

**Ocean reanalysis and ocean monitoring products at NCEP**

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The National Centers for Environmental Prediction (NCEP) has been involved in the development of ocean reanalysis for initialization of its operational coupled ocean-atmosphere forecast systems since the early 1990s. A global ocean data assimilation system (GODAS) was implemented in 2004 (Behringer and Xue 2004). A partnership was formed between the Climate Prediction Center (CPC) of NCEP and the Climate Observation Division (COD) of Climate Program Office of NOAA for an end-to-end ocean climate delivery information system that connects gathering of the ocean observations (supported by the COD) to the dissemination of readily usable ocean products to global user community (<http://www.cpc.ncep.noaa.gov/products/GODAS>). The most popular product is "Monthly Ocean Briefing", which includes a monthly assessment of recent evolution of the major climate variability modes, such as El Niño and Southern Oscillation (ENSO), Pacific Decadal Oscillation (PDO), Indian Ocean Dipole (IOD), tropical Atlantic and North Atlantic variability, and further examination of the air-sea interaction processes, as well as a verification of the NCEP coupled model SST predictions. This product is disseminated using a PPT presentation and conference call around the 6th - 8th day of each month. A new coupled reanalysis of the atmosphere, ocean, sea ice and land over 1979-2009 has been recently completed as the Climate Forecast System Reanalysis (CFSR). The CFSR went operational in March 2011. The oceanic component of the CFSR includes many advances: (a) the MOM4 ocean model with an interactive sea-ice, (b) a 6 hour coupled model forecast as the first guess, (c) inclusion of the mean climatological river runoff, and (d) high spatial (0.5° by 0.5°) and temporal (hourly) model output. Both the historical and real time CFSR data are accessible at <http://cfs.ncep.noaa.gov/cfsr>. We have conducted a comprehensive evaluation of the oceanic component of the CFSR (Xue et al. 2011), and significant improvements of many aspects of air-sea interaction in the CFSR have been demonstrated in comparison with previous NCEP reanalyses (R1, R2). We will develop global ocean monitoring products based on the CFSR in the near future.