IASCLiP FORECAST FORUM (IFF)

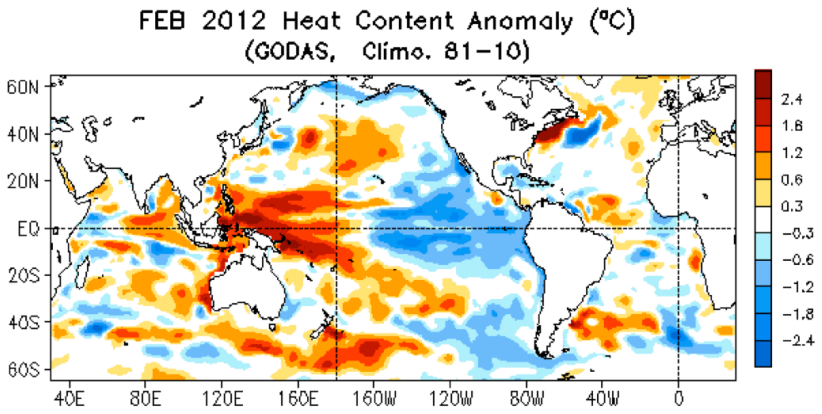
March-April-May 2012

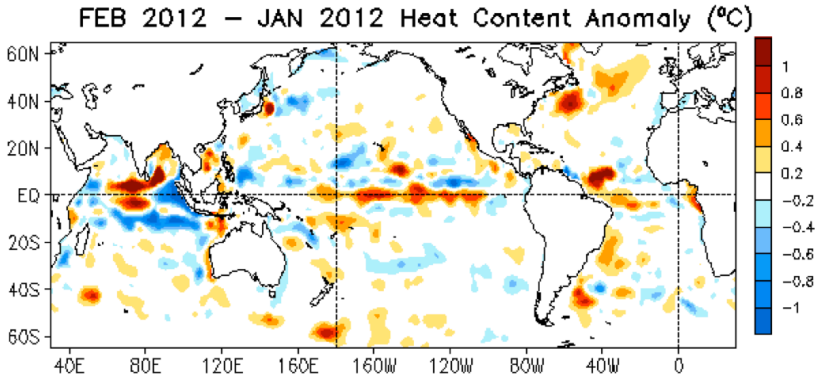
Disclaimer: The forecast and the discussions in this forum in no way reflect the opinion of the contributing personnel's institutions and organizations. These forecasts are experimental with voluntary contributions from ECPC/SIO, RSMAS/UM and NCEP-CFS forecasts downloaded from their website.

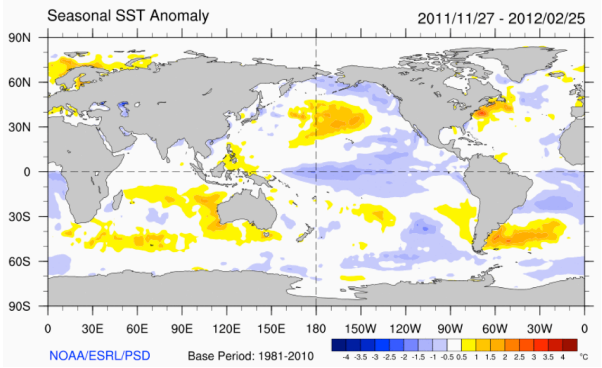
Process: The forecast forum comprises of a coalition of climate scientists working on IASCLiP including the modeling working group of the IASCLiP. We hold discussions analyzing the model forecast and current conditions to come with a "consensus" forecast. We intend to update this forecast in June for June-July-August and in August for August-September-October seasons.

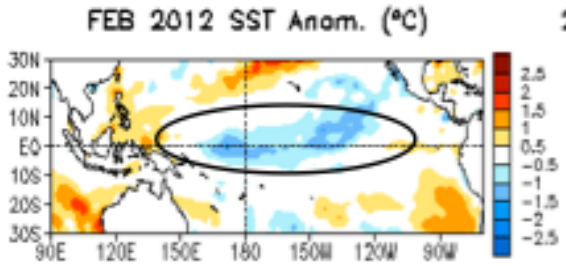
Acknowledgements: We thank NOAA-CPC, Asia Pacific Climate Center (S. Korea), IRI, and the US National Multi-model Ensemble Experiment (NMME) team for making the model forecast data available. We thank Steven DiNapoli of COAPS/FSU for assistance in preparing the figures.

