J2.6 INTERACTIVE WEB ACCESS TO OCEAN SURFACE CURRENTS ANALYSES – REALTIME DATA

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1. INTRODUCTION

Ocean Surface Currents Analyses – Realtime (OSCAR) data access system provides global data of operational ocean surface velocity fields to a broad-based user community via a web-based interactive data selection interface. The OSCAR data, (Bonjean, 2002) is automatically computed from gridded fields of surface topography and wind derived from satellite altimeter and scatterometer vector wind data through methods developed at Earth & Space Research (ESR). The web-based interactive data access system, developed at PMEL, makes it easy for user to display and download the Surface Current data.

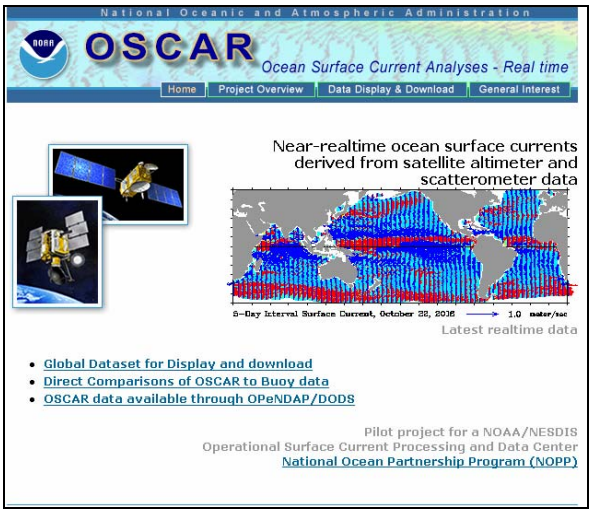

Figure 1. The OSCAR Web site (www.oscar.noaa.gov)

2. DATA PROCESSING SYSTEM

The OSCAR data processing system is an entirely automated computer system, Bonjean (2004), developed at ESR. It gathers and processes up-to-date source data, including satellite sea surface height (SSH), wind and sea surface Temperature (SST) data, calculates ocean surface velocity and creates surface velocity files which are then used by the OSCAR web server for the display and download facilities.

The OSCAR surface currents are available on a time base with exactly 72 steps per year (about 5 day spacing) starting form October 1992. The near real-time geostrophic component is derived from a combined satellite product (AVISO) that merges the altimetry data from JASON-1 (complete cycle in 10 days), GFO and ENVISAT. The near real-time wind-driven component is derived from gridded scatterometer data (FSU/COAPS) based on the QUIKSCAT satellite. The historical dataset from Oct. 1992 to 2006 is built by combining earlier gridded satellite data from altimeters TOPEX/ POSEIDON and ERS1-2, and radiometer SSM/I. The regional focus has been extended from Tropical Pacific to entire globe (70S to 70 N). The data files are stored in netCDF format and available in filtered (for display only) and unfiltered 5-day mean, monthly mean, long term seasonal mean. And anomaly data are also available, particularly useful for ocean climate analyses.

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3. INTERACTIVE WEB ACCESS

The OSCAR Web site, located at PMEL's server machine, is established to provide information and easy access to OSCAR surface currents data (Figure 1).

3.1 *Data Update*

An automated procedure is used to retrieve updated data files from data server at ESR. A map showing near real-time vector overlay surface current speed on the cover page (Figure 1) is updated daily. Other maps, section plots and information are also updated to show the most recent data.

3.2 *Data Display*

The OSCAR Web Interface provides features that allow user to make Ocean Surface Currents plots including Lat-Lon Map, Lat-Time Section, Time-Lon Section, and Time Series Plot of desired geographical region and time period. Anomaly data calculated as the deviation from the mean seasonal cycle are also available for display. Figure 2 to Figure 8 show some sample plots of 5-Day Interval Ocean Surface Currents. User can also download Postscript file of plotting result.

