

Establishing a NOAA Operational Data Center for Surface Currents Derived from Satellite Altimeters and Scatterometers; Pilot Study for the Tropical Pacific Including the Hawaiian Islands and US Territorial Islands.

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<http://www.oscar.noaa.gov>

LONG-TERM GOALS

This project, which now has a working name OSCAR (**O**cean **S**urface **C**urrents **A**nalysis **R**eal-time), develops a processing system and data center to provide operational ocean surface velocity fields from satellite altimeter and vector wind data. The regional focus is the tropical Pacific, where the value of this data is demonstrated for a variety of uses, specifically large scale climate diagnostics and prediction as well as fisheries management and recruitment, monitoring debris drift, larvae drift, oil spills, fronts and eddies. The end product will be to leave in place a turnkey system running at NOAA/NESDIS, with an established user clientele and easy internet data access.

OBJECTIVES

The method to derive surface currents with satellite altimeter and scatterometer data is the outcome of several years of NASA-sponsored research. This project transitions the capability to operational

oceanographic applications. The near term objective is to provide data that is updated on a weekly basis, and to carry out a thorough validation analysis. The data have been very useful to monitoring the El Nino in 2002 and its fading in early 2003 and evaluating forecast models.

APPROACH AND WORK PLAN

Gary Mitchum acquires Jason-1 altimeter Interim Geophysical Data Records (IGDRs) from NASA on a daily basis. Every week the gridded sea surface height analysis is updated. Mark Bourassa provides routine gridded analyses of scatterometer vector wind data. Once per week, these files are transferred to the PI's institution (ESR) where the data are converted into surface currents using the dynamical model of Bonjean and Lagerloef (2002). The surface current fields are then automatically sent to NOAA/PMEL where the OSCAR website (www.oscar.noaa.gov) is being developed. Figure 1 shows the latest image from the web page. Presently, we are upgrading the processor to produce an analysis every 5 days rather than 10 days. Work in the coming year will include streamlining the automated processing system, documentation, validation analyses, scientific evaluations of the ocean dynamics, evaluating alternative operational surface height input fields and transferring the system to NOAA/NESDIS.

