Changes to the hydrography and zooplankton off Newport, Oregon in response to 'the blob'

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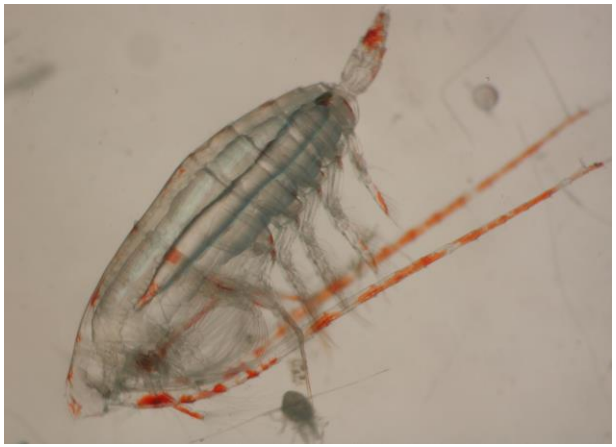


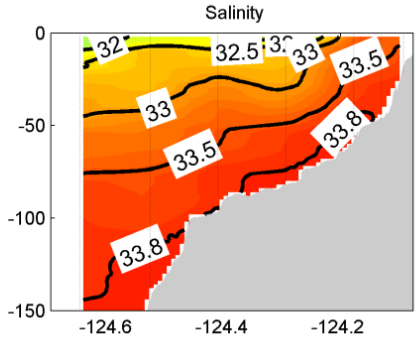
Upwelling at 45°N in 2014

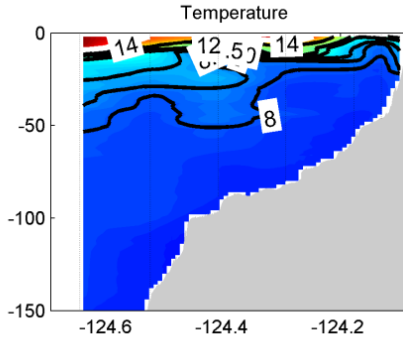
- Start of upwelling delayed until late June (nearly matched 2005)

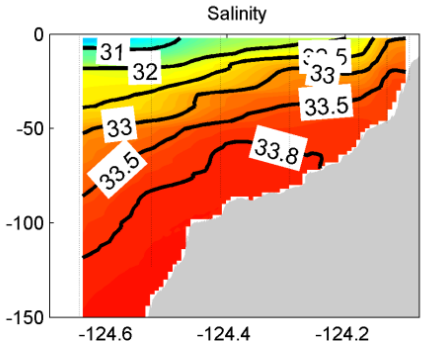
- As soon as the northerly winds ceased to blow, the warm blob began moving eastward

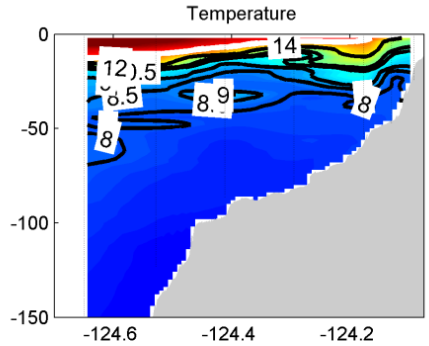
- Upwelling season ended mid September
  - the **second shortest** upwelling season (only 4 days longer than 2005) observed since 1996

