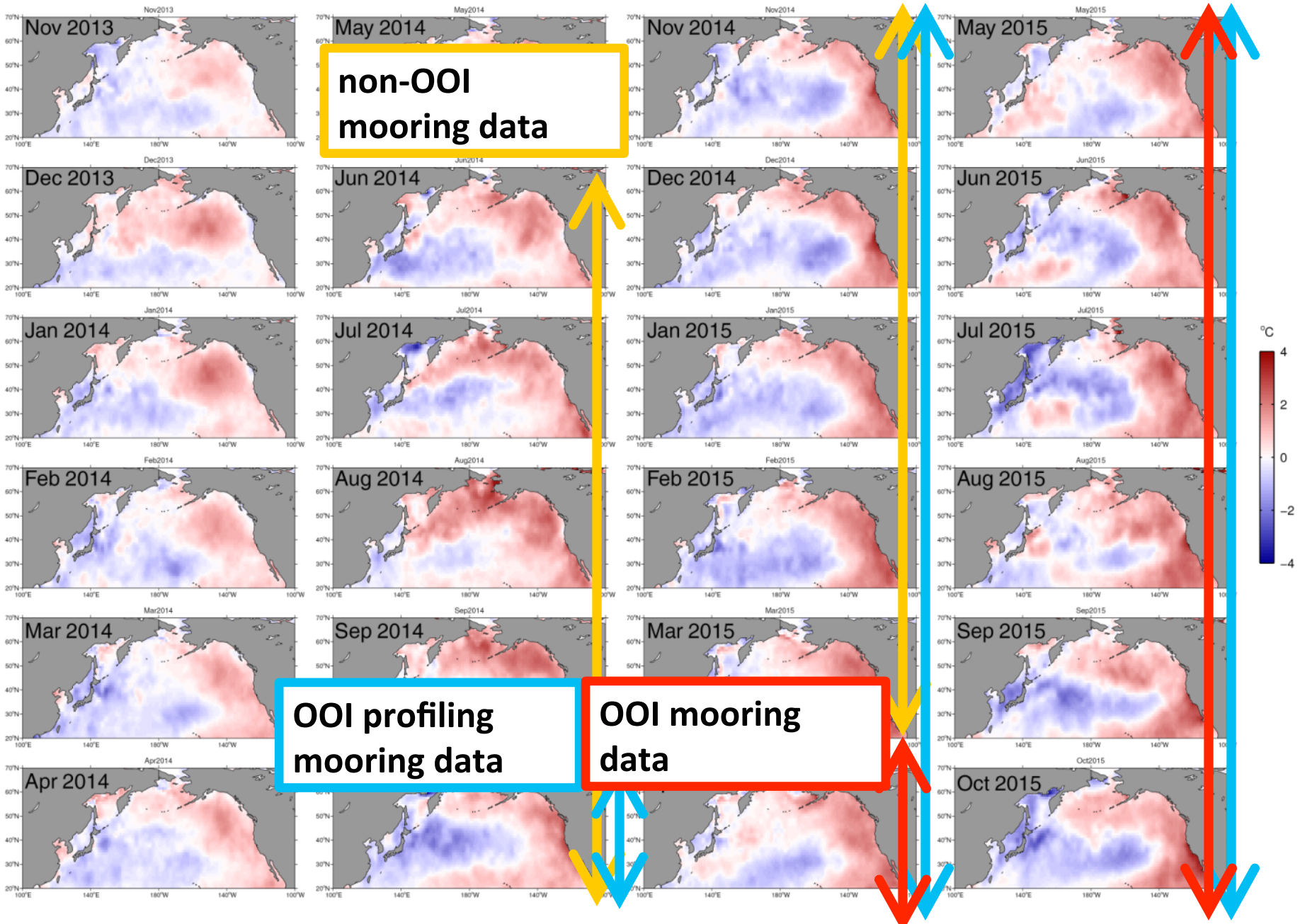


From Bond et al. (2015)

Fig. 1(a) Sea surface temperature anomalies (°C) in NE Pacific Ocean for February 2014. Anomalies are calculated relative to the mean from 1981 – 2010. **(b)** Upper ocean temperature anomalies (°C) along “Line P” (heavy gray line shown in part a) from 48° 34.5N, 125° 30.0°W to 50° 145°W for February 2014. Anomalies are relative to the mean from 1956-1991. **(c)** Monthly temperature anomalies (normalized) from the surface to 200 m averaged over the area of 50 to 40 °N, 150 to 135 °W (indicated by the box shown in part a) for the period of January 1980 through November 2014.