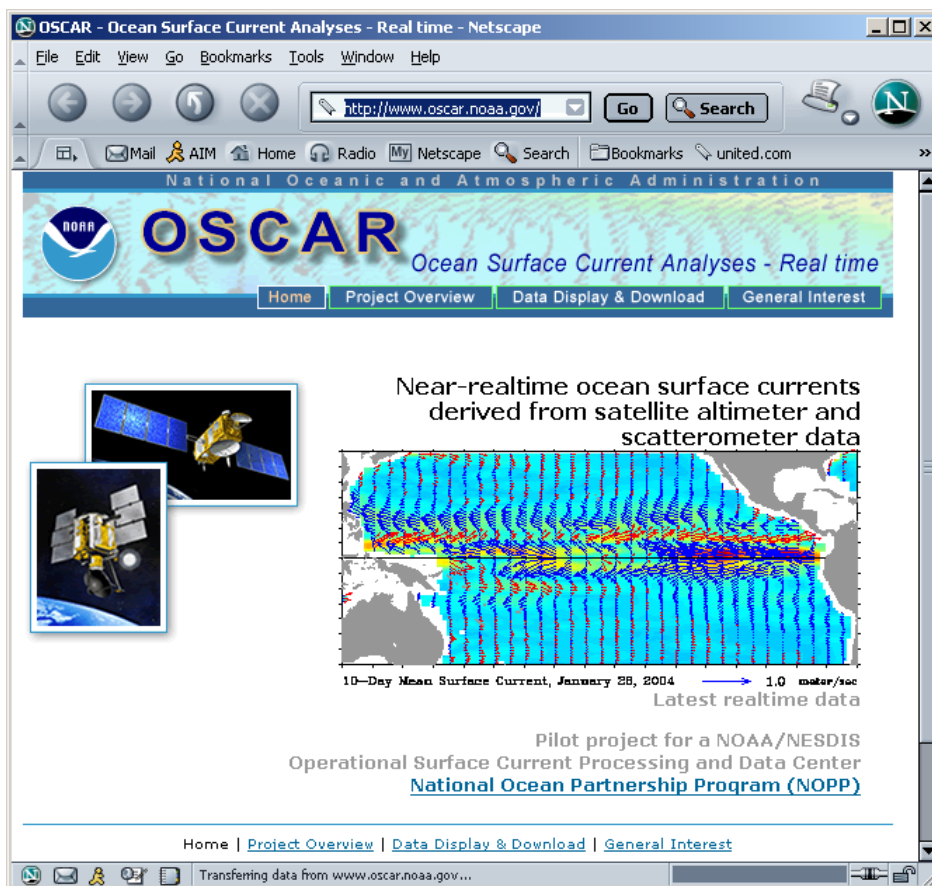


Figure 1: OSCAR home page showing data for the period 21-31 January 2004.

WORK COMPLETED

Monthly surface current maps are routinely furnished to the NOAA Climate Diagnostics Bulletin.

The OSCAR website has been active since September 2002, allowing public access. A live access server was installed this year to provide data download for researchers and other users.

The website is continually modified to improve data display options. NOAA/NCEP is using the data to evaluate the tropical Pacific climate prediction ocean model data assimilation procedures. An improved mean sea level field was introduced which enhanced the accuracy of the mean currents analysis. A paper on the evolution of the 2002-2003 El Nino was published in Geophysical Research Letters.

RESULTS

The peak and decline of the 2002 El Nino was watched closely with the real time surface current data. Our analyses indicate that the surface currents peaked in October, the SST peaked in late November, and the warm event declined through the 2003 winter-spring. La Nina-like conditions developed in late spring and then faded during the summer-fall. Most of the past year has shown no strong tendency toward either El Nino or La Nina conditions.

IMPACT AND APPLICATIONS

Please describe the potential future impact for the NOPP evaluation factors below. Impact is taken to mean “to have an effect on” and/or “to produce changes.”

National Security (Delete this section if there are none)

The surface current data may become important for naval, commercial maritime or search and rescue operations.

Economic Development (Delete this section if there are none)

To the extent that the data from this project improves El Nino prediction, there are potential societal benefits for forecasting economic and environmental impacts.

Quality of Life (Delete this section if there are none)

These data are being applied to Pacific fisheries resource management.

Science Education and Communication

The OSCAR website is open to the public and available students and educators. The PI is working with NASA to help develop high school science curricula concerning ocean currents.

TRANSITIONS

None except as noted above.

RELATED PROJECTS

The PI and CoI Gary Mitchum collaborate on a NASA-funded program for scientific analysis of Jason altimeter data. This long term project supported the initial development of the surface current analysis. The PI has an investigation on wind-driven currents with the NASA Ocean Vector Winds Science Team (OVWST).

PUBLICATIONS

Lagerloef, G. S. E., R. Lukas, F. Bonjean, J. T. Gunn, G. T. Mitchum, M. Bourassa, and A. J. Busalacchi, El Niño Tropical Pacific Ocean surface current and temperature evolution in 2002 and outlook for early 2003, *Geophys. Res. Lett.*, 30(10), 1514, doi:10.1029/2003GL017096, 2003.

Bonjean, F., and G.S.E. Lagerloef: Diagnostic model and analysis of the surface currents in the tropical Pacific Ocean, *Journal of Physical Oceanography*, 32, 2938-2954, 2002.

Picaut, J., E. Hackert, A. J. Busalacchi, R. Murtugudde and G. S. E. Lagerloef, Mechanisms of the 1997-1998 El Nino-La Nina, as inferred from space-based observations. *J. Geophys. Res.*, 107 (C5), doi:10.1029/2001JC000850, 2002.