

A National Oceanographic Partnership Program Award

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 fisheries

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management and recruitment, monitoring debris drift, larvae drift, oil spills, fronts and eddies, as well as large scale climate diagnostics and prediction. 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.

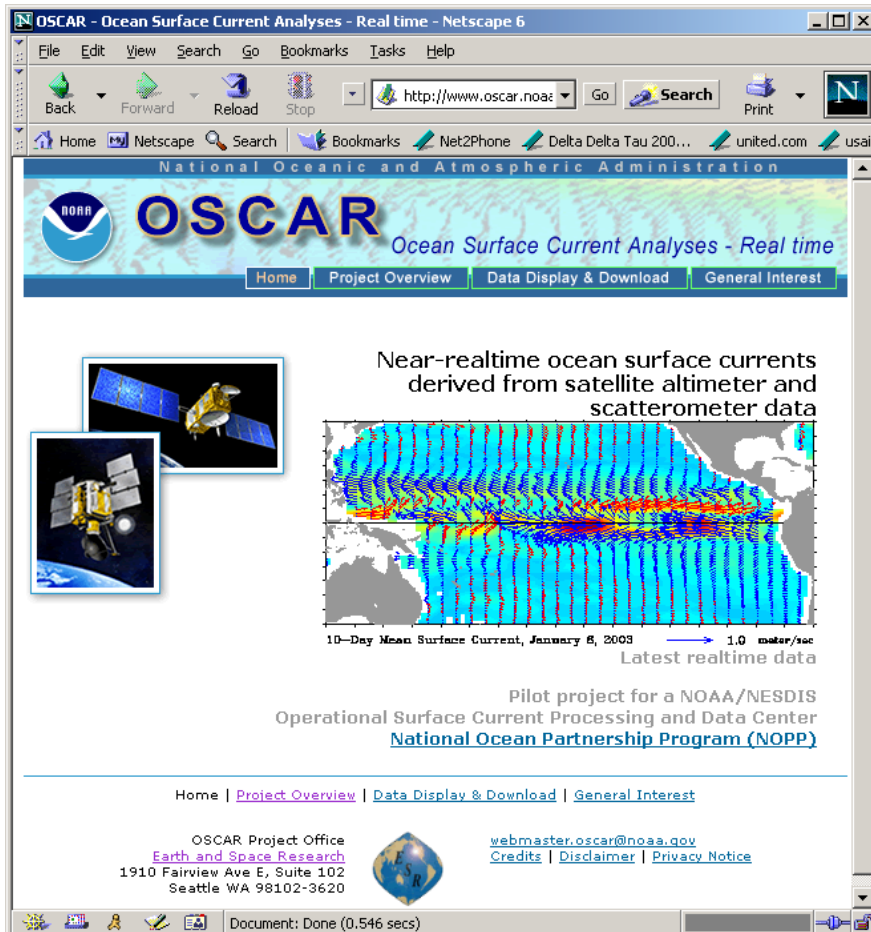


Figure 1 OSCAR home page showing data for the period 1-10 January 2003.

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.

Approach and work plan

Gary Mitchum acquires Jason-1 altimeter Interim Geophysical Data Records (IGDRs) from NASA on a regular basis and every week the gridded sea surface height analysis is updated.

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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. Work in the coming year will include streamlining the automated processing system, documentation, extensive validation analyses using surface drifters and ocean current measurements, and scientific evaluations of the ocean dynamics.

Work Completed

- Monthly surface current maps were furnished to the NOAA Climate Diagnostics Bulletin.
- The OSCAR website was activated in September 2002, allowing public access.
- The website is continually modified to improve data display options.
- The paper presenting the dynamical model was published in *J. Physical Oceanography*.

Results

The evolution of the 2002 El Nino was watched closely with the real time surface current data. Strong eastward anomalous flow occurred along the equator from June through November, and was followed by rapid sea surface temperature (SST) growth as the El Nino developed. Our analyses indicate that the surface currents peaked in October, the SST peaked in late November, and the warm event is now in decline (Lagerloef et al., 2003).

Impact and Applications

National Security

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

Economic Development

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

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.

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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, and is scheduled to continue one more year with low-level funding.

Publications

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.

Kaplan, A., M. Cane, D. Chen, D. Witter, and R. Cheney, Signal and noise in tropical Pacific sea level height analyses, *J. Geophys. Res.*, 2003 (submitted).

Lagerloef, G., R. Lukas, F. Bonjean, J. Gunn, G. Mitchum, M. Bourassa, A. Busalacchi: El Niño Tropical Pacific Ocean surface current and temperature evolution in 2002 and outlook for early 2003, *Geophys. Res. Lett.*, 2003 (Submitted)

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