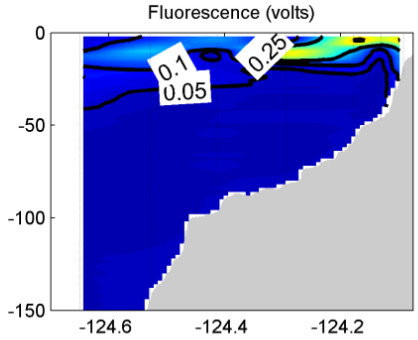
16 & 24 July 2014, Newport Line

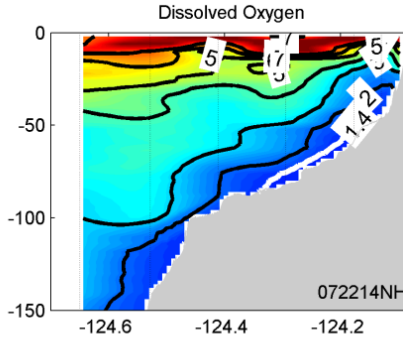


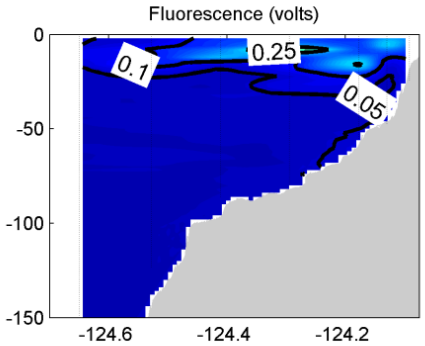


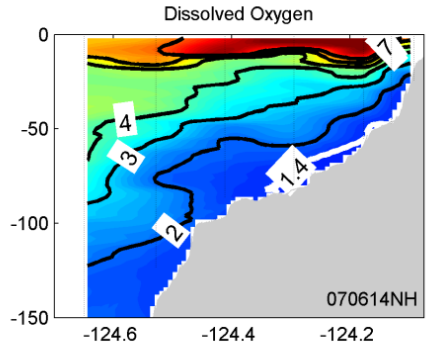




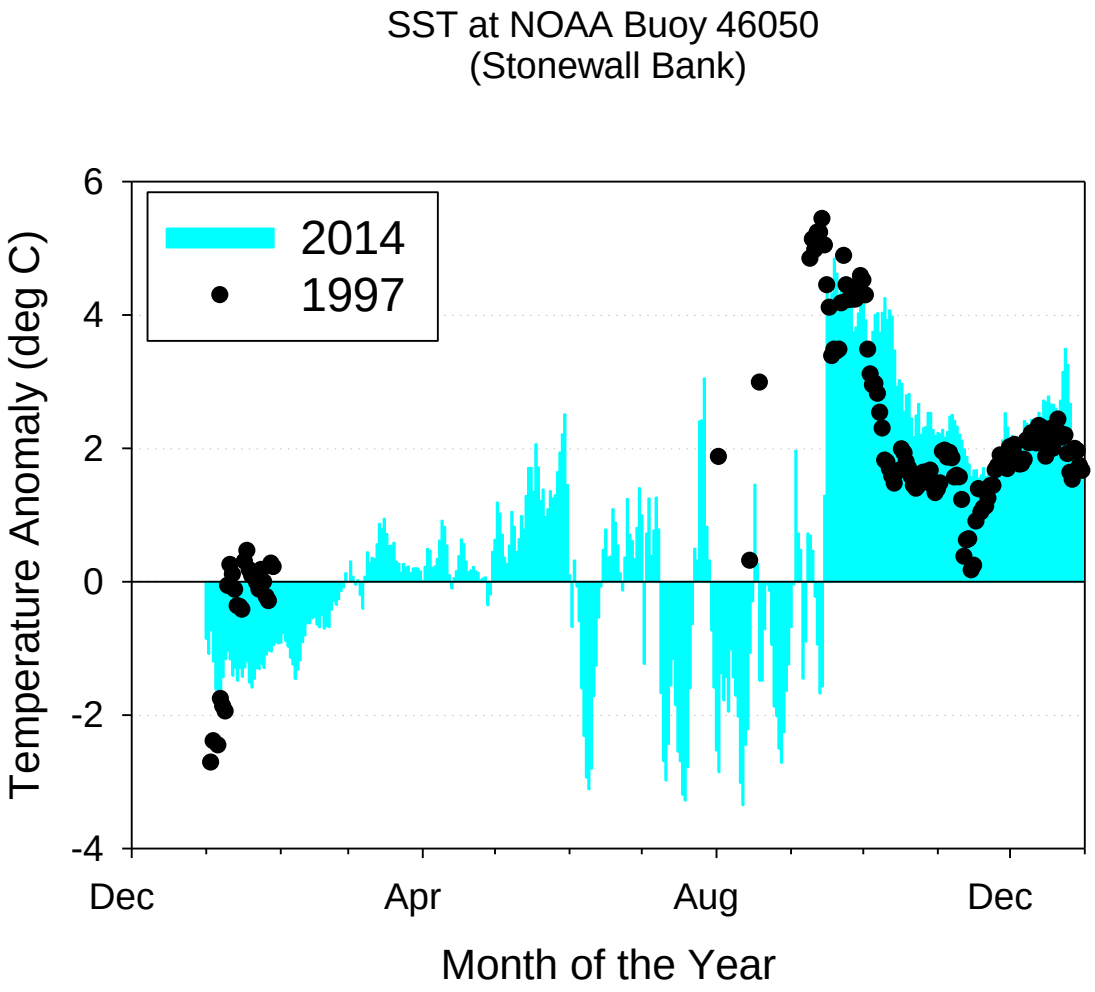








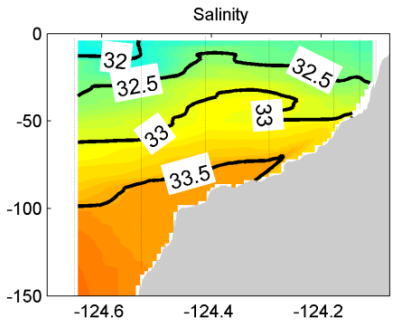
SST at NOAA Buoy 46050
Stonewall Bank off Newport