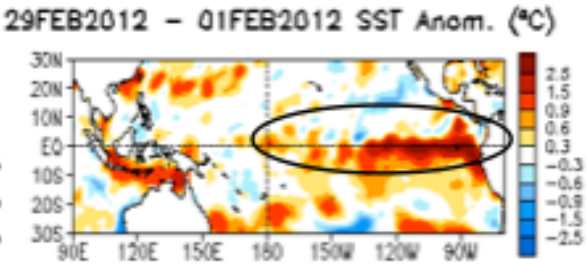
Current conditions



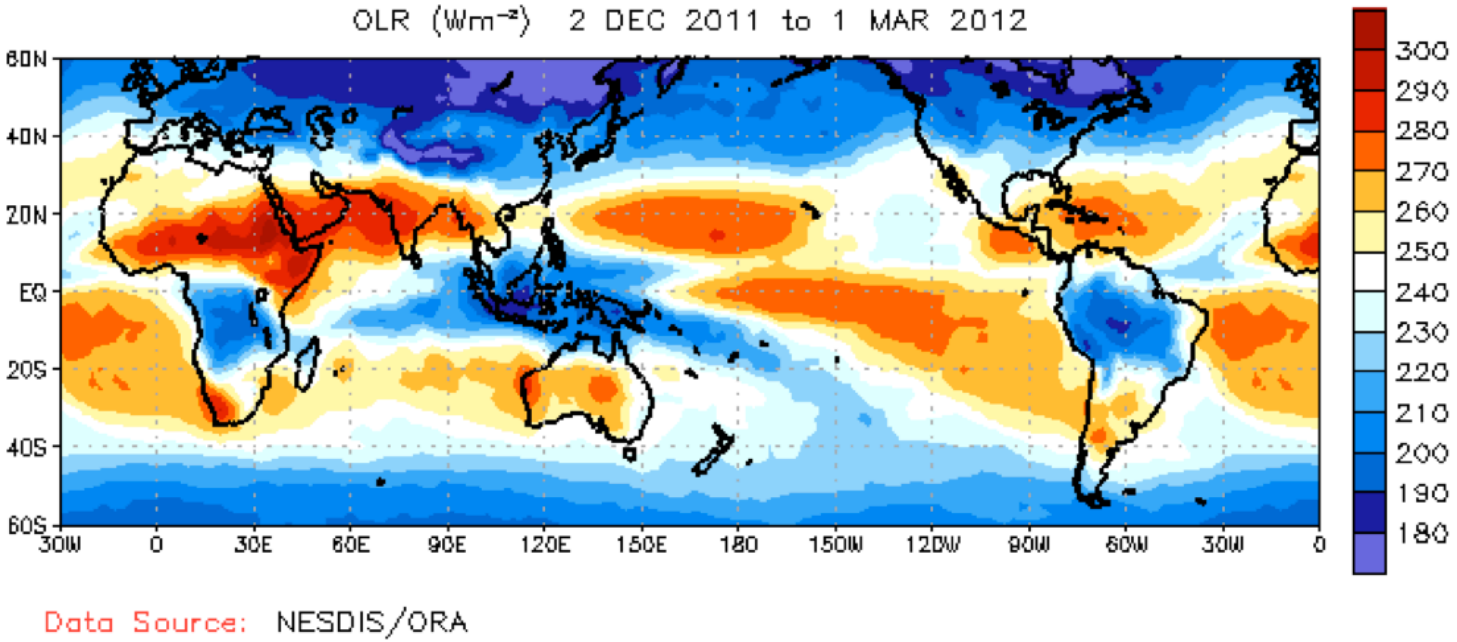








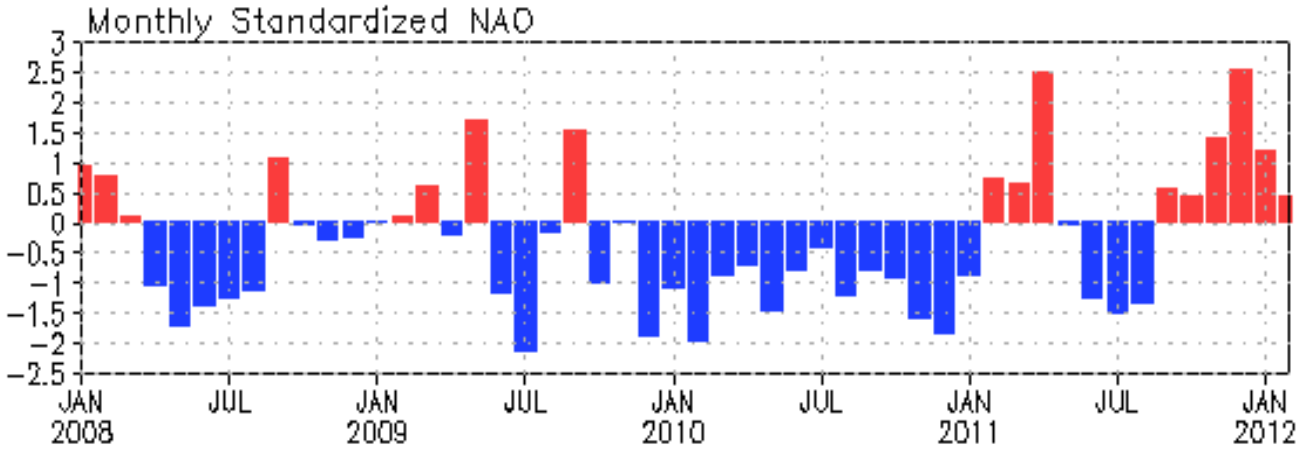
Historically, El Nino affects the Atlantic SST in the following year, not during the onset summer. It would be a factor affecting vertical wind shear and hurricanes in 2012, however. In all probability the La Nina will continue to wane as the SST tendency (bottom panel) shows it is doing. The question is, will it linger long enough and strongly enough to affect SSTA in the Atlantic over the next few months? This La Nina event has been strong and the anomalies still appear considerable (is now well below -1.0C), and they may last at least through March, so our experience would indicate it will be **a cooling influence** on the SST over the AWP region**. However some weak warm anomalies (~0.5C) seem to have appeared in the Nino1+2 region.**



From: http://www.cpc.ncep.noaa.gov/products/Global_Monsoons/Figures/curr.olr.90day.figa.gif

The Amazon region has exhibited enhanced convection in the past 3 months, which would suggest stronger subsidence over the North Atlantic Subtropical high (NASH), stronger northeast trades and cooler SST's across tropical North Atlantic due to reduced net heat flux into the Ocean.

Current conditions



The NAO has been positive since September of 2012, so if anything, it is now **a cooling influence** in the AWP region (from increased evaporation from a stronger NASH and by stronger longwave upwelling in a relatively dry atmosphere)**.** It may be however noted that NAO has weakened considerably from December 2011.

http://www.cpc.ncep.noaa.gov/products/GODAS/ocean_briefing_gif/global_ocean_monitoring_current.ppt

Some Caveats

- Forecasts from dynamical models in boreal spring, initialized in late Winter or early Spring have traditionally been the least skillful compared to seasonal forecasts initialized in other seasons of the year. This is primarily owed to the so-called Spring predictability barrier, wherein the SST gradients in the equatorial Pacific are extremely weak and the persistence of the SST anomalies is also at its minimum.

- Most coupled ocean atmosphere models have comparatively far less seasonal prediction skill over the tropical Atlantic Ocean compared to other tropical Oceans. This stems from some large systematic errors displayed by these models in the slope of the thermocline in the equatorial Atlantic, precipitation over the tropical South America and Africa, bias in trade winds, complemented with relatively much smaller observed interannual variability of tropical Atlantic SST compared with equatorial Pacific SST.