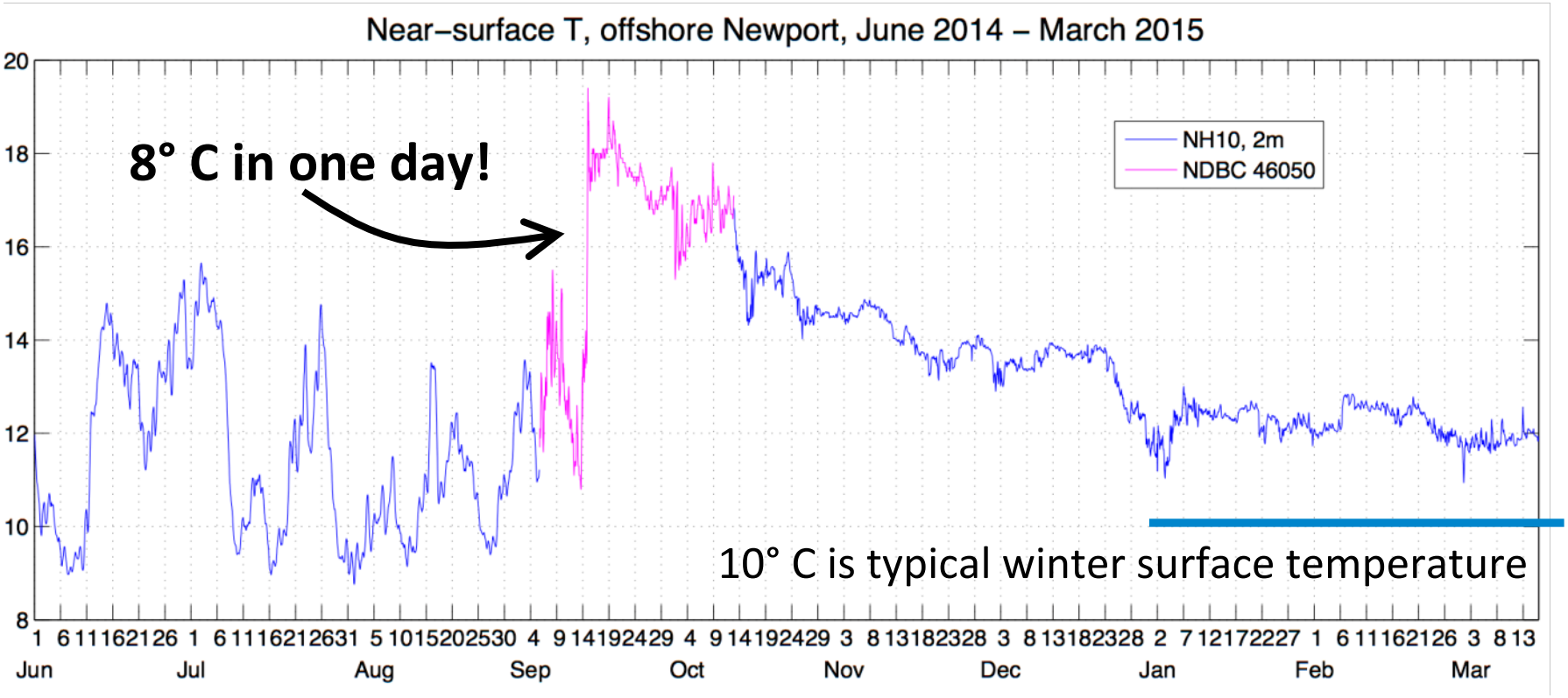
Examine data from non-OOI moorings off central Oregon along the Newport Hydrographic Line (44° 39'N)





Plot by Craig Risien (OSU)