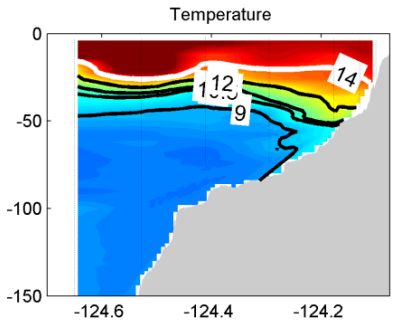


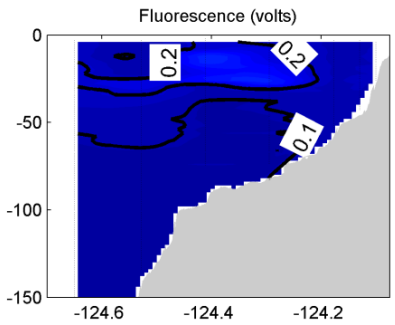
The “Blob” came onshore on 14 Sep 2014 at 10 pm with a peak temperature of 19.4°C

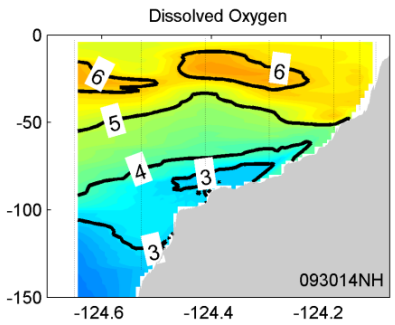
SST in 2014 (teal blue) compares very well to the 1997 El Niño (black dots). (Buoy was non-operational for most of 1997, hence no black dots)