- While it was shown that models display some skill over the AWP region in boreal Summer and Fall seasons at zero lead time, it is unclear in the absence of any systematic study to know if these models show similar behavior in boreal Spring. Although NMME has made available the skill mask for each season and for each lead time. This shows that for the most part rainfall has no prediction skill in MAM for nearly all of continental US in many of the NMME models.

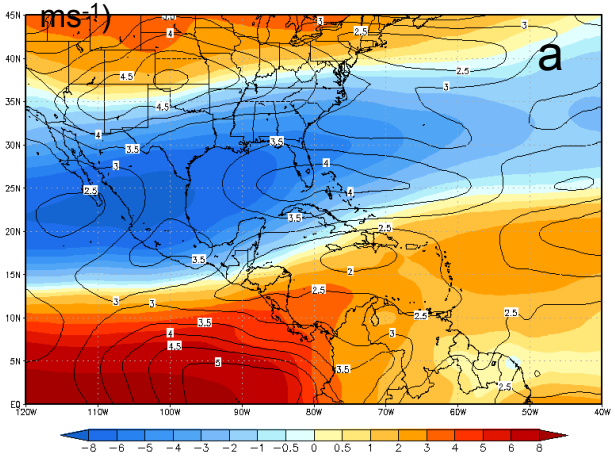
Models

Model	Reference	No. of Ensemble members	Coupled to ocean?
NCEP CFS v1	A	15	Yes
CCSM3.0	B	6	Yes
NASA GMAO	C	10	Yes
POAMA	D	10	Yes
GFDL	E	10	
FCI-FSU (previously ECPC)	F	12	No. Prescribed (persisted SST & IRI forecasted SST)
CWB	G	10	Yes
IRI-ECHAM4p5 (Anom)	H	12	Yes
IRI-ECHAM4p5 (direct)	I	12	Yes

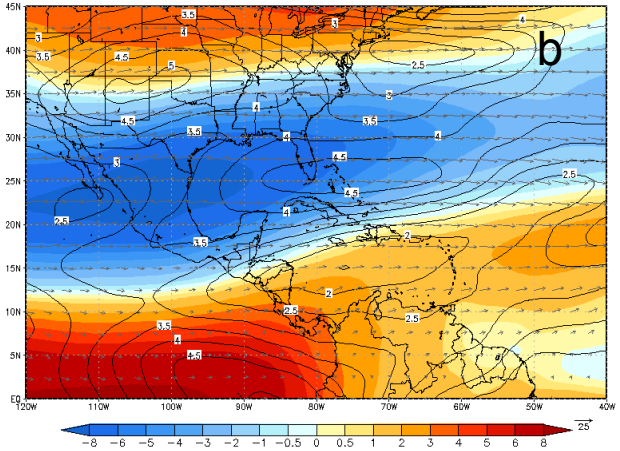
Index	Reference
A	http://cfs.ncep.noaa.gov/menu/doc/
B	http://journals.ametsoc.org/doi/abs/10.1175/2009MWR2672.1
C	http://gmao.gsfc.nasa.gov/research/modeling/cgcm/
D	http://poama.bom.gov.au/
E	http://iridl.ldeo.columbia.edu/SOURCES/.Models/.NMME/.GFDL-CM2p1/
F	http://ecpc.ucsd.edu/projects/GSM_model.html
G	http://www.cwb.gov.tw/V6/climate/other-subject/WPGM_CWB2tier_CFS.pdf
H	http://iridl.ldeo.columbia.edu/SOURCES/.Models/.NMME/.IRI-ECHAM4p5-AnomalyCoupled/
I	http://iridl.ldeo.columbia.edu/SOURCES/.Models/.NMME/.IRI-ECHAM4p5-DirectCoupled/

NCEP CFS v1 (Forecast for MAM 2012; ic: 201202)