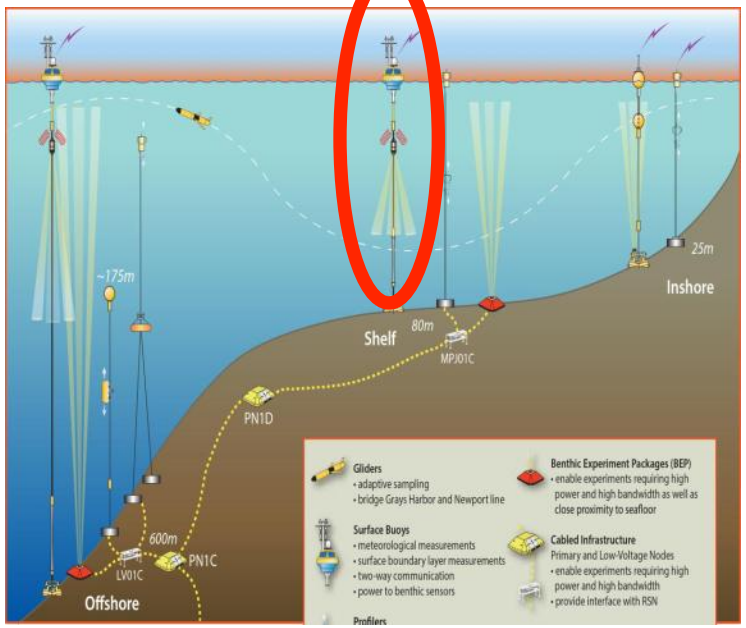
Surface Temperature, 6/1/2014 – 3/14/2015
(non-OOI mooring data)