25 September 2014
Newport Line

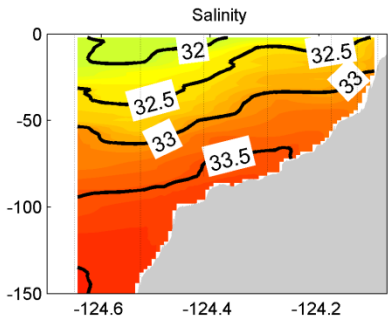


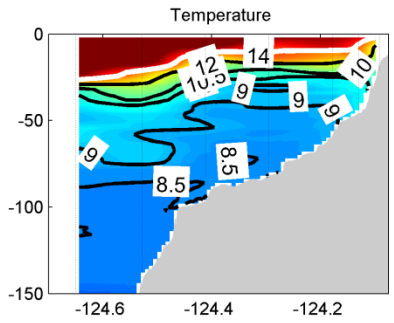


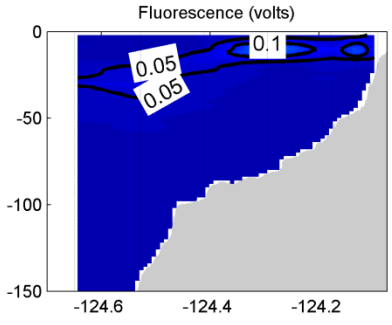


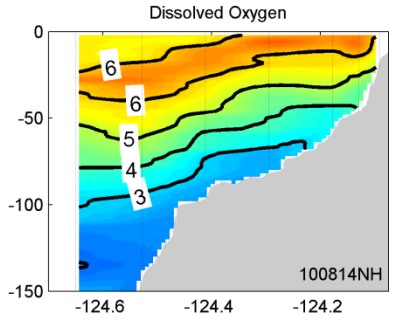


8 October 2014
Newport Line



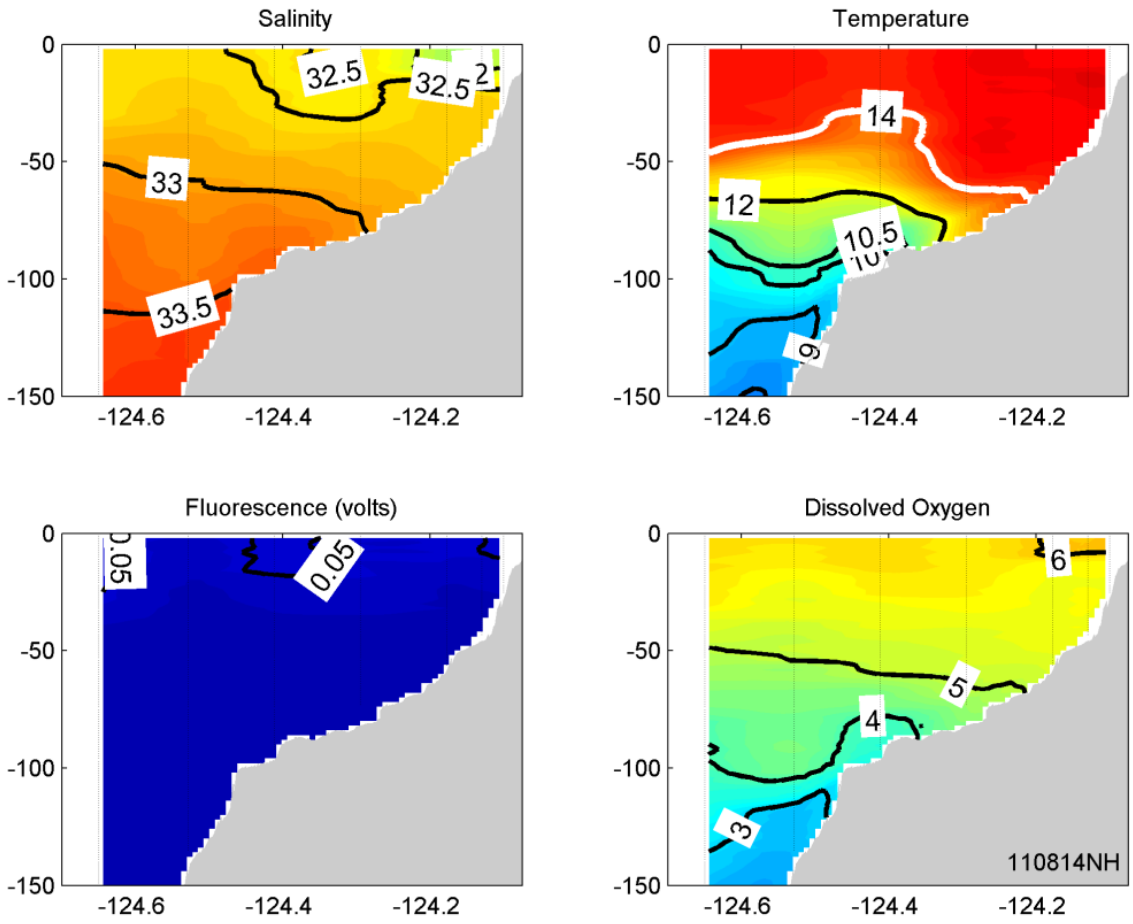