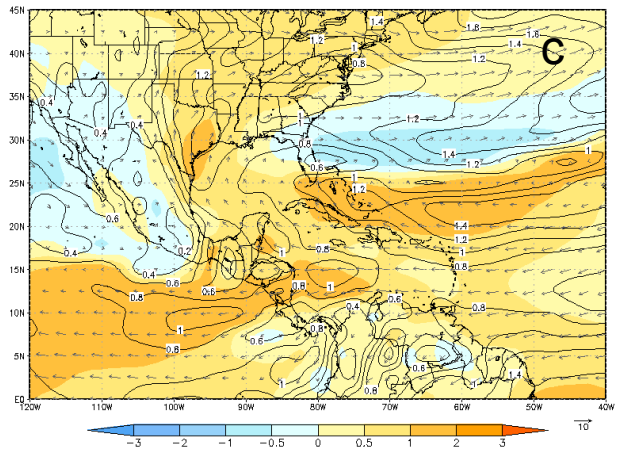
Vertical wind shear (200-850 hpa, in ms^{-1})



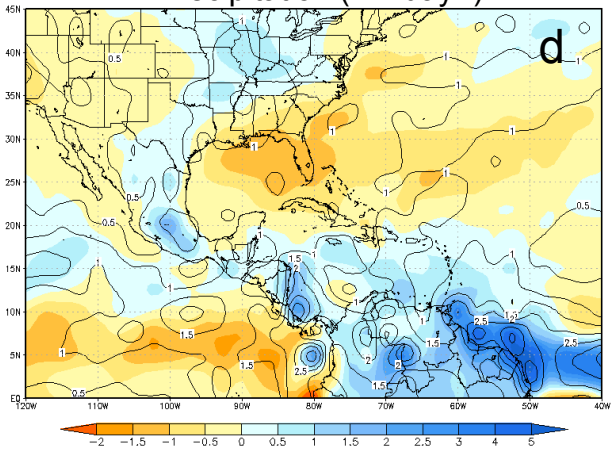
200 hPa winds ms^{-1}



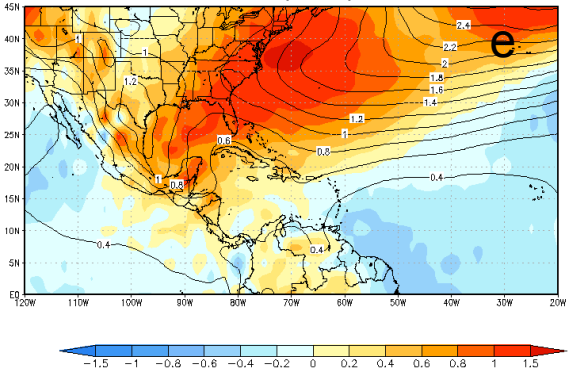
850 hPa winds ms^{-1}



Precipitation ($mmday^{-1}$)

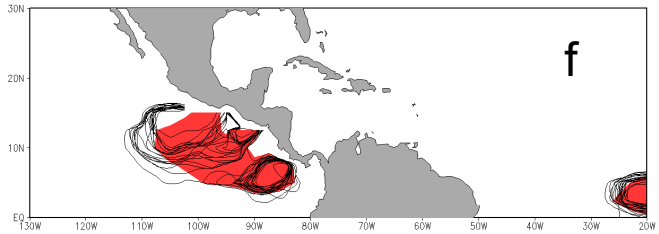


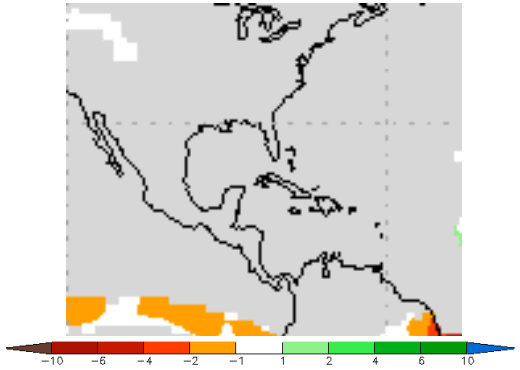
MSLP (hPa)



Contours are intra-ensemble spread and shading is anomaly of the ensemble mean in a, b, c, d, and e. In f model climatology of the 28.5^{0}C isotherm is shaded in red and the 28.5^{0}C isotherm from the individual ensemble forecasts are contoured.