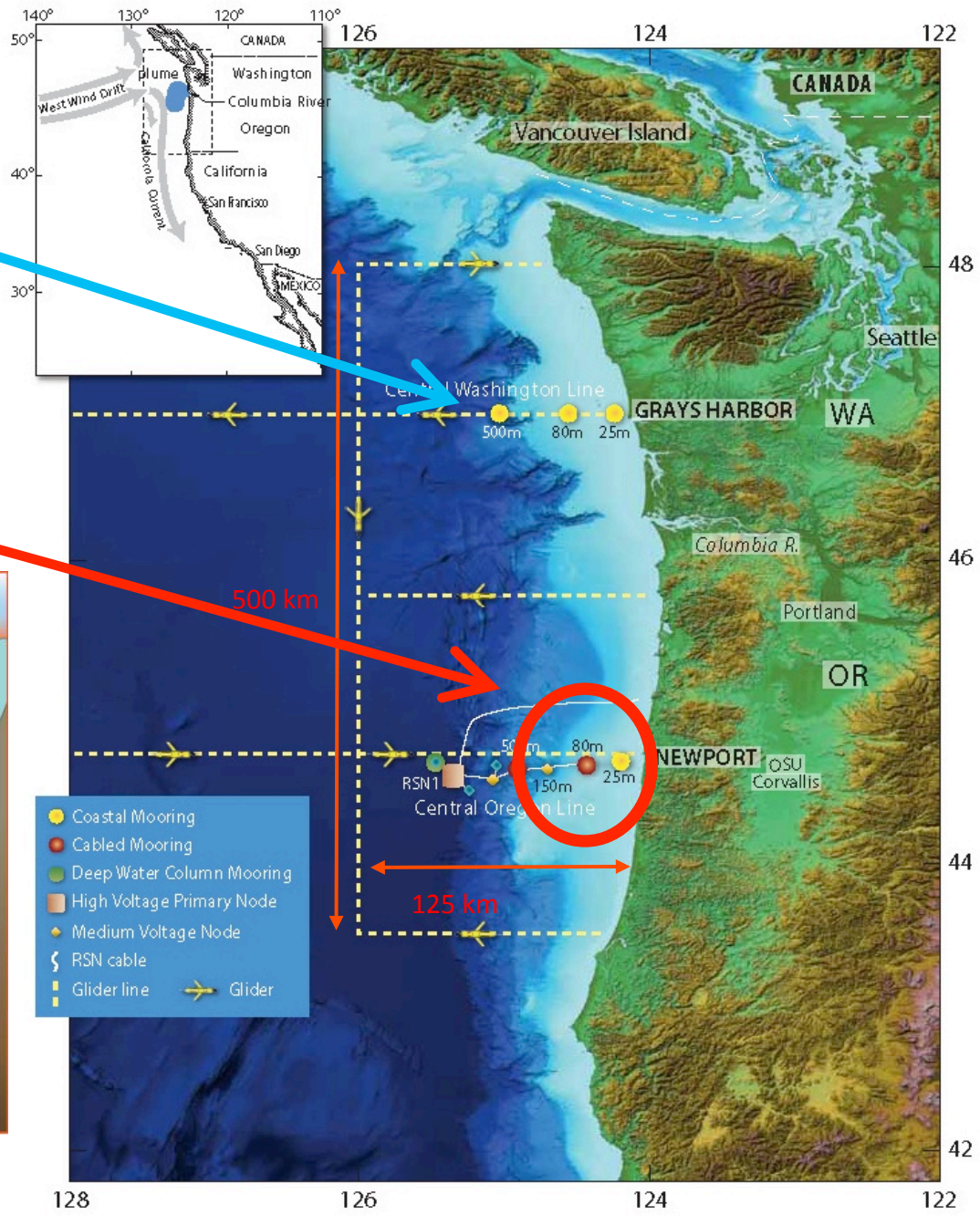


Plot by Mike Kosro (OSU)

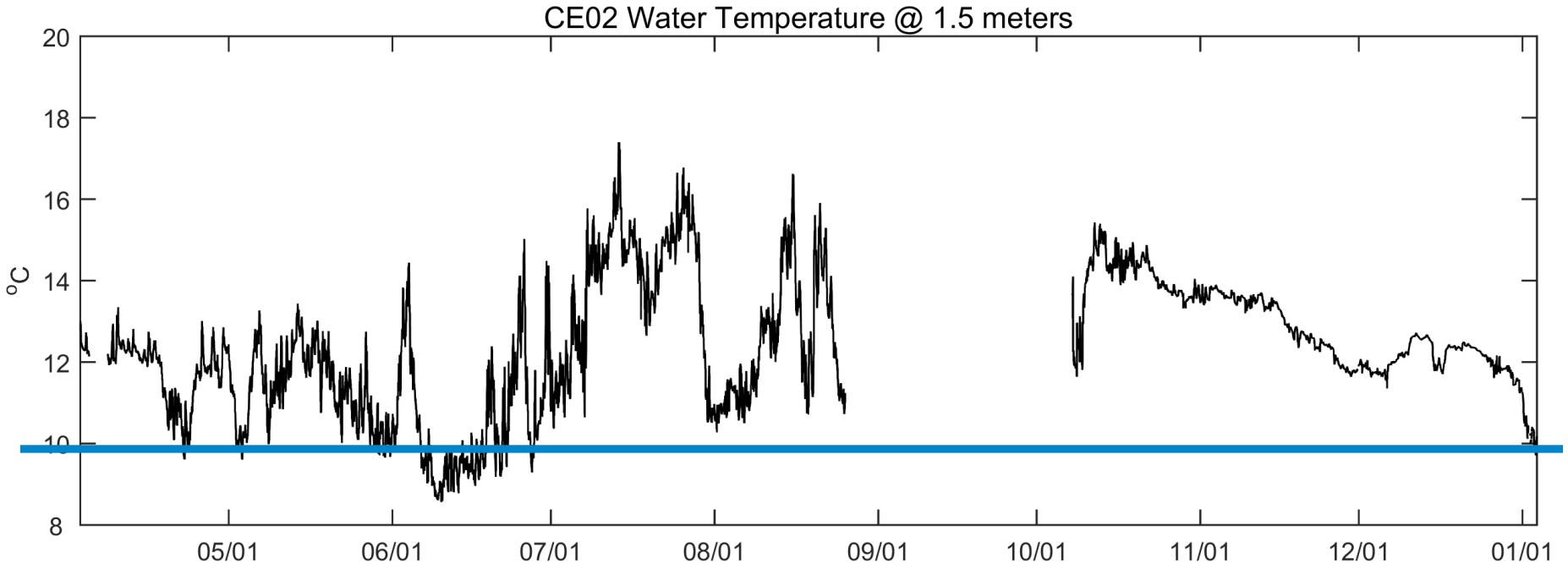
OOI Endurance Washington Offshore (CE09)

OOI Endurance Oregon Shelf (CE02)





