Ocean Monitoring Products at NCEP

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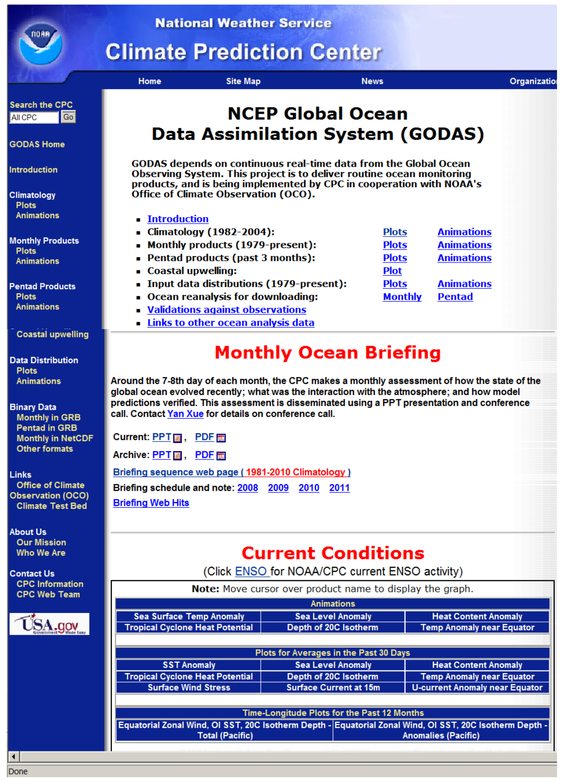
T03B

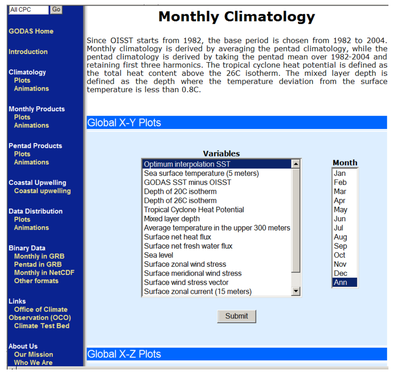
Introduction

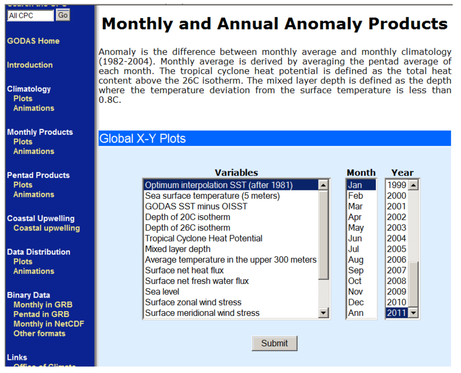
This project is a partnership between the Office of Climate Observations (OCO) and the Climate Prediction Center (CPC) of NOAA and focuses on the development and dissemination of *real-time ocean monitoring products* to the user community. The importance of this project underpinned by the fact that raw ocean observations can seldom be ingested by the user community, and it is the process of converting individual observations into a synthesis in a form that could be easily understood, and having a dissemination system, is what is required for an end-to-end ocean climate information system. Further, such an ocean climate information system is envisioned to be an integral component of the emerging NOAA's Climate Service (NCS).

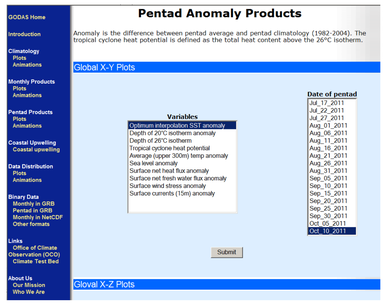
The deliverable of this project is to maintain and improve a comprehensive web based information delivery system for the ocean products developed based on an operational Global Ocean Data Assimilation System (GODAS) at the National Centers for Environmental Prediction (NCEP). The web site serves the global user community with synthesis products related to real-time monitoring of the oceans climate variability from intraseasonal to interannual to decadal and long-term time scales.

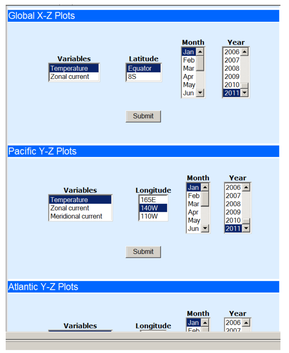
GODAS Web Site http://www.cpc.ncep.noaa.gov/products/GODAS