Only the upper 20-30 m was excessively warm

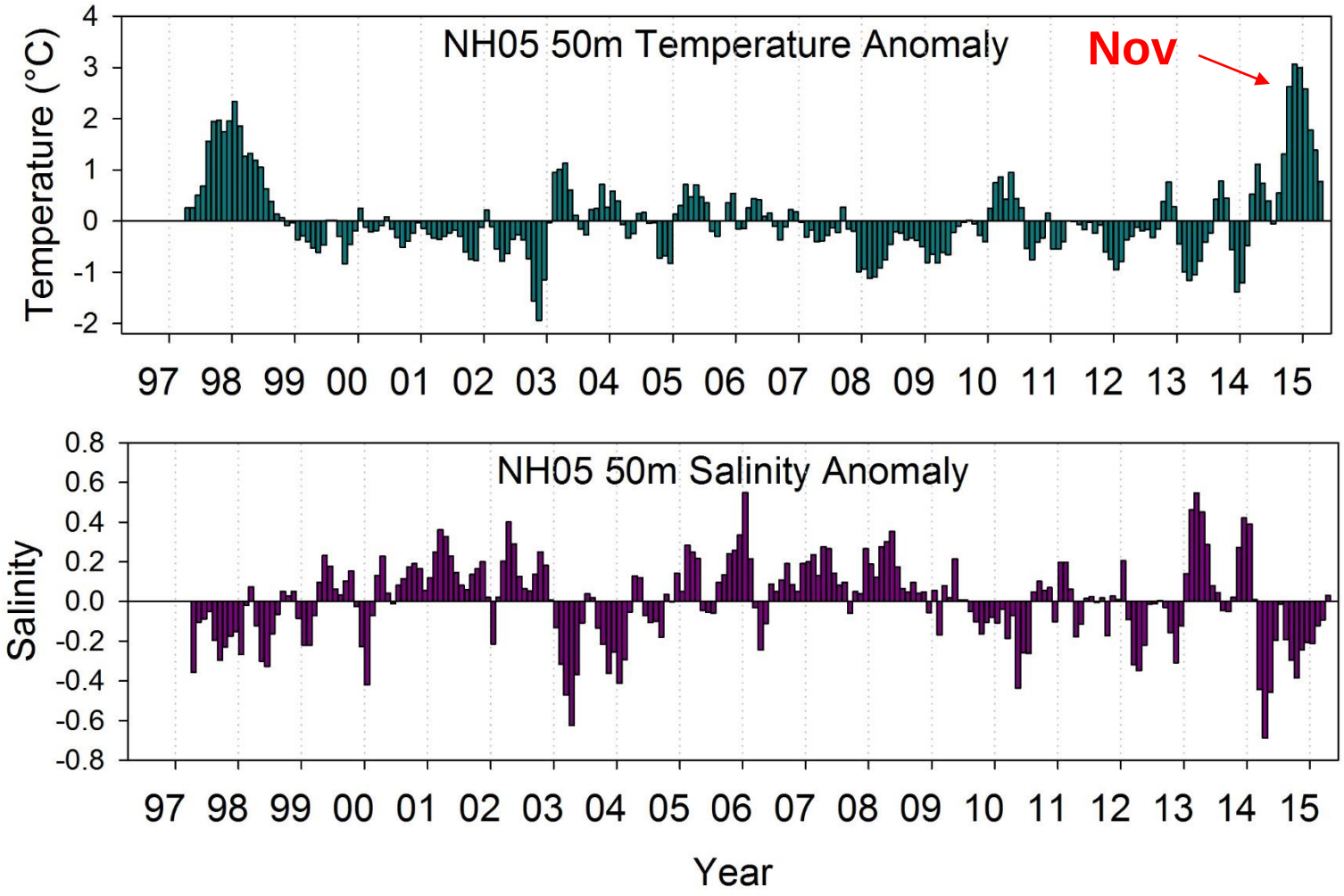
8 Nov 2014, Newport Line



Shelf waters were excessively warm to depths of 50-80 m

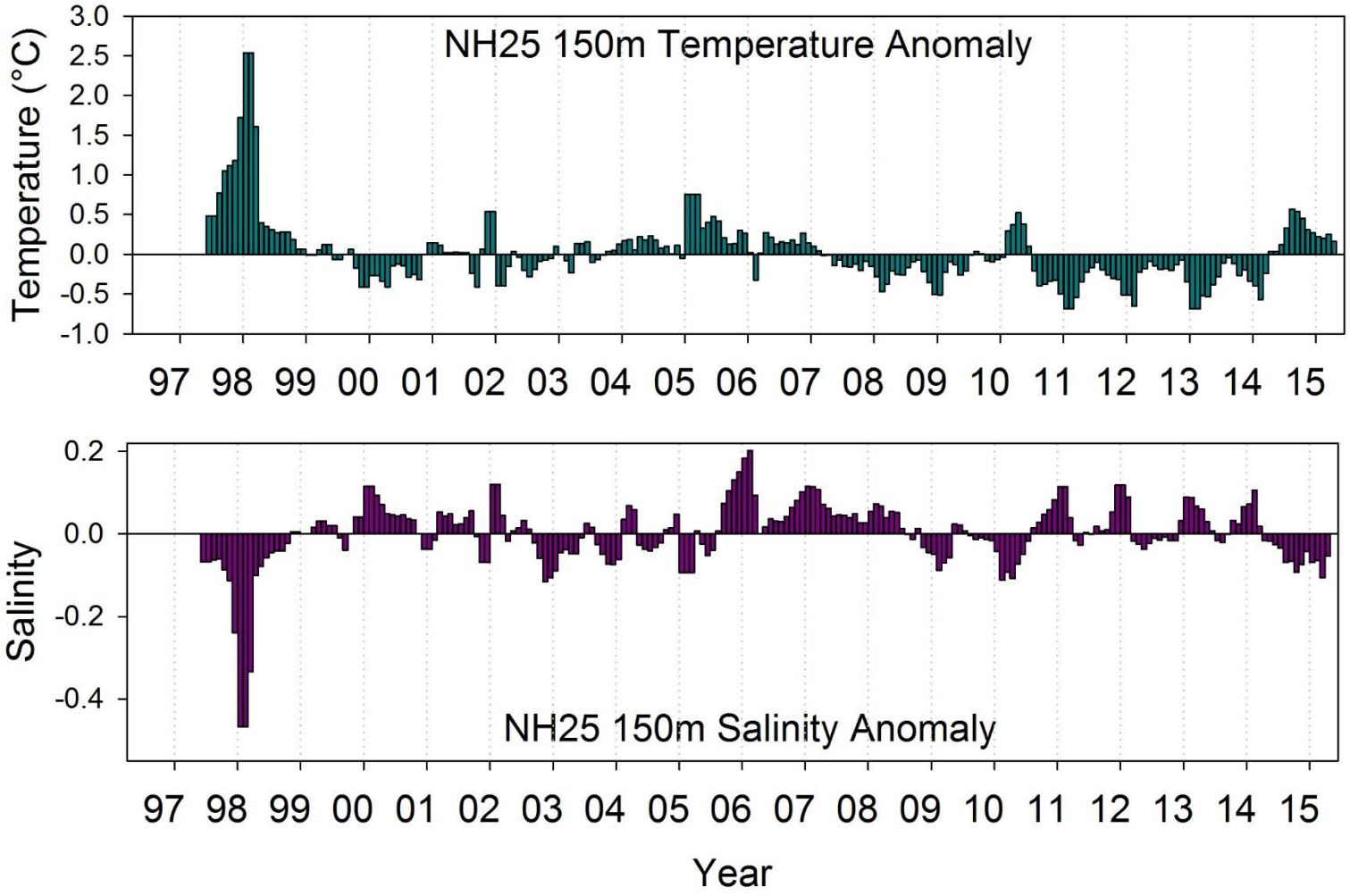
Cruises in Jan-March 2015 show the same patterns

