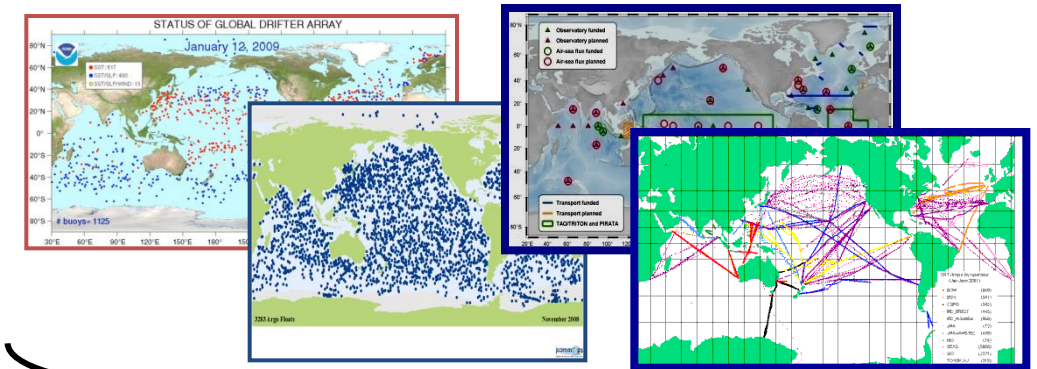
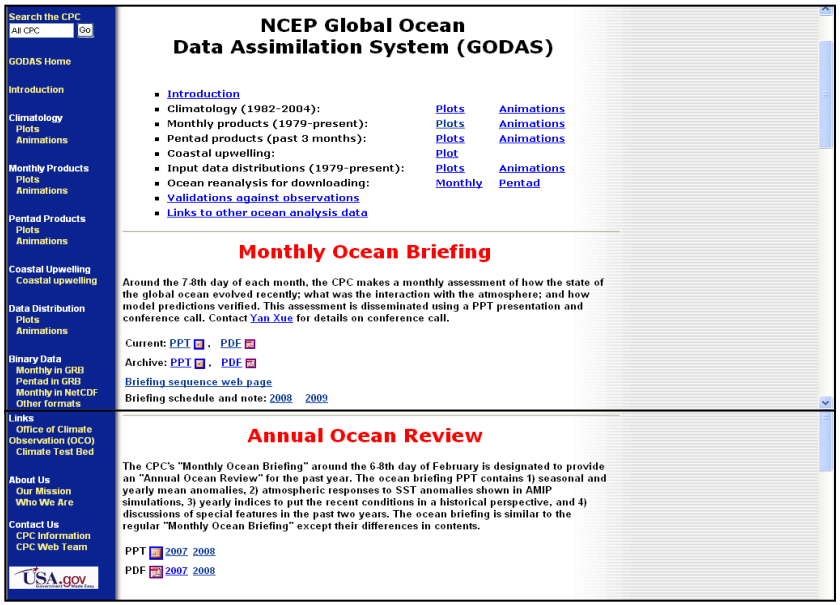
Global Ocean Monitoring Products Based on GODAS

(A partnership between CPC and COD/CPO to deliver climate relevant products to the society)

http://www.cpc.ncep.noaa.gov/products/GODAS/



Synthesis of Ocean Observations

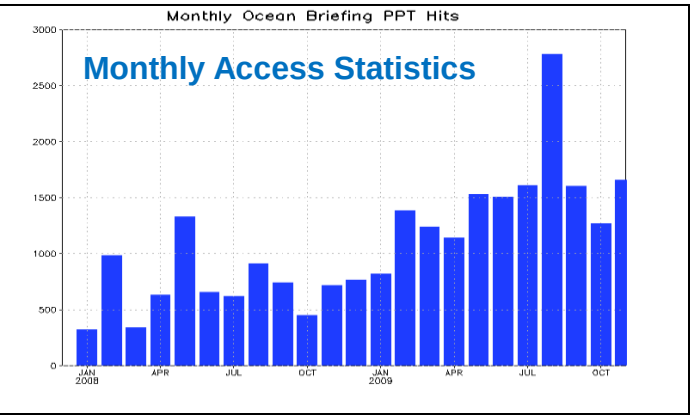


- Synthesis of global ocean observations by NCEP's Global Ocean Data Assimilation System (GODAS)
- Monthly Ocean Briefing & Annual Ocean Review
- Products used widely by operational climate prediction centers, researchers, fishery managers, news media, program managers, teachers and students

