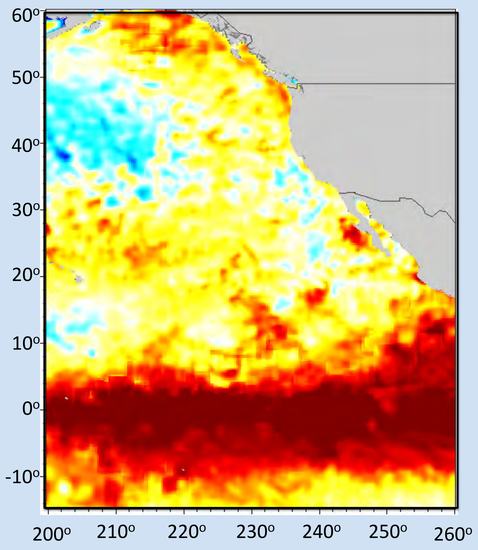
NE Pacific Ocean variability observed with satellite imagery, numeric models and large-scale observations

Dale Robinson[1], Newell Garfield[2], Nate Mantua[2], Andrew Leising[2]
[1]NOAA CoastWatch, [2]NOAA Southwest Fisheries Science Center

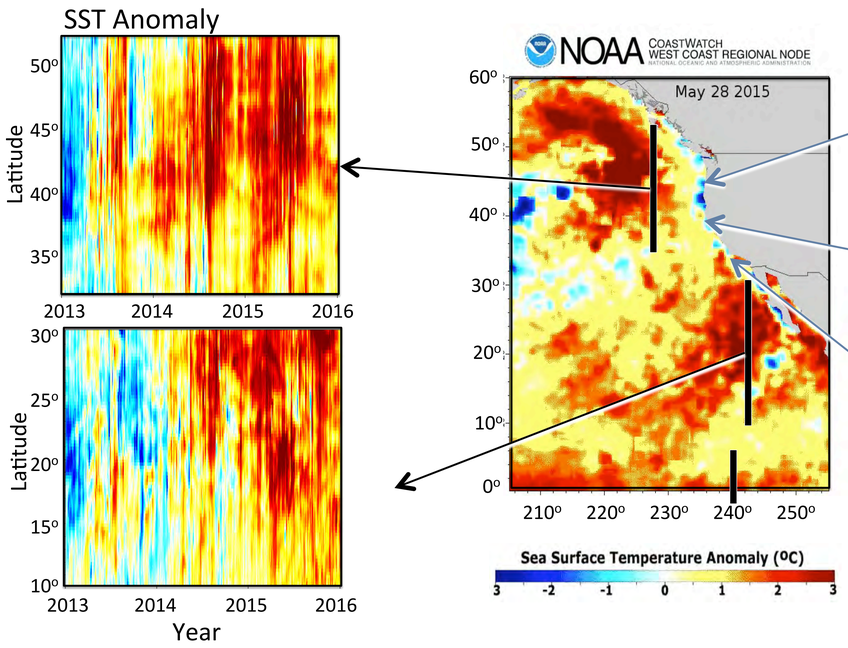
Abstract

The West Coast Regional Node of NOAA CoastWatch and NOAA Southwest Fisheries Science Center have been monitoring ocean surface characteristics over the last three years to capture the evolution of Northeast Pacific SST anomalies and the ongoing El Niño. These and other data are presented to illustrate the temporal and spatial variability occurring during this anomalously warm period and to provide a large-scale context to the regional data presented at the PAW2 meeting.

