

WHAT'S NEW AT THE APDRC?

The Asia-Pacific Data Research Center (APDRC) continues to maintain an extensive archive of climate-related data and model outputs that is accessible not only to the international climate science community, but also to the general public. The APDRC data server allows interactive access to these data sets, and the APDRC staff are always working to improve the user-interface in ways that will make the data more useful.

The data sets served include many that are produced elsewhere, but the “Projects” page on the APDRC web site point to many data sets developed by IPRC and our close partners. Most of these IPRC data sets are somewhat specialized products, often involving model simulations. In addition, however, IPRC has recently produced several data sets with our own analyses of long time periods of near-global coverage for standard meteorological and oceanographic variables, and we expect these data sets to have wide application throughout the community. Below we introduce two of these

IPRC-developed global data sets, one for surface winds and one for surface ocean currents. We also briefly discuss a recent development that improves user interaction with some historical ocean-current profile data.

New Marine Wind-product Available for Climate-change Studies

Extensive compilations of sea-surface wind observations taken mainly from ships-of-opportunity have existed for some time. The reported wind values from ships can include direct anemometer observations and also “Beaufort winds,” estimated winds from visual observation of the sea state. In addition, determinations of swell and wave amplitudes themselves are often reported, and these values potentially yield information about the near-surface winds. These various raw observations have several error sources that are a concern particularly for de-

termining long-term trends. For example, direct wind observations have a spurious bias towards increasing wind speed due to increasing heights of the anemometers as the reporting “ships-of-opportunity” have become on average taller.

In a project led by IPRC Assistant Researcher **Hiroki Tokinaga**, a new a long-term (1950–2008) data set of monthly mean near-surface winds over the global ocean has been developed that combines ship-based direct observations and estimated winds. The wind product is meant to represent winds 10 m above the sea surface. The raw wind reports are quality-controlled and corrected to minimize spurious trends. This new “Wave and Anemometer Based Sea-surface Wind (WASWind)” data set is notable for its corrections for the anemometer height bias, its use of visually observed wave heights to estimate winds, and omission of the estimated Beaufort winds after 1980 when suspicious trends appear in the raw data.

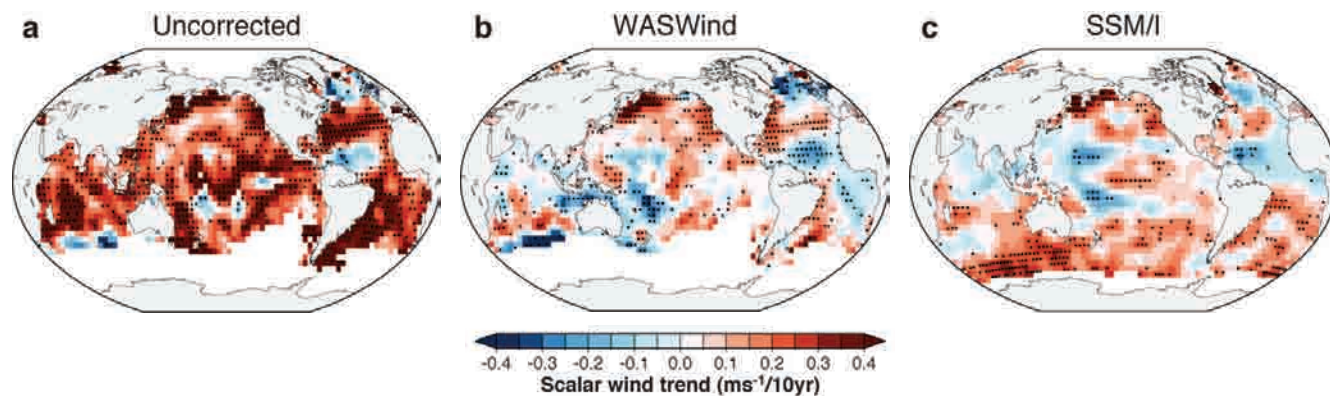


Figure 1. Linear trends in surface scalar-mean wind over 20 years from July 1987 to August 2006 derived from (a) uncorrected ship-observed wind, (b) WASWind, and (c) SSM/I satellite observations. Grid points marked with dots exceed 95% confidence level based on the Mann-Kendall test.

