Anomalous Saltier Water Mass with low Oxygen and Corrosive Detected onto the Continental Shelf from Baja California México to San Luis Obispo EUA

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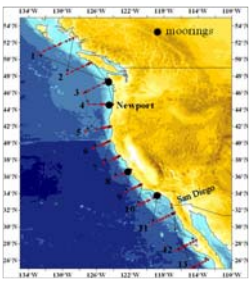
North American Carbon Program
Continental Carbon Budgets, Dynamics, Processes, and Management

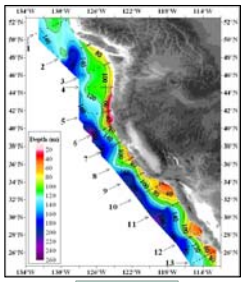
Introduction

NACP West Coast cruise aboard the R/V *Wecoma* was the first study of carbon in the dynamic coastal ocean region above/adjacent to the continental shelf along the west coast of the North American continent. Data from this cruise will provide a robust observational framework to monitor long-term trends on inter-annual timescales, and determine the temporal variability of the inorganic carbon system and its relationship to biological and physical processes in the coastal ocean and their capacity to withstand the onset of ocean acidification.

"Evidence for Upwelling of Corrosive 'Acidified' Water onto the West Coast of North America was Observed in the summer 2007"



NACP West Coast Survey Cruise : 11 May - 14 June 2007 and mooring locations

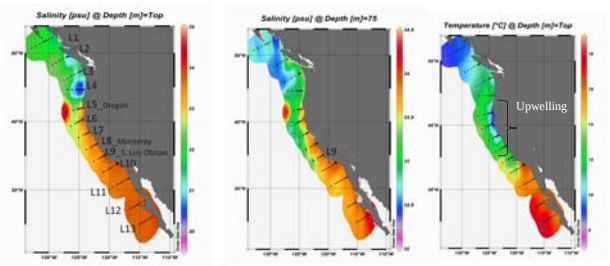


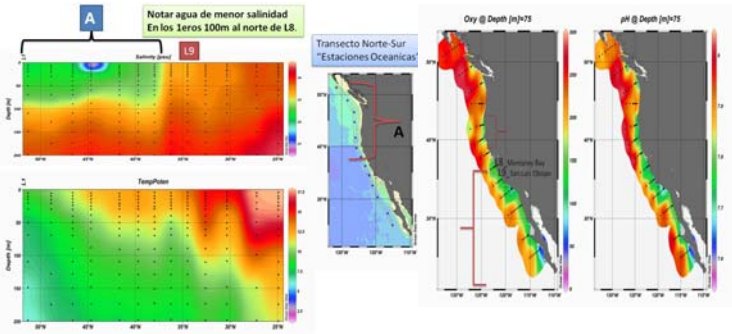
Feely et al. (2008)

Ocean Acidification of the North American Continental Shelf

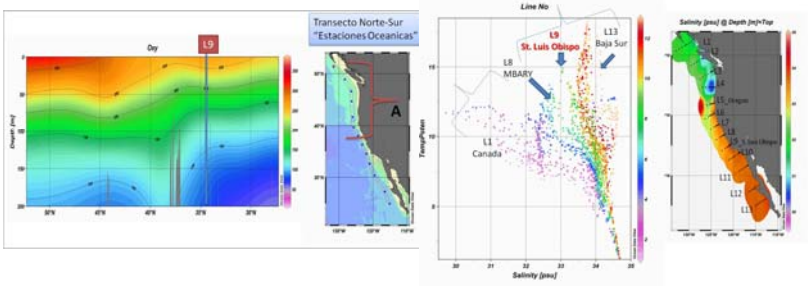
Distribution of the depths of the corrosive water (aragonite saturation < 1.0; pH < 7.75) on the continental shelf of western North America from Queen Charlotte Sound, Canada to San Gregorio Baja California Sur, Mexico.
On transect lines 5 and 6 the corrosive water reaches all the way to the surface in the inshore waters near the coast.

Saltier and low oxygen water coming from the equatorial was observed from San Gregorio Baja California, Mexico to San Luis Obispo CA EUA.

