Name: Yan Xue
Yan.Xue@noaa.gov
CPC/NCEP
5830 University Research Court Room 3005
College Park, MD 20740
Country: USA
Title: Observing System Experiments for Tropical Pacific Observing System
Additional authors: Arun Kumar, Gaberial Vecchi, David Behringer, Caihong Wen, Xiaosong Yang, Hui Wang, Wanqiu Wang
Additional Affiliations: NCEP (Arun, David, Caihong, Hui, Wanqiu), GFDL (Gaberial, Xiaosong)
Abstract:
The TAO/TRITON array is the cornerstone of the ENSO observing system because it systematically measures upper ocean temperature, salinity, velocity and air-sea fluxes that contribute to the dynamics of ENSO, and are essential for ENSO monitoring and prediction. One tool to assess the value of the TAO data in the presence of the Argo data is to conduct Observing System Experiments (OSEs). We conduct coordinated OSEs and hindcast experiments using the NCEP and GFDL ocean data assimilation systems and seasonal forecast models for the post-Argo period 2004-2011. The relative roles of the TAO and Argo data towards constraining the upper ocean thermal structure and ocean currents in ocean reanalysis are assessed. Hindcast experiments initialized from the OSEs are used to show if the seasonal forecast skill of the current generation seasonal forecast models are able to show the benefits of enhanced ocean observing systems.

Four OSE runs are made, in which no observations (CTL), all observations (XBT, moorings, Argo) (ALL), all except the moorings (noTAO), and all except the Argo (noArgo) data are assimilated. Hindcast experiments are initialized with oceanic conditions from the four OSEs around January 1, April 1, July 1 and October 1 during 2004-2011. For each start time, an ensemble of 6 (10) coupled forecasts with perturbed initial conditions is integrated up to 9 (12) months ahead using the seasonal forecast model at NCEP (GFDL). For the OSE runs, we examine the mean bias, standard deviation, root-mean-square error and anomaly correlation with observations. The error statistics contrasted between a pair of OSE runs are used to assess the impacts of different ocean observing systems on the ocean analyses. For the hindcast experiments, we examine the systematic bias, root-mean-square error and anomaly correlation of the tropical Pacific SST. The results from the two seasonal forecast systems are compared and the common characteristics on the impacts of different observing systems on ocean analysis and forecast skill will be summarized. This project is part of the efforts to build a multi-model capability in NOAA for assessing impacts of ocean observing systems on seasonal forecast.

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