

UC San Diego

Research Final Reports

Title

Developing the capability to monitor and predict upwelling along the California coast using an ocean circulation model

Permalink

<https://escholarship.org/uc/item/3cm37961>

Authors

Wang, Xiaochun
Chao, Yi

Publication Date

2011-09-22

**California Sea Grant College Program
Completion Report**

R/ENV-217
7/1/2010–8/31/2011

Developing the capability to monitor and predict upwelling along the California coast using an ocean circulation model

Xiaochun Wang
818.393.7231
xcwang@jifresse.ucla.edu

Yi Chao
818.394.8168
yi.chao@jpl.nasa.gov

Project Hypothesis

Coastal ocean forecasting models can be used to monitor and predict coastal upwelling.

Project Goals and Objectives

This program development proposal will evaluate the output (mainly vertical velocity) from a coastal ocean circulation model, designed for real-time forecasting for the entire California coastal region, for monitoring and predicting upwelling.

Briefly describe project methodology

Using a 3-km California coastal ocean model, we will extend our preliminary analyses by comparing model output with the conventional upwelling index to identify any possible limitations of the model to reproduce vertical velocities.

Describe progress and accomplishments toward meeting goals and objectives.

Through analysis of the California coastal ocean model output and data, we identified the following:

- 1) Model vertical velocity at the bottom of the surface mixed layer compares favorably with upwelling index produced by NOAA Pacific Fisheries Environmental Laboratory (PFEL) for climatological wind forcing.
- 2) Model vertical velocity at the top of the bottom mixed layer can provide extra information regarding the source of upwelling water.
- 3) Both these products from the ocean circulation model can be used to monitor upwelling and provide upwelling prediction with a lead time of two to three days.

A meeting with scientists from NOAA PFEL was held in September 2010 to discuss possible collaborations. A poster presentation regarding the above findings was made at the AGU fall meeting in December 2010

PROJECT MODIFICATIONS:

N/A

PROJECT OUTCOMES:

A poster presentation entitled "Developing the capability to monitor and predict California coastal upwelling using an ocean circulation model" was made at the AGU fall meeting in December 2010.

IMPACTS OF PROJECT:

A meeting between the PI and scientists of the NOAA Pacific Fisheries Environmental Laboratory (Drs. Steven Bograd, David Foley, Franklin Schwing) was held in September 2010 to discuss possible collaborations.

During October 2010, a field experiment Monterey Bay Bloom Experiment (BloomEX) was conducted with the goal to identify, characterize and predict the development and movement of phytoplankton blooms in the Monterey Bay region. Our Regional Ocean Modeling System (ROMS) group provided real-time ocean forecasting to all the PIs of the field experiment (<http://ourocean.jpl.nasa.gov/MB>). In addition to our conventional products (temperature, salinity, and current), model based

upwelling was also provided. These products were used during the experiment for the deployment of observational assets and are currently used for further investigation.

In November 2010, I gave a seminar based on the results funded by the project at weekly coastal ocean seminar series organized by the Department of Atmospheric and Oceanic Sciences, UCLA.

A trainee (Mr. Justin Ko, a M.Sc. student at UCLA) was hired for one year to help with data analysis.

BENEFITS, COMMERCIALIZATION, AND APPLICATION OF PROJECT RESULTS:

None listed.

ECONOMIC BENEFITS generated by discovery

None listed.

Issue-based forecast capabilities

Once it is completely implemented, the California coastal ocean circulation model can provide upwelling forecasting with a lead time of two to three days.

Tool, technologies and information services developed

None listed.

Publications

Miscellaneous Documents

Poster presentation: Xiaochun Wang, Steven James Bograd, Larry Breaker, Yi Chao, Jim Doyle, David Gareth Foley, Franklin Schwing. Developing the capability to monitor and predict California coastal upwelling using an ocean. December 2010.

DISSEMINATION OF RESULTS

A poster presentation entitled "Developing the capability to monitor and predict California coastal upwelling using an ocean circulation model" (X. Wang, S. Bograd, L. Breaker, Y. Chao, J. Doyle, D. G. Foley, F. Schwing) was made at the AGU fall meeting in December 2010.

COOPERATING ORGANIZATIONS

None listed.

Volunteer Count: 1

STUDENTS SUPPORTED BY THIS GRANT:

Justin Ko

UCLA; Dept. of Atmospheric and Oceanic Sciences

mattimeo005@ucla.edu

650.305.9618

Degree Program: M.Sc

Start date: 9/1/2010 End date: 6/30/2011