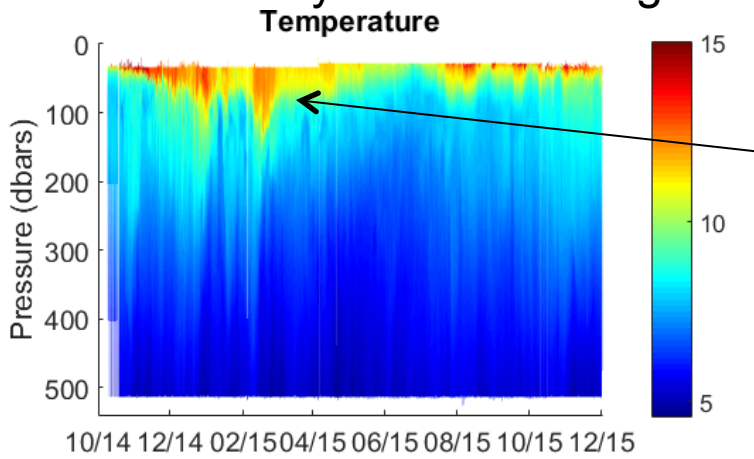
OOI Endurance Oregon Shelf Surface Water Temperature 2015-2016



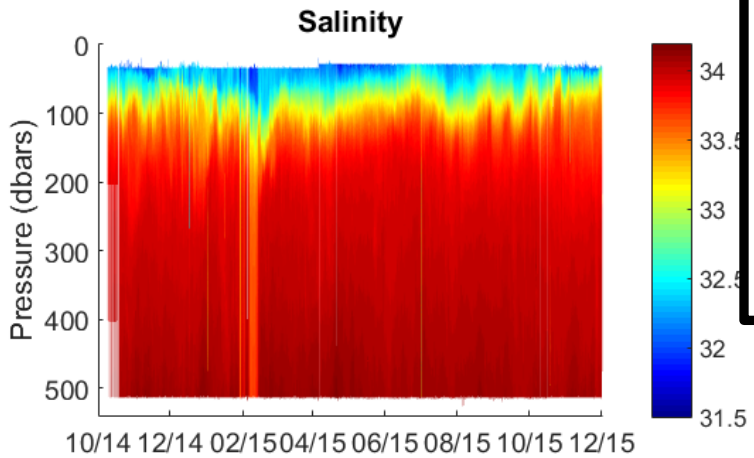
Plot by Craig Risien (OSU)

Endurance Wire Following Profiler CTD

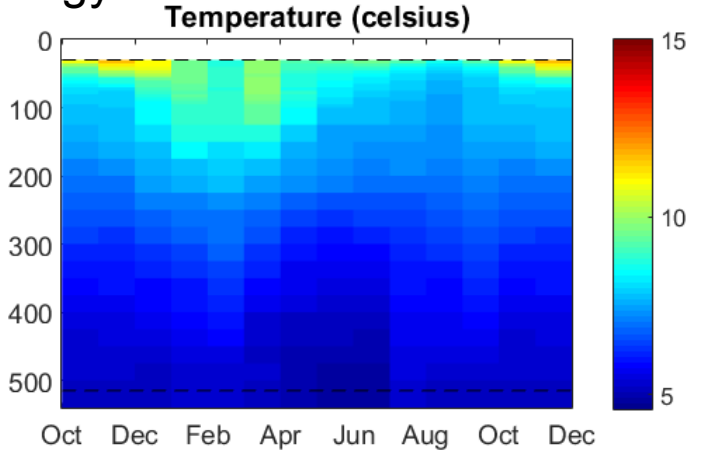
Endurance Array Wire Following Profiler

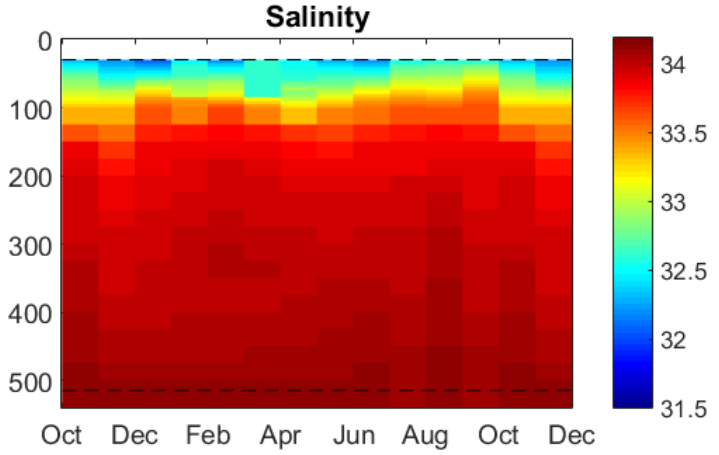


Warm Blob



Climatology from World Ocean Atlas 2013





3 profiles / day
2014-10-08 – 2015-12-01

Plot by
Jon Fram