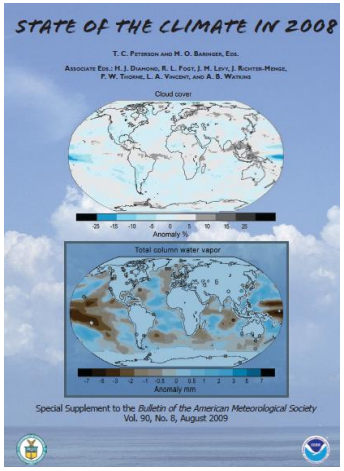
Contact: Yan Xue, NOAA/CPC

Real-time Ocean Monitoring Products

BAMS Annual Report



PaCOOS Annual Report on Physical and Ecological Conditions in the California Current Large Marine Ecosystem



PHYSICAL CONDITIONS IN 2009

El Niño Southern Oscillation (ENSO):

Source : Yan Xue (Climate Prediction Center, NOAA, Yan.Xue@noaa.gov),
http://www.cpc.noaa.gov/products/analysis_monitoring/enso_advisory
http://www.cpc.ncep.noaa.gov/products/GODAS "Monthly Ocean Briefing" PPTs

The evolutions of the equatorial sea surface temperature (SST), zonal wind stress, and heat content (upper 300m temperature average) anomalies in 2009 are shown in Figure 1. The SST in the equatorial Pacific was in a cold phase (NINO3.4 SST < -0.5°C) from December 2008 - March 2009, and in a warm phase (NINO3.4 SST > +0.5°C) from June – December 2009. The above-normal SST in the east-central Pacific strengthened significantly in October 2009, and the 3-month-running mean NINO3.4 SST was 1°C above-normal in September-November 2009, indicating a moderate strength of El Niño. Consistent with the positive SST anomalies the positive zonal wind stress anomalies persisted in the western Pacific and positive heat content anomalies persisted across the equatorial Pacific. Intraseasonal variability dominated zonal wind stress anomalies in the central Pacific, and forced three episodes of downwelling and upwelling oceanic Kelvin waves that were evident in heat content anomalies since June 2009. Therefore, the 2009/10 El Niño developed and strengthened by a series of westerly wind burst events.

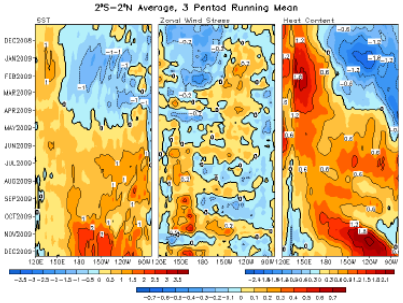


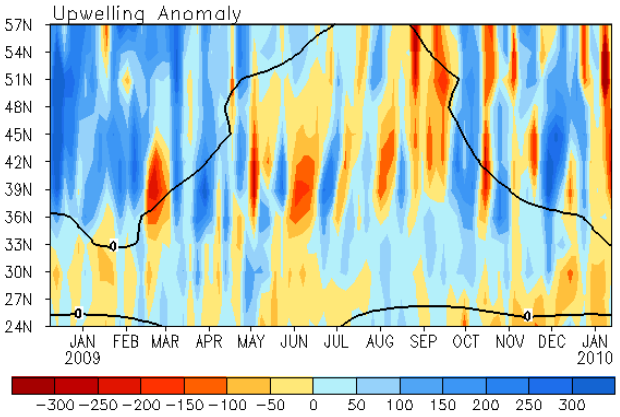
Figure 1. Time-longitude plots of 3-pentad-running mean of SST (left), zonal wind stress (middle) and heat content (upper 300m temperature average, right) anomalies averaged in 2°S-2°N. SSTs are from the weekly 1° Optimum Interpolation (OI) analyses of (Reynolds et al. 2002), heat contents from the NCEP GODAS (Behringer and Xue 2004), and zonal wind stresses from the NCEP Reanalysis 2 (Kanamitsu et al. 2002). Anomalies for SST, zonal wind stress and heat content were calculated for the base periods of 1971-2000, 1982-2004, and 1982-2004 respectively.

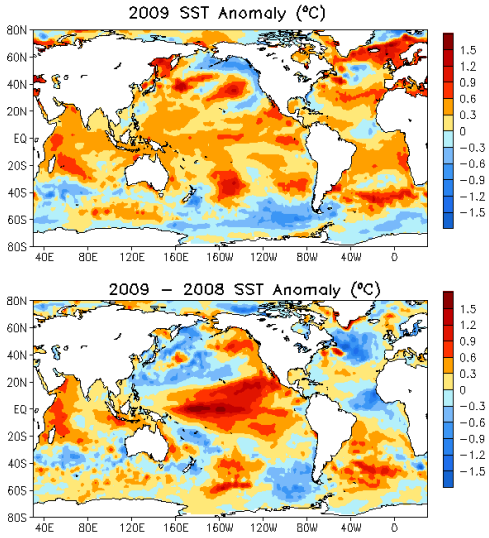
Pacific Decadal Oscillation (PDO) and GODAS Upwelling Indices