SST Anomaly - Jan. 13, 2016

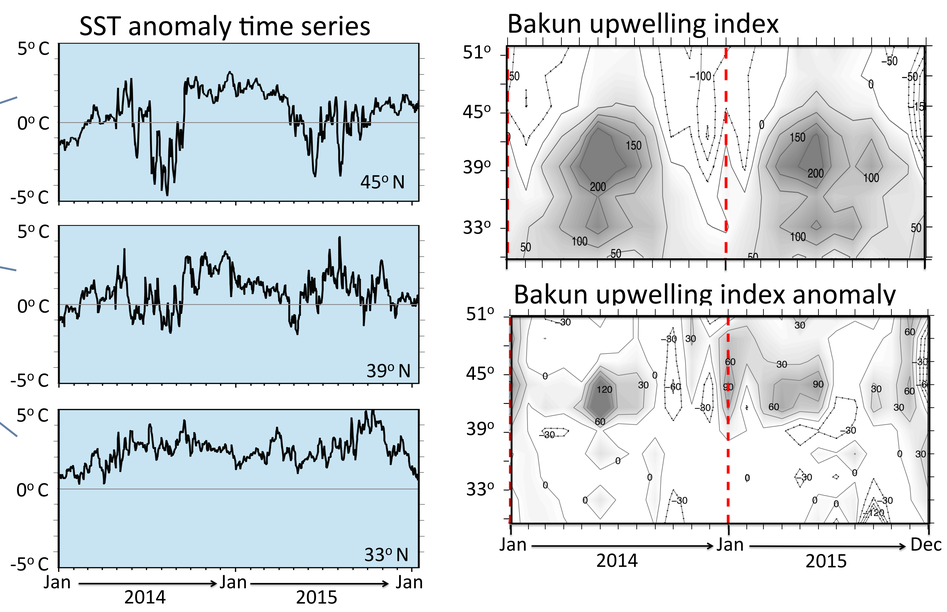


Large scale anomaly dynamics



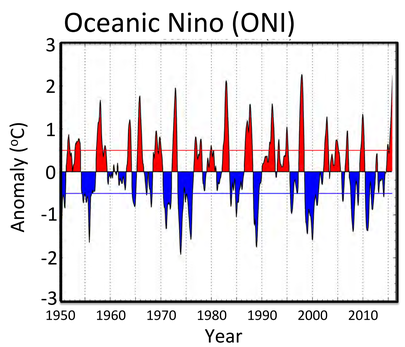
A warm water (ca. 3°C above the mean) anomaly, the "Blob," dominated the waters of the Northeastern Pacific off the US west coast from autumn 2013 to autumn 2015. A second warm water anomaly developed in the Pacific west of Southern and Baja California in spring 2014, persisting into winter 2015. While warm anomalies are not uncommon in the NE Pacific, the 2013-2015 conditions are unique both in persistence and magnitude.

Coastal anomaly dynamics

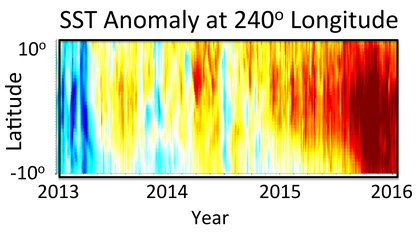


Coastal waters exhibited the warm signature of the "Blob" (ca. +3ºC sst anomaly) throughout 2014 and 2015, with periodic decreases in the anomaly values to normal and below normal values in spring, summer, and fall. Temperature decreases were associated with upwelling events.

Current El Niño dynamics



The current El Niño developed slowly, beginning in 2014. Elevated ONI values (> 0.5ºC) were recorded through autumn 2014 and surpassed the threshold for El Niño conditions in the Feb-Mar-Apr period of 2015. The latest available ONI (Oct-Nov-Dec 2015) tied the highest historical ONI value of 2.3ºC from the 1998 El Niño (Oct-Nov-Dec and Nov-Dec-Jan 1997).



A consistent warm temperature signal from pre-El Niño conditions was observed in the eastern Pacific beginning spring 2014, expanding and intensifying as the current El Niño developed.

Summary

The Northeastern Pacific Ocean exhibited unusual variability during the period from mid-2013 to the present that was characterized by two persistent and spatially distinct warm temperature anomalies followed by a major El Niño that is still evolving. The development of the Northeast Pacific "Blob," beginning in 2013 and ebbing in 2015 completely changed the oceanographic landscape prior to the 2015 El Niño that initially looked as though it would form in 2013 or 2014.

Timeline of recent anomaly and El Niño events