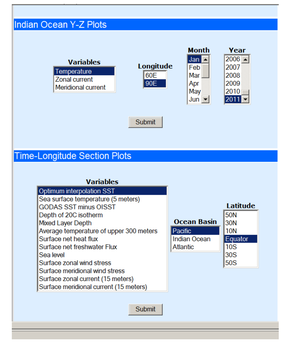






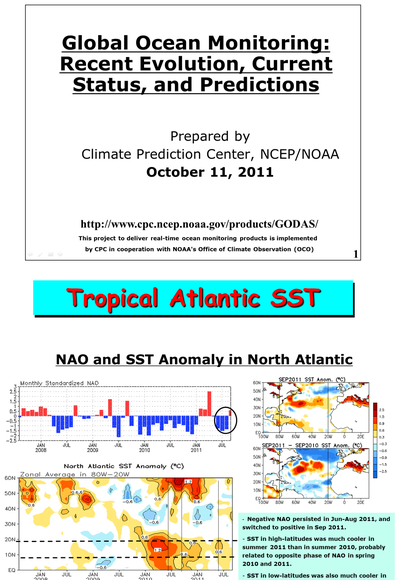


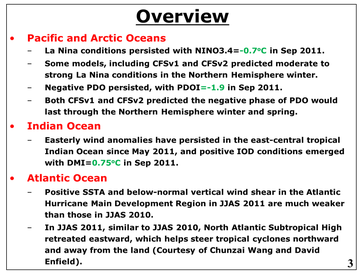




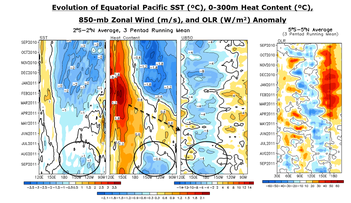
CPC's Monthly Ocean Briefing

Through "Monthly Ocean Briefing" (MOB) since 2007, we provide the user community with expert assessments of the state of the global ocean, its interactions with atmosphere, and SST predictions. The MOB consists of a conference call and a PowerPoint presentation (PPT), and is held around the 6th-8th day of each month. The schedule of MOB is sent out to the community through an email distribution list. The conference call is open to anyone interested in current state of the global ocean. The MOB is regularly attended by both internal and external participants, and through interactions with the user community, the content of the PPT presentation has evolved over time. The current format of the briefing PPT includes a fixed set of plots, while keeping the provision to address unique climate events of interest.



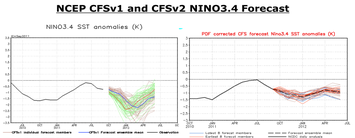


ENSO



- Negative HC and SST anomalies rebounded in the central and eastern equatorial Pacific since Jul 2011 and intensified in Aug-Sep 2011.
- That is consistent with intensified anomalous easterly wind in the low level in the central Pacific Ocean.

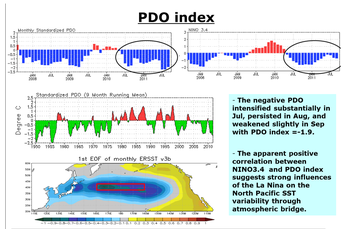
NCEP CFSv1 and CFSv2 NINO3.4 Forecast



- Both CFSv1 and CFSv2 predicted strong La Nina conditions (NINO3.4 less than -1.5°C) would peak in Mar 2011 and Jan 2011 respectively.
- After a PDF correction, CFSv1 forecast favors moderate La Nina conditions to peak around Jan 2011.
- NOAA "ENSO Diagnostic Discussion" suggests La Niña conditions are expected to gradually strengthen in fall and a weak or moderate strength La Niña is most likely during the Northern Hemisphere winter.

PDO

PDO index



- The negative PDO intensified substantially in Jul, persisted in Aug, and weakened slightly in Sep with PDO index =-1.9.
- The apparent positive correlation between NINO3.4 and PDO index suggests strong influences of the La Nina on the North Pacific SST variability through atmospheric bridge.

Pacific Decadal Oscillation is defined as the 1st EOF of monthly ERSST v3b in the North Pacific for the period 1900-1993. PDO index is the standardized projection of the monthly SST anomalies onto the 1st EOF pattern.
- The PDO index differs slightly from that of JISAO, which uses a blend of UKMET and OIv1 and OIv2 SST.

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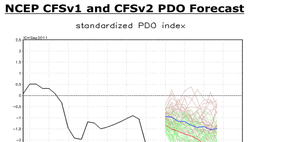
NCEP CFSv1 and CFSv2 PDO Forecast



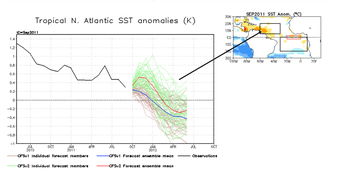
- Both CFSv1 and CFSv2 predicted that negative PDO phase would last through the Northern Hemisphere winter and next spring.
- Both models seems underwent significant initialization shock, but CFSv2 has smaller drift than CFSv1.