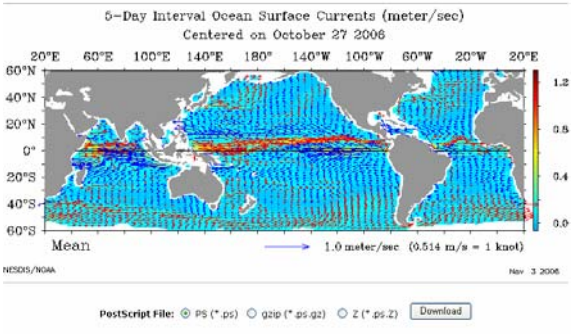

Figure 2. Vector Overlay Surface Currents

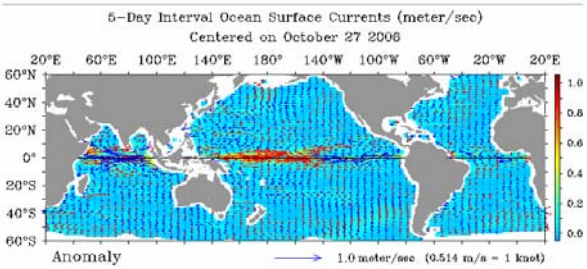

Figure 3. Vector Overlay Surface Currents Anomaly. Large eastward anomalies (red arrows) have persisted in the western equatorial Pacific since early Spring 2006, and are associated with El Nino (warm) conditions.

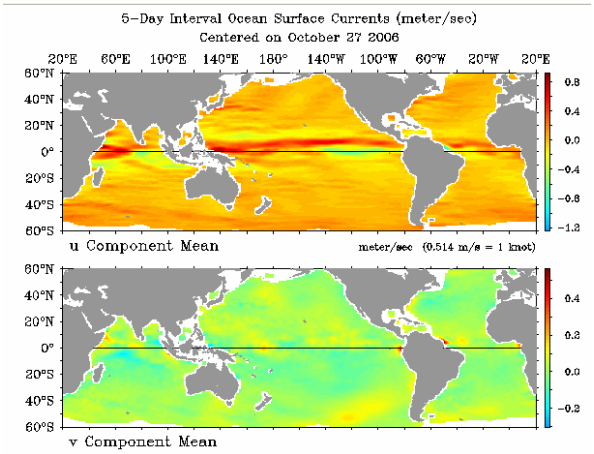

Figure 4. Lat-Lon Map of Meridianal and Zonal Current Mean Centered on October 27, 2006

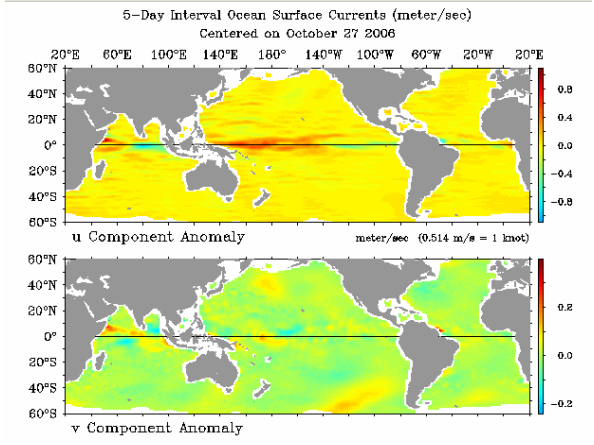

Figure 5. Lat-Lon Map of Meridianal and Zonal Current Anomaly Centered on October 27, 2006