Source : Yan Xue (Climate Prediction Center, NOAA, Yan.Xue@noaa.gov), Jerrold Norton (NOAA, Jerrold.G.Norton@noaa.gov) http://jisao.washington.edu/pdo/, and Bill Peterson (NOAA, NMFS)
http://www.cpc.ncep.noaa.gov/products/GODAS "Monthly Ocean Briefing" PPTs

Monthly standardized Pacific Decadal Oscillation (PDO) index downloaded from http://jisao.washington.edu/pdo is shown in Figure. 2. The negative PDO phase, which lasted 23 months from September 2007 to July 2009, switched to a weak positive phase during August-October 2009 (ftp://ftp.atmos.washington.edu/mantua/pnw_impacts/INDICES/PDO.latest). The PDO phase switched from

GODAS Upwelling Indices for west coast of North America



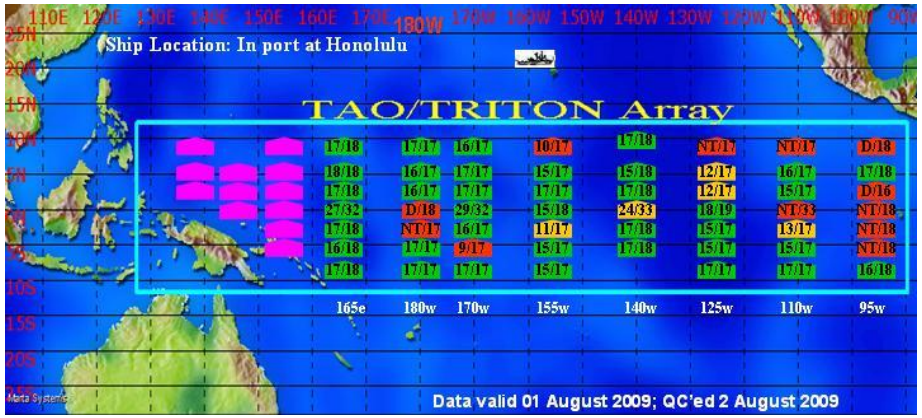


- **Averaged monthly access of the current ocean briefing PPT has increased steadily;**
- **Advanced ocean monitoring tools in support of NOAA's "ENSO Diagnostic Discussions";**
- **Participants in the ocean briefing are from NMFS, IRI, NBDC, PMEL, AOML, COLA, ESRL,CPO;**
- **Academic community uses the ocean briefing material in their teaching and research.**

Advancing Ocean Monitoring Capabilities

Buoy damage blurs El Niño forecasts

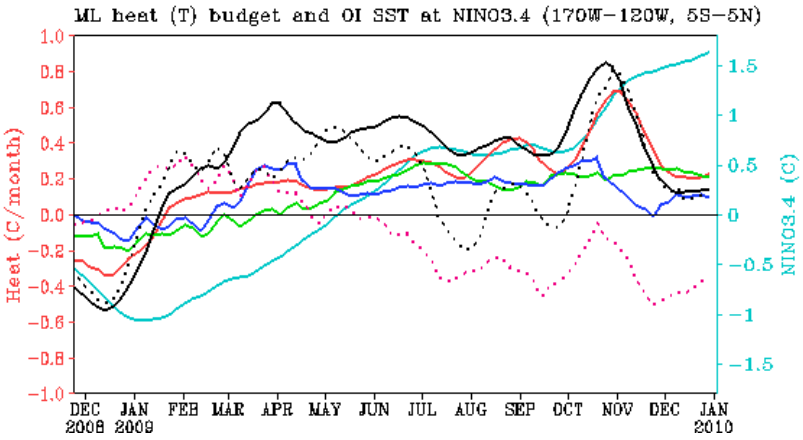
Missing data from the eastern Pacific Ocean may hinder predictions of this year's event.



TAO Array Ocean Observing System Evaluation (OSE)

- **Maintenance for the TAO array is becoming increasingly expensive due to aging and damaging of TAO buoys;**
- **Departures between GODAS and TAO temperature during the 2009/10 El Nino can be as large as 2-3 degree in the eastern tropical Pacific, probably related to the buoy damage there;**
- **GODAS_MOM4 system is used to assess impacts of TAO array on the quality of the ocean analysis and CFS SST forecast;**

Real Time ENSO Heat Budget



Oceanic Kelvin Waves