Deep shelf waters anomalously warm and fresh



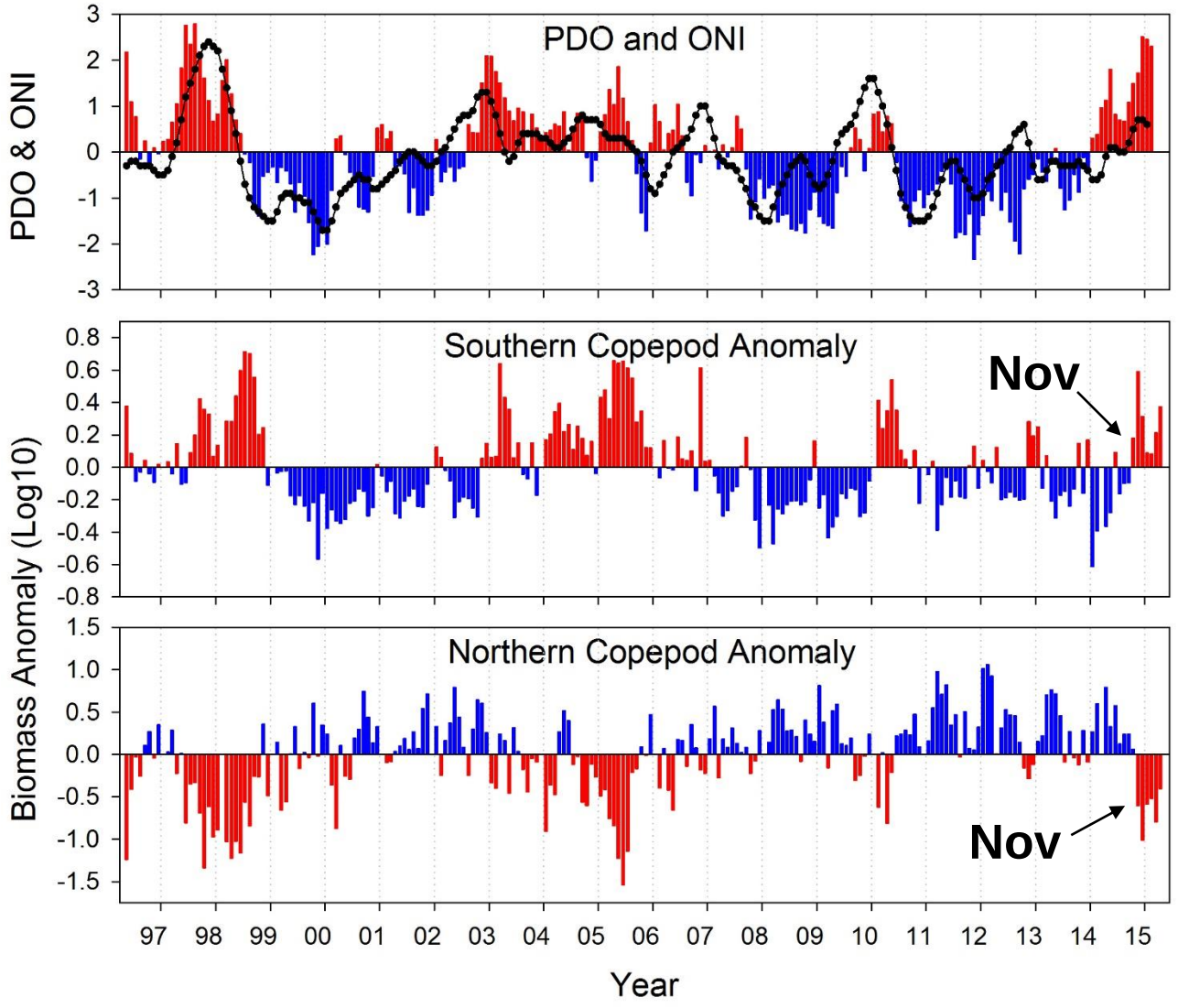
50 m temperatures were **3°C above** 'normal',
the warmest in the past 19 years

NH 25 temperature at 150 m (California Undercurrent)

