Biogeochemical Changes in Hypersaline Mexican Coastal Lagoon during intense upwelling events

J. Martín Hernández-Ayón¹, Victor Camacho-Ibar³, A. Dickson⁴, A. Mejía-Trejo¹
Santamaria Del Angel², S. Galindo, A. Cabello, N. Oliva, J. Zertuche, W. Daessle¹

¹Instituto de Investigaciones Oceanológicas, ²Facultad de Ciencias Marinas, Universidad Autónoma de Baja California, Ensenada, BC, México.
³Scripps Institution of Oceanography, Univ. of California, San Diego, La Jolla, CA. EUA

Introduction

There is an absence of previous work recognizing the widespread occurrence of seasonal hypersalinity in numerous mid-latitude, west-coast estuaries. In all of the Californian estuaries, there is negligible freshwater runoff summer and salinities increase with distance from the ocean. The longitudinal salinity structure reflects the length of time for the parcel of water. Upwelled water is nutrient and total CO₂ rich, and supports high levels of phytoplankton and higher trophic level production but also there are an interchange of CO₂ ocean-atmosphere. Off the western United States and Baja California, coastal upwelling occurs seasonally.

Upwelling

Oyster culture support ~60 families

Objective

- Determine the principals mechanism of control of Total CO₂.
- Determine if San Quintín bay is a source or sink of CO₂ during upwelling events

Methods

Field work:

June 2002 “4 Transects”
May– June 2004 “10 transects”
May– July 2005 “14 transects”

Variables analyzed:
- Total Alkalinity
- Total CO₂
- Salinity
- Nutrients

Results

In San Quintin the upwelling are present between spring and Summer when wind came from the Northwest.

Conclusions

- The combination of upwelling-spring tides have a big control in the spatial availability of inorganic carbon.
- Inorganic carbon uptake by macroalgae was observed just in the inner part of the bay during upwelling.
- ~65% of the bay was a source of CO₂ to the atmosphere during upwelling events, however without upwelling SQB was saturated with CO₂ by organic matter oxidation from the sediments above the equilibrium value.
- The biggest pools of carbon were observed in the sediments in the period without upwelling.

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