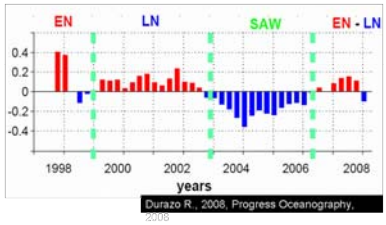


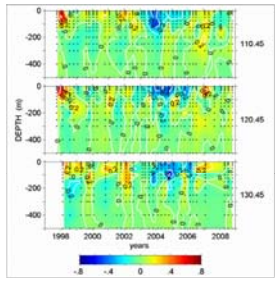


The water with oxygen lower than 150µM was also corrosive with pH ~7.7 and saltier between 34 and 34.5"



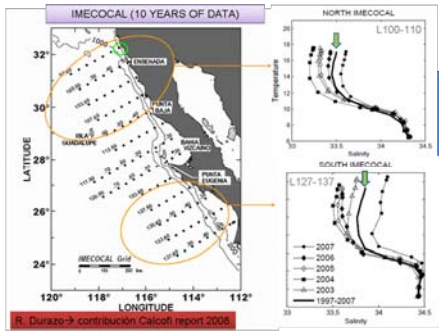
Anomalies of Salinities 10 m for the North Region of IMECOCAL (Ensenada, 31.8º N, a Punta Baja, 30º N)

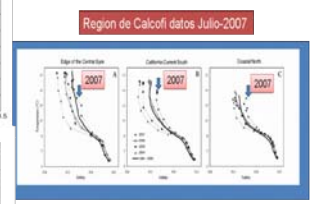


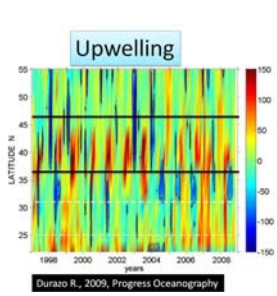


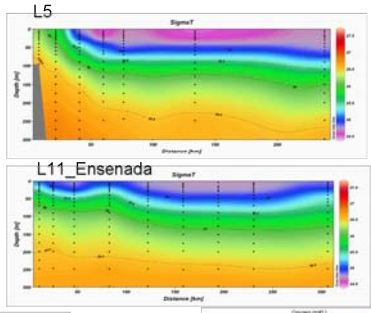
Time-depth variability of salinity anomalies

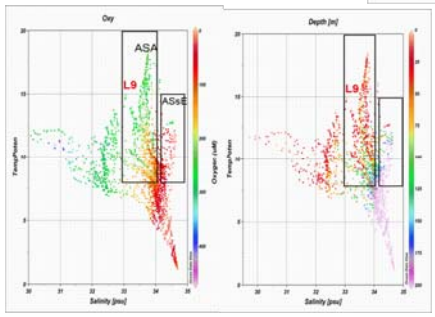
Durazo R., 2009, Progress Oceanography

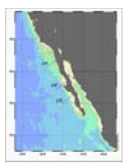


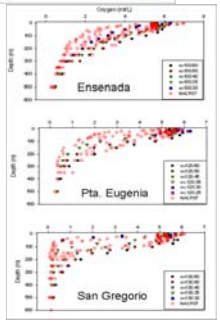












Conclusions

1) Saltier and low oxygen water coming from the equatorial observed from San Gregorio Baja California, Mexico to San Luis Obispo CA EUA. The water with oxygen lower than 150µM was also corrosive with pH ~7.7 and saltier between 34 and 34.5. The water reached mid-shelf depths of approximately below 40m coming up from the south tropical waters approximately 40 km from the coast.
2) The above water can be related to the to the moderate-to-strong La Niña had developed in summer but also to the positive PDO.
3) Positive anomalies of the West Coast upwelling index in 2007 upwelling season and early contributed to transport low oxygen and pH to the shelf.
4) In Baja California the temperature and salinity data were considered anomalous when is compared with the climatology data base. The lowest Oxygen concentrations were detected in San Gregorio Baja California with values below 10µM but also with the more corrosive water (Ωarag between 0.9 to 0.7).
5) Under this condition the duo low oxygen-corrosive water can impact the development and environment of organisms in this region.