WASWind displays rich spatial structures in trend patterns as shown in the 20-year trend in Figure 1b. The combination of ship-based observations of winds and wind wave-height successfully reproduces not only major modes of seasonal-to-decadal variability, but also trend patterns physically consistent with trends seen over the last two decades in sea level pressure (SLP) and in satellite measurements of the Special Sensor Microwave Imager (SSM/I) (Figure 1c). The agreement in trend patterns with such independent observations illustrates the usefulness of WASWind for climate-trend analyses, especially since it is available from the pre-satellite era starting in 1950 to 2008. The dataset is of sufficiently high resolution to make it valuable for regional climate-change study. [H. Tokinaga and S.-P. Xie: Wave and Anemometer-based Sea-surface Wind (WASWind) for climate change analysis, *J. Climate*, in press]

Ocean Surface Currents from a Diagnostic Model

IPRC's Senior Scientist **Nikolai Maximenko**, with the help of Scientific Computer Programmer **Jan Hafner**, has produced a new surface current data set with high-resolution, daily, near-global coverage. The Surface CUrrents from Diagnostic model (SCUD) data set aims to make the best estimates of an "ocean surface current velocity" that would describe the motion of standard floats drogued at 15-m depth.

The SCUD velocities are derived from AVISO satellite observations of sea-level anomalies, a mean dynamic topography, and QuikSCAT observations of surface winds.

The estimated total surface current velocity is comprised of a component linearly related to the local horizontal

pressure gradient (but not necessarily geostrophic balance) and a component that is a linear function of the local surface wind (but not necessarily assuming Ekman balance). The SCUD velocities are specified daily on a 0.25 degree latitude-longitude grid, but are averaged over the local inertial period for up to three days.

The dataset can be applied to diagnosing trajectories of passive tracers floating at or near the sea surface, such as marine debris, oil spills, etc., but it should be appreciated that movements of a particular tracer may systematically differ from the motion of the standard drifters used to calibrate the SCUD model.

The SCUD data is currently limited to the period of QuikSCAT wind observations from August 1, 1999, through November 19, 2009. The possibility of extending the data set using alternate wind determinations is being investigated.

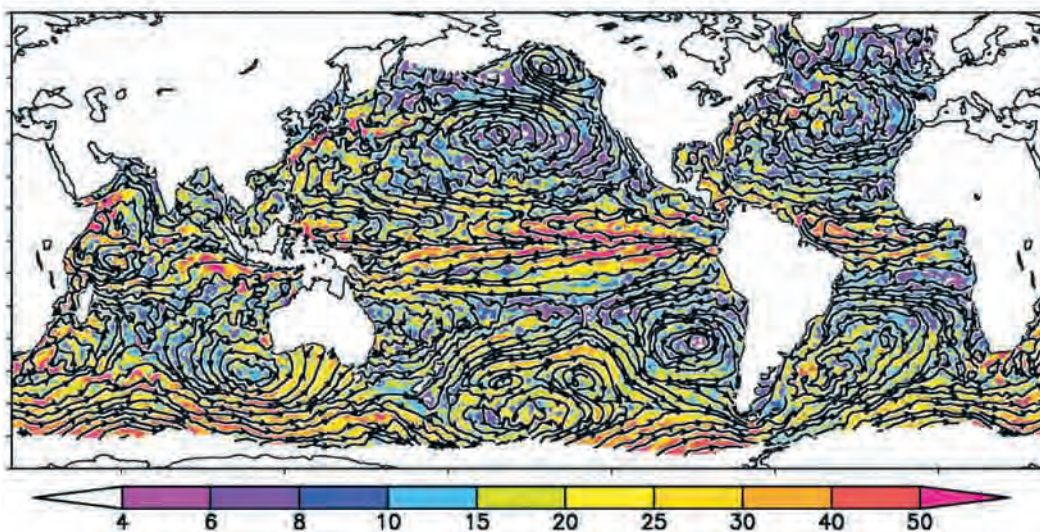
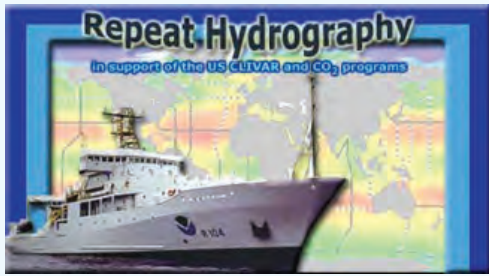


Figure 2. Streamlines of the Surface Current Diagnostic velocity on August 20, 2008. Colors indicate speed and units are cm/s.



