

Author's Accepted Manuscript

Controlling factors of the seasonal variability of productivity in the southern Humboldt Current System (30°S-40°S): a biophysical modeling approach

Odette A. Vergara, Vincent Echevín, Héctor Hito Sepúlveda, Renato A. Quiñones



www.elsevier.com/locate/csr

PII: S0278-4343(17)30089-4
DOI: <http://dx.doi.org/10.1016/j.csr.2017.08.013>
Reference: CSR3655

To appear in: *Continental Shelf Research*

Received date: 17 February 2017
Revised date: 19 July 2017
Accepted date: 19 August 2017

Cite this article as: Odette A. Vergara, Vincent Echevín, Héctor Hito Sepúlveda and Renato A. Quiñones, Controlling factors of the seasonal variability of productivity in the southern Humboldt Current System (30°S-40°S): a biophysical modeling approach, *Continental Shelf Research*, <http://dx.doi.org/10.1016/j.csr.2017.08.013>

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting galley proof before it is published in its final citable form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

Controlling factors of the seasonal variability of productivity in the southern Humboldt Current System (30°S-40°S): a biophysical modeling approach

Odette A. Vergara^{1,2}, Vincent Echevín³, Héctor Hito Sepúlveda⁴, Renato A. Quiñones^{1,2}

¹Interdisciplinary Center for Aquaculture Research, Universidad de Concepción, O'Higgins 1695, Concepción, Chile

²Doctorate Program in Oceanography, Department of Oceanography, Universidad de Concepción, Casilla 160-C, Concepción, Chile

³UMR LOCEAN, IRD/Sorbonne Universités (UPMC Univ Paris 06)/CNRS/MNHN, 4 Place Jussieu, Case 100, 75252 Paris cedex 05, France

⁴Geophysics Department, University of Concepción, Concepción, Chile

Abstract

The spatial and seasonal variability of nutrients and chlorophyll in the southern Humboldt Current System were assessed using a high-resolution regional ocean circulation model (ROMS) coupled to a biogeochemical model (Pelagic-Interactions Scheme for carbon and Ecosystem Studies; PISCES). The simulated nutrients and chlorophyll fields were validated using satellite and *in situ* observations at a continental shelf time-series station. The annual cycles of modeled chlorophyll and nutrients were consistent with the highest values observed in spring and summer, which is in agreement with enhanced upwelling observations. Co-limitation of phytoplankton growth by nutrients and light was analyzed for diatoms, the dominant phytoplankton group in the simulations. The results showed that co-limitation, near the coast, was governed in autumn and winter by light, and by silicate in spring and summer, whereas other nutrients were limiting offshore between January and April. Nutrient transport in the surface layer was analyzed. Vertical advection reflected areas with higher coastal upwelling, and was partly offset by horizontal processes related to eddy-induced transport from the nearshore to the open ocean. Vertical mixing was shown to play a key role in replenishing the surface layer with nutrients.

Download English Version:

<https://daneshyari.com/en/article/5764530>

Download Persian Version:

<https://daneshyari.com/article/5764530>

[Daneshyari.com](https://daneshyari.com)