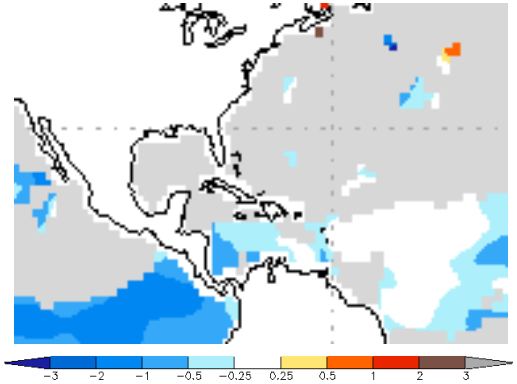
28.5^{0}C isotherm of SST





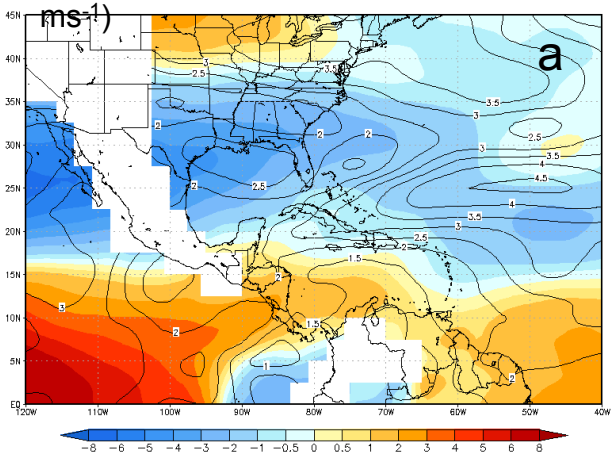
Skill masked rainfall anomalies for MAM2012 (ic: 201202)

Skill masked SSTA for MAM2012 (ic: 201202)

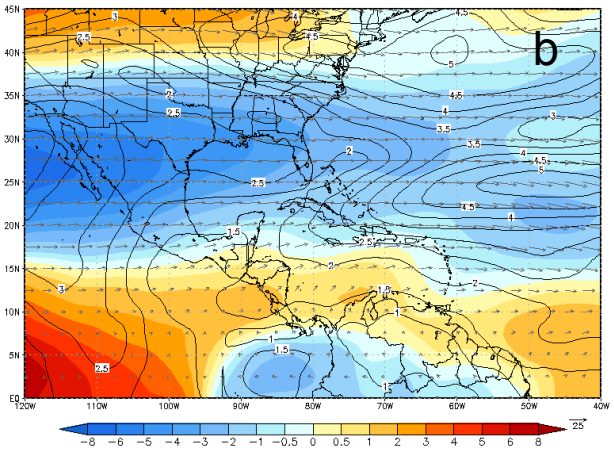


NASA GMAO (Forecast for MAM2012; ic:201202)

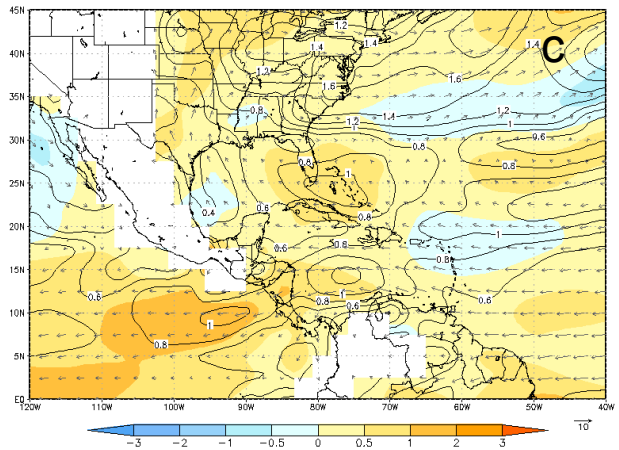
Vertical wind shear (200-850 hpa, in ms^{-1})