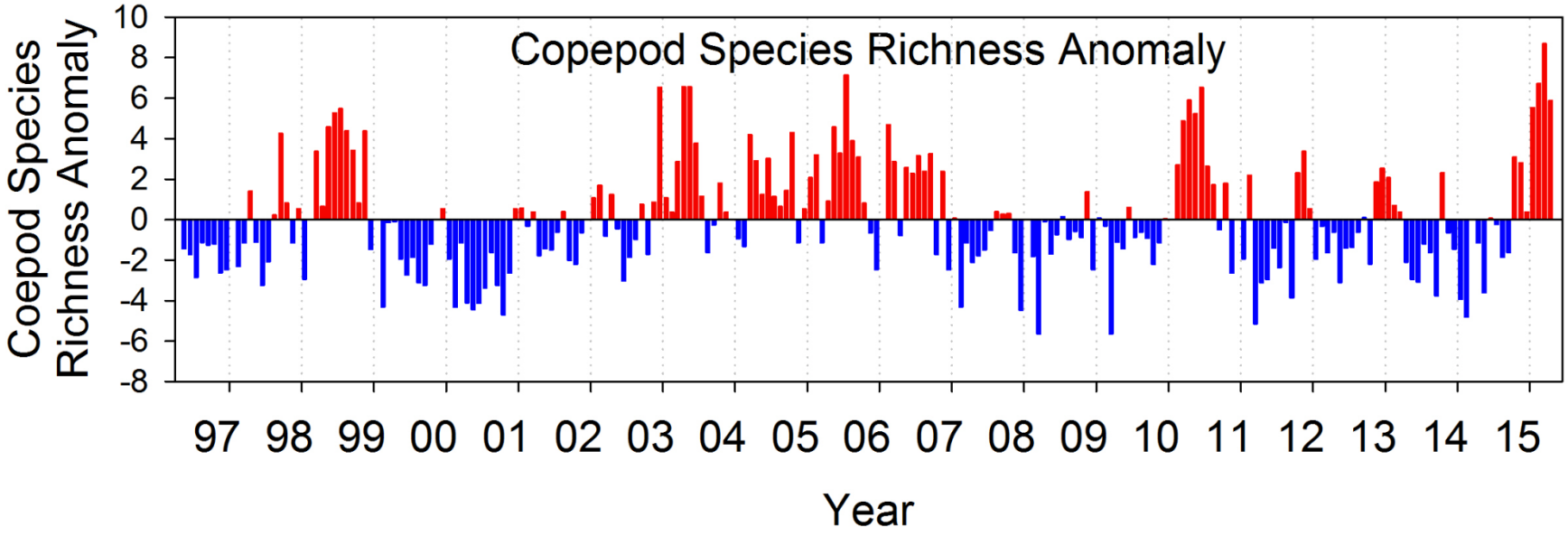


- The deep waters (below 100 m) were not unusual in any way, being only slightly warmer than climatology
- Note difference in temperature during the 1997/98 El Niño

NH05 copepod biomass anomalies



NH05 copepod species richness



17 new copepod species observed in 2014-2015, many with oceanic and/or sub-tropical affinities

Winter Ichthyoplankton (Jan-Mar 2015)