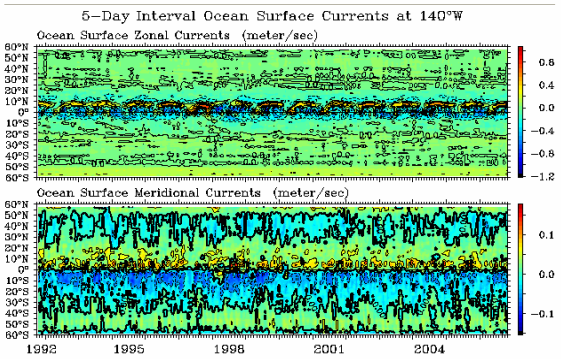

Figure 6. Lat-Time Section of Zonal & Meridional Current

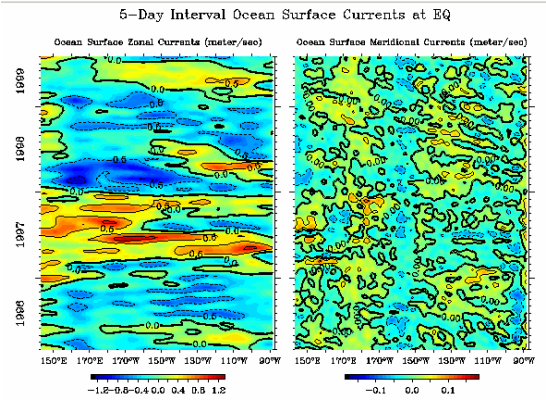

Figure 7. Time-Lon Section of Zonal & Meridional Current

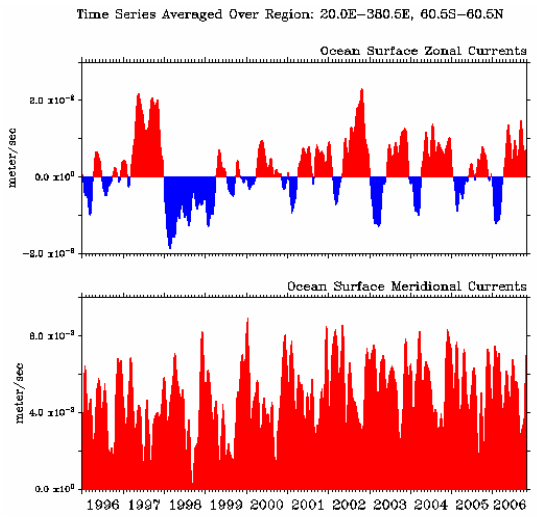

Figure 8. Time Series Plot

3.3 *Data Download*

The OSCAR web system allows users to download data of desired region and time range. In addition, entire data sets are also available through Dapper server (Sirott, 2004) - an OPeNDAP/DODS web server: http://dapper.pmel.noaa.gov/dapper/oscar/. Users can access OSCAR data (netCDF) files using Dapper supported client software, e.g. Matlab, from their desktop computers.

4. WEB TECHNOLOGIES

The OSCAR web access system implement Java Applet and JavaScript to provide user interactive front-end. Figure 9 to Figure 11 show the interface of some of selection pages.

User can use Java-enhanced selection interface to select the geographic region or time range with mouse-dragging over the map (rubble-band selection), or entering longitude, latitude or time value in the text fields. We also provide non-java selection version, in case user's browser doesn't support the Java Applet. Several plot options are also available such as select data type (5-day, monthly, or long term mean, or anomaly), select filtered or unfiltered data, specify contour color, vector scale, etc. The JavaScript and PHP scripts are used to generate the result pages dynamically on-the-fly. The EPIC system utilities (www.epic.noaa.gov) and the PPLUS graphic package (Denbo, http://dwd6.home.mindspring.com) are used to perform back-end data retrieving, and data plotting.