Tropical Atlantic SST

NAO and SST Anomaly in North Atlantic

- Negative NAO persisted in Jun-Aug 2011, and switched to positive in Sep 2011.
- SST in high-latitudes was much cooler in summer 2011 than in summer 2010, probably related to opposite phase of NAO in spring 2010 and 2011.
- SST in low-latitudes was also much cooler in summer 2011 than in summer 2010, probably due to the contrary impact of El Nino in spring 2010 and La Nina in spring 2011.

NCEP CFSv1 and CFSv2 Tropical North Atlantic SST Forecast



- Both CFSv1 and CFSv2 predicted that negative TNA (TNA) SST would remain above-normal during the remaining hurricane season.
- CFSv1 suggested positive TNA would weaken gradually and switch to negative in mid-winter, continuing to cool in spring 2012.
- However, CFSv2 forecast positive TNA would strengthen in next 2-3 months, and switch to negative in early spring 2012.

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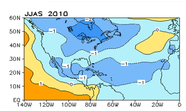
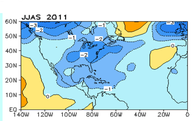
Atlantic Hurricane Season

North Atlantic Subtropical High (NASH)



Models & data show that a large AWP is associated with a smaller, weakened North Atlantic subtropical high (NASH) that retreats eastward toward Europe and that SLP weakens off the east coast of the US creating a weakness where tropical cyclones can be steered northward and away from land (Wang et al. 2011). The situation in 2010 (left) is an illustrative case in point.

2011, like 2010, has had a larger than normal warm pool. Once again we find that the high pressure of the NASH has retreated eastward leaving an area of weakness off the east coast where TCs can recurve, as we have observed. The next slide shows how the storm tracks in 2011 have generally avoided making landfall in the US. Even Irene, which narrowly made landfall, was diverted northward by the pressure distribution (personal communication, David Enfield).



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NOAA Predicts an Active Atlantic Hurricane Season in 2011

- By Oct. 7, 2011, 16 tropical storms, 5 hurricanes and 3 major hurricanes (category 3, 4) formed in the North Atlantic Ocean.

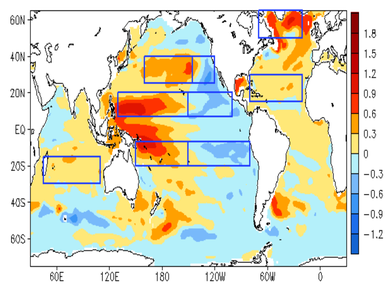
	Normal	May 19	Aug. 4	Obs. by Oct. 7
Named storms	11	12-18	14-19	16
Hurricanes	6	6-10	7-10	5
Major hurricanes	2	3-6	3-5	3
ACE (% median)	100	105-200	135-215	

Future Plan: Multi-model Operational Climate Indices

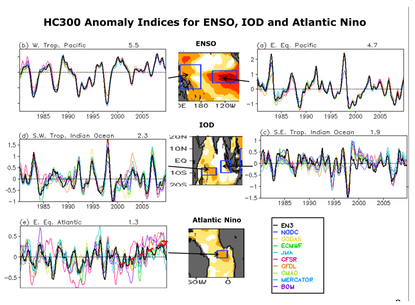
Yan Xue [1], Magdalena A. Balmaseda [2], Tim Boyer [3], Nicolas Ferry [4], Simon Good [5], Ichiro Ishikawa [6], Arun Kumar[1], Michele Rienecker [7], Anthony J. Rosati[8], Yonghong Yin[9]

Upper ocean heat content (HC) is one of the key indicators of climate variability on many time-scales extending from interannual to long-term trends. The availability of multiple operational ocean analyses (ORA) that are now routinely produced around the world provides an opportunity for quasi-real time monitoring of this variable using the ensemble methodology. The ensemble can be used to assess uncertainties in the HC analysis, which may help to identify gaps in observing systems, and deficiencies in data assimilation schemes. Towards this goal we analyzed ten ORAs, two objective analyses based on in situ data only and eight model analyses based on ocean data assimilation systems.

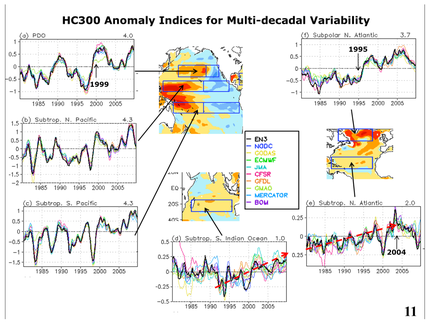
Linear Trend of HC300 Anomaly in 1993-2009



HC300 Anomaly Indices for ENSO, IOD and Atlantic Nino



HC300 Anomaly Indices for Multi-decadal Variability



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