On this web page, you will find links to measurements of quasi-instantaneous vertical profiles of horizontal ocean velocities using a Lowered Acoustic Doppler Current Profiler (LADCP) taken as part of the **US component of the CLIVAR/CO2 repeat hydrography program**. Final LADCP processing was performed using the **LDEO processing software** by Andreas Thurnherr (Lamont-Doherty Earth Observatory of Columbia University) through 2008 and by University of Hawaii "currents" group (Firing/Hummon/Ascani) since 2009. This project is supported by NSF grants OCE-0223869 and OCE-0752970. The continuous-in-time upper-ocean velocities from Shipboard Acoustic Doppler Current Profiler (SADCP) are available on the **University of Hawaii "currents" group's website**. Click on the checkboxes to the left of the CLIVAR sections that you would like to see. The station locations will appear on the map below. You may zoom in/out and drag to re-center the *Google* map. Clicking on a station will bring up a popup with a profile plot and links for downloading the data. The third column links (LADCP) provide technical information and access to the entire cruise's data. The fourth column links send you to the CCHDO website with other hydrographic data (CTD etc.)

Figure 3. Access to shipboard measurements on the APDRC website.

Easy Access to Ship-board Measurements of Currents

In situ measurements of ocean currents are sometimes made with lowered acoustic Doppler current profilers, or L-ADCPs. These instruments are lowered through the water column at measuring stations during oceanographic cruises. Since the measurements are not on a standard horizontal grid but are made along a ship track, they have been difficult to present. To aid in the data search and discovery of these measurements, **Sharon DeCarlo** worked with **François Ascani** to develop a system based on Google Maps to display such ADCP data.

By clicking in Figure 3 on the boxes next to the name of the cruise-data desired, the station locations appears on the map in Figure 4. Clicking on a station will bring up a popup with a profile plot and links for downloading that station's data.

In the third column (LADCP), links provide technical information and access to the entire cruise's data; in the fourth column, links send you to the CLIVAR & Carbon Hy-

CLIVAR LADCP Individual sections

<input type="checkbox"/>	A16N 2003	LADCP	CCHDO
<input type="checkbox"/>	A20 2003	LADCP	CCHDO
<input type="checkbox"/>	A22 2003	LADCP	CCHDO
<input type="checkbox"/>	P02W 2004	LADCP	CCHDO
<input checked="" type="checkbox"/>	P02E 2004	LADCP	CCHDO
<input type="checkbox"/>	P16S 2005	LADCP	CCHDO
<input type="checkbox"/>	A16S 2005	LADCP	CCHDO
<input type="checkbox"/>	P16C 2006 (P16N leg 1)	LADCP	CCHDO
<input checked="" type="checkbox"/>	P16N 2006 (P16N leg2)	LADCP	CCHDO
<input type="checkbox"/>	I08S 2007	LADCP	CCHDO
<input type="checkbox"/>	I09N 2007	LADCP	CCHDO
<input type="checkbox"/>	P18_1 2008	LADCP	CCHDO
<input type="checkbox"/>	P18_2 2008	LADCP	CCHDO
<input type="checkbox"/>	I0 6S 2008	LADCP	CCHDO
<input type="checkbox"/>	I05S 2009	LADCP	CCHDO

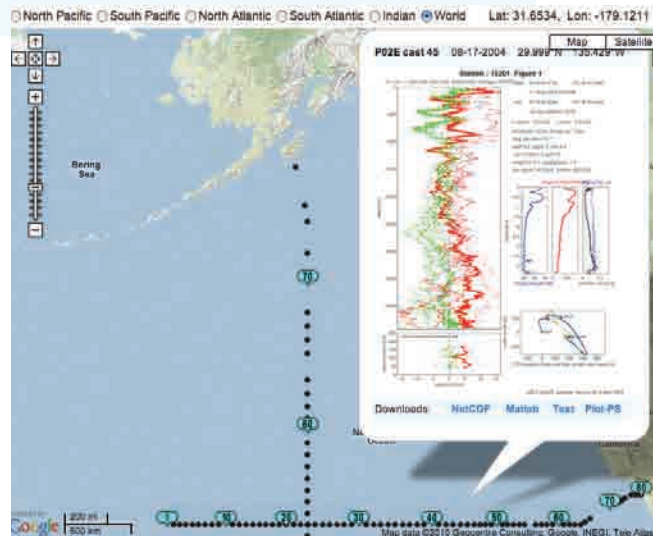


Figure 4. Map of shipboard locations with popup profile for location P02E

drographic Data Office website with further hydrographic data (CTD etc.) (<http://apdrc.soest.hawaii.edu/gg/ladcp.php>). Users can select the data by cruise number or geographic location, and then get either quick-look plots or download the data itself.

The project was done in collaboration with the US component of the CLIVAR/CO2 repeat hydrography program.