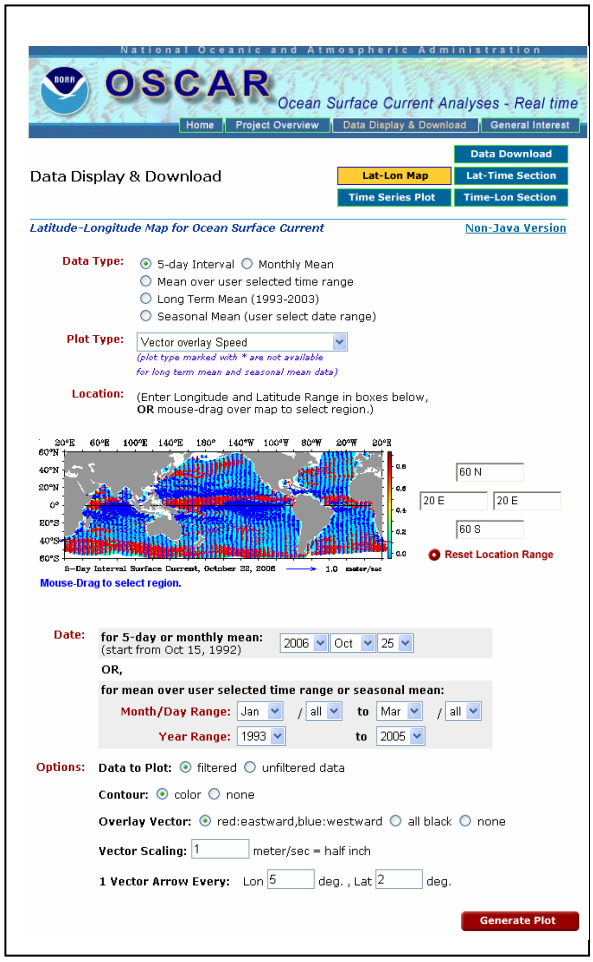

Figure 9. Lat-Lon Map Selection Options

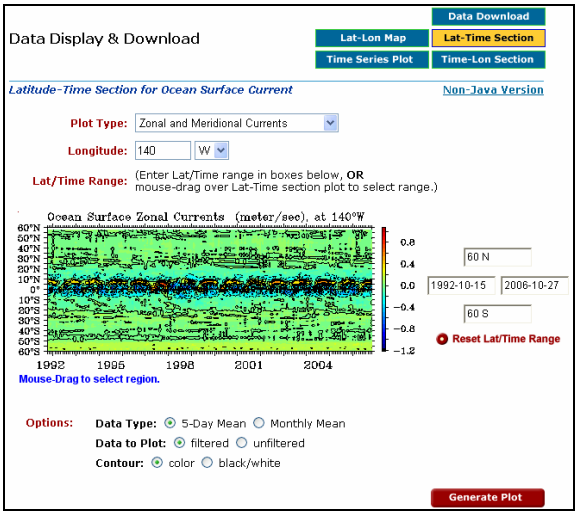

Figure 10. Lat-Time Section Plot Options

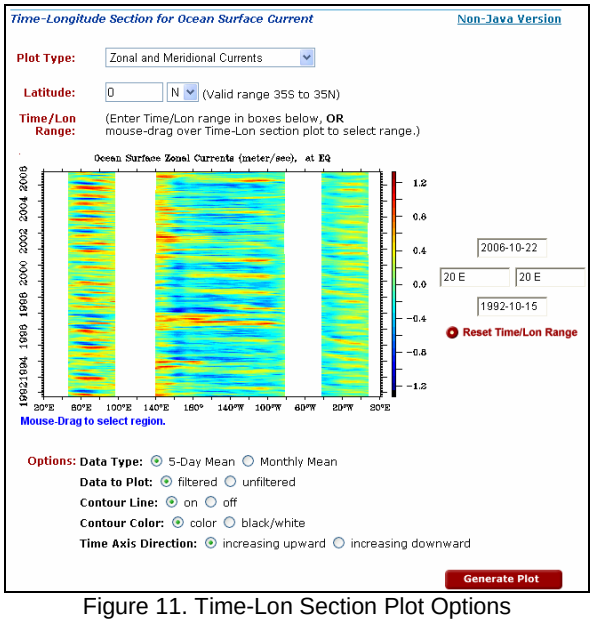

Figure 11. Time-Lon Section Plot Options

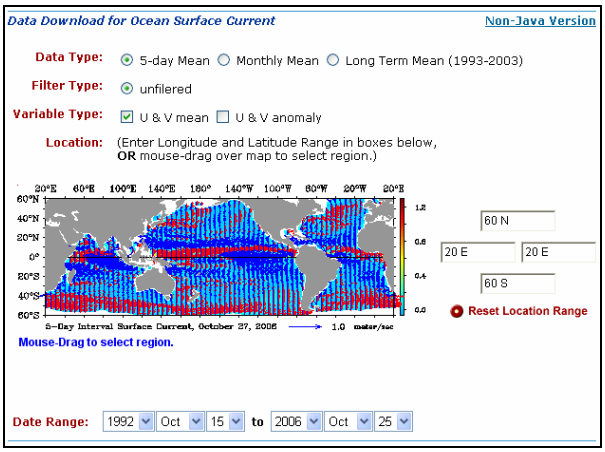

Figure 11. Data Download Options

5. Summary

The OSCAR project develops a processing system and data center to provide operational ocean surface velocity fields from satellite altimeter and vector wind data.

Some key features included in the Web access system are: (1) automated data update procedure; (2) direct access to global data (70S – 70N in latitude and entire longitude) from Oct. 1992 to present; (3) data display of vectors and/or speed over lat-lon map, lat-time section, time-lon section, and time series; (4) data download for selected regions and time range; (5) two selectable filtered/unfiltered modes available with mean and anomaly currents of 5-day interval, monthly, long term, and seasonal data; (6) interactive web interface selections of location range, time range, and other plot/downloading options; (7) data available through OPeNDAP/DODS.

The OSCAR data website has been used extensively by scientists and researchers for research purpose, and it is also used by others, such as fisherman and school students, for informational purpose. For more information about OSCAR data and data processing system, please contact: Fabrice Bonjean, Earth and Space Research, 1910 Fairview Ave E, Suite 210, Seattle, Washington, 98102. Email: bonjean@esr.org.

6. Acknowledgments

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7. References

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Sirott, J., D.W. Denbo, and W.H. Zhu (2004): Dapper: An OPeNDAP server for in-situ data. In *Proceedings of the 20th International Conference on Interactive Information and Processing Systems (IIPS) for Meteorology, Oceanography, and Hydrology*, 2004 AMS Annual Meeting, Seattle, WA, 12–15 January 2004, paper 9.12.

Denbo, W. Donald, Plot Plus Graphics, http://dwd6.home.mindspring.com/