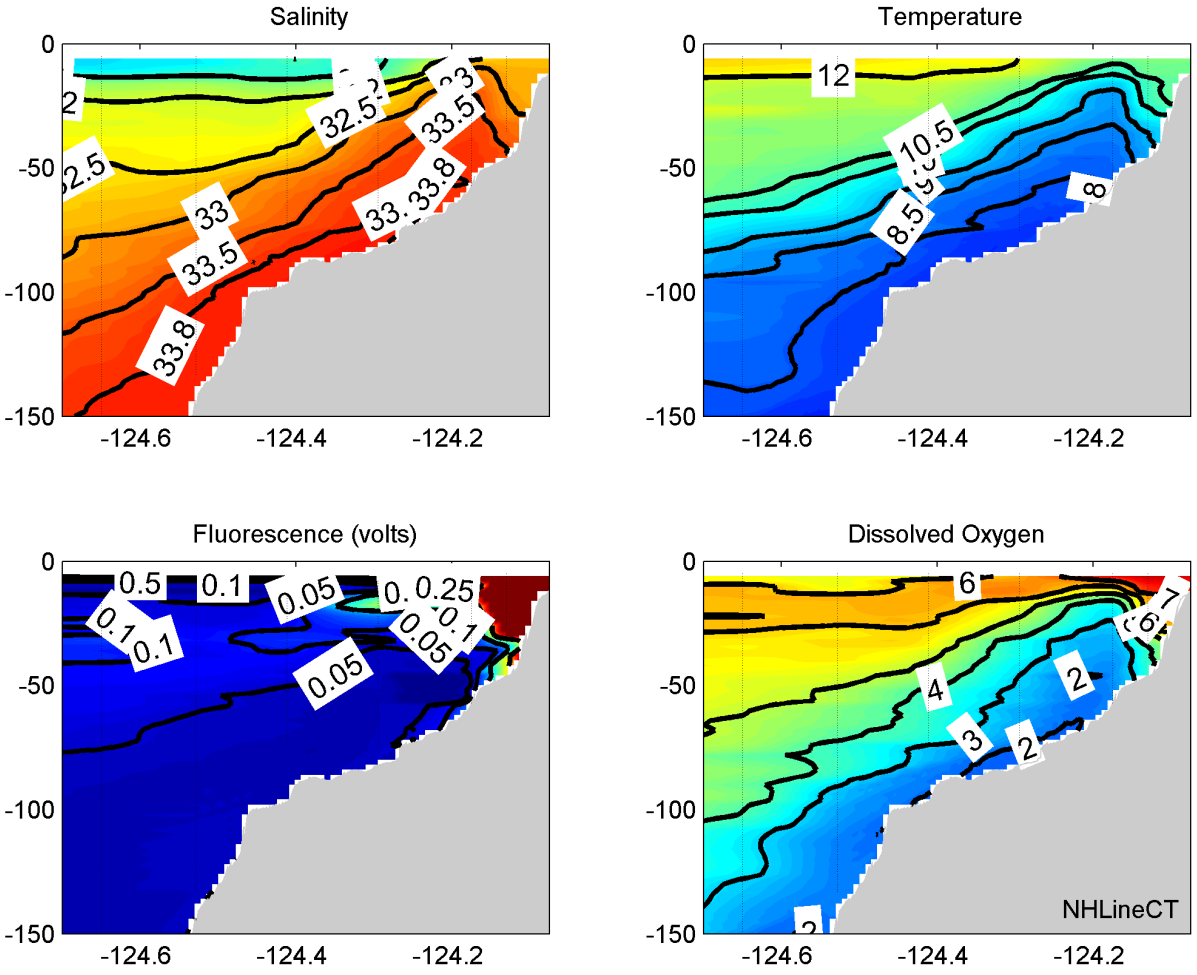
Toby Auth and Elizabeth Daly

- High biomass of Northern anchovy and rockfish larvae
- Northern anchovy larvae were collected during 1998 & 2003, but the biomass in 2015 biomass was >100 times greater
- Extremely high abundance and biomass of sardine larvae on the Newport, OR shelf in February and March
  - This is unprecedented in the time series
- 3 new taxa were collected, including Pacific saury larvae

What's happening off Newport now?

Physical spring transition was right on time

29 April 2015



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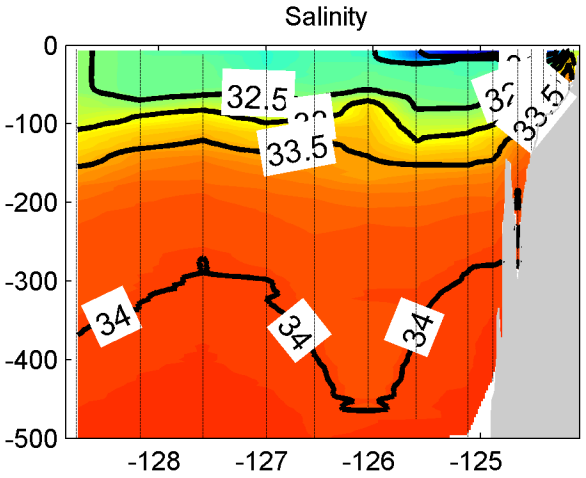

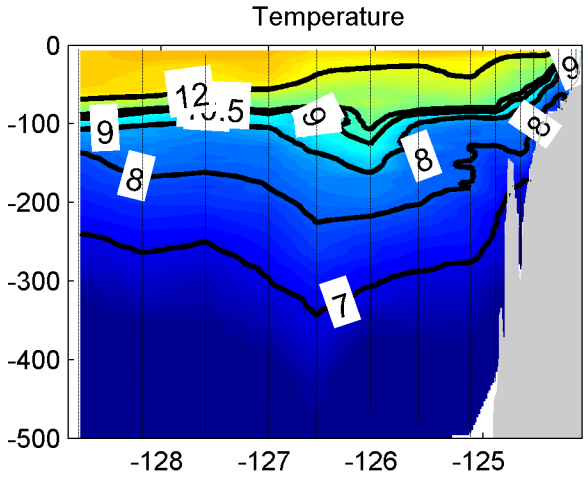

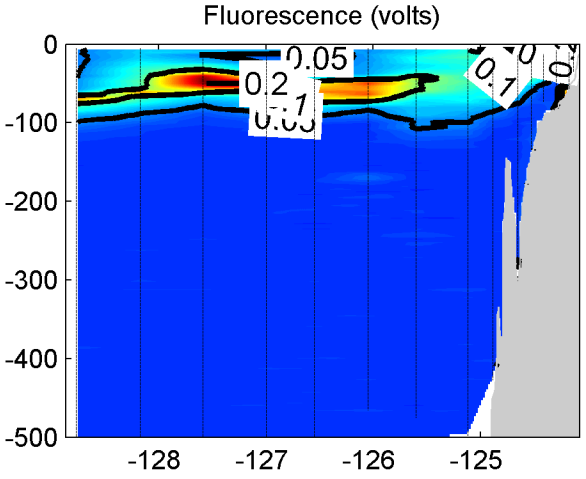

Copepod community is presently a warm water 'Southern' community

Final Comment (from Bill): When someone tells you that on average,
this or that will change at such and such a rate by the year 2050, tell them you don't care!

Your worry should be increased 'climate variability' and 'climate surprises', not slow chronic climate change!

How many more surprises are on the horizon? Remember the result of delayed upwelling in 2005?

Some unusual bugs observed since Nov 2014

- *Rhincalanus nasutus*
- *Eucalanus hyalinus*
- *Eucalanus subcrassus* (Lifer)
- *Clausocalanus farrani*
- *Clausocalanus furcatus* (Lifer)
- *Calocalanus pavo*
- *Penilia* spp. (Lifer)