

TEMPORAL VARIABILITY of DOWNWARD FLUXES of ORGANIC CARBON off MONTEREY BAY (CA, USA)

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451 ID:26559

ABSTRACT

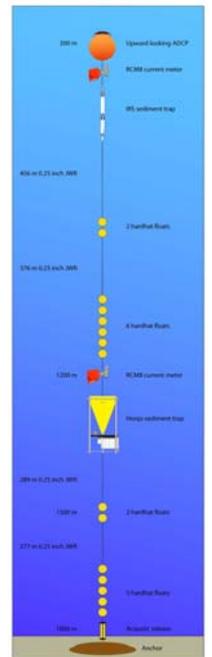
The interannual and seasonal changes in the vertical biogenic particulate fluxes, and its relation to the environmental conditions in the coastal upwelling region of Monterey Bay (Central California) has been studied since 1998 till 2006.

The magnitude and composition of the settling particles presented a large interannual and seasonal variability. Organic carbon (Corg) fluxes ranged between 4 - 296 mgC·m⁻²·day⁻¹ and 1 - 142 mgC·m⁻²·day⁻¹ for shallow and deep sediment traps respectively. The time series of Corg vertical export was characterized by pulses of intense fluxes, that were associated to peaks of primary production, generally during upwelling periods. These results illustrate how the hydrodynamics and primary production of this coastal upwelling system regulates the vertical export of biogenic particles.

1. OBSERVATIONS



Figure 1. Monterey Bay Time Series stations (M1 and M2) have been occupied biweekly since mid-1989 (Pennington & Chavez 2000). Since 1998, the M2 mooring has been deployed with meteorological and physical equipment and two sediment traps (300m and 1200m depth), and is biannually redeployed. For all sediment trap samples, total mass, total carbon, nitrogen and organic carbon (Corg) were determined.



2. MONTEREY BAY TIME SERIES

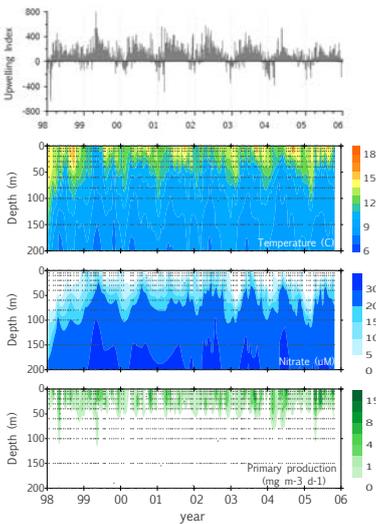


Figure 2. Water column properties presented a large interannual variability. Temperature was warmer for the 1998 El Niño and colder for the 1999 La Niña. Nitracline depth was deeper for 1998, recurrently deep between 2000 and 2001, and shoaled again for the upwelling seasons of subsequent years. Primary production reached maxima for the last three years and minima in 2000 and 2001.

3. MONTEREY BAY VERTICAL FLUXES TIME SERIES

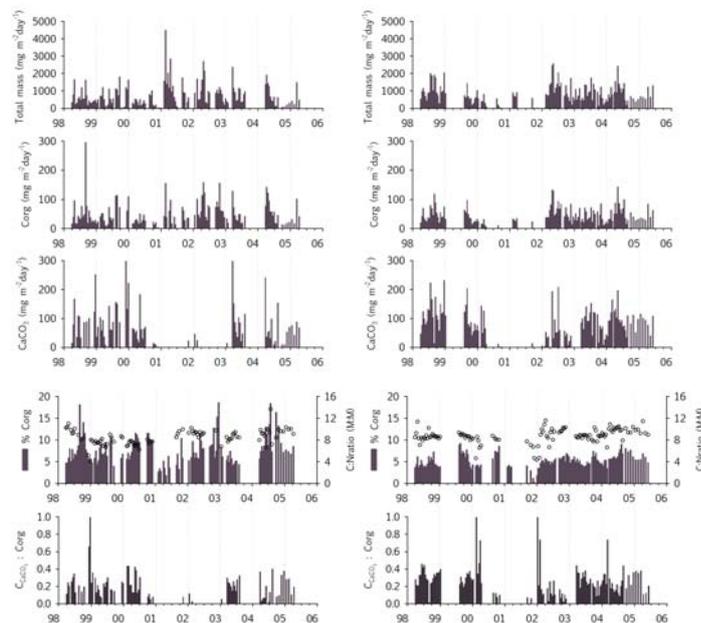


Figure 3. The magnitude and composition of the settling particles showed a large interannual and seasonal variability. At the shallowest sediment trap, the highest fluxes of total mass and Corg were registered in Feb 2001 and Sep 1998, while frequently low fluxes occurred in 2000. The percentage of Corg was relatively high, with average of 8 ±3% and the contribution of inorganic carbon represented about 0.22 of Corg share. Vertical flux variability was not so large at 1200m. The percentage of Corg decrease to 5 ±1% and the C_{CaCO3}:C_{org} slightly increased to 0.3.

ACKNOWLEDGMENTS

This project was funded by the David and Lucile Packard foundation, the Naval Post Graduate School, and the National Research Council. We thank the crews of R/V Point Lobos, R/V Point Sur and R/V New Horizon. We specially thank Maria Stone and Erich Rienecker for mooring deployment.

4. PRIMARY PRODUCTION and Corg FLUX COUPLING

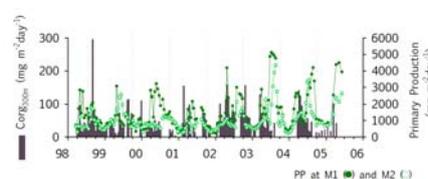


Figure 4. The vertical export of organic carbon off Monterey Bay is characterized by pulses of intense fluxes, generally during upwelling periods. These pulses seem to be modulated by peaks of high primary production at the bay, pointing to a strong coupling between vertical export of Corg and primary production. On the other hand, this export of Corg is transferred to the deeper trap, though diminished in quantity and quality. In fact, Corg flux is reduced on average 26% and the %Corg is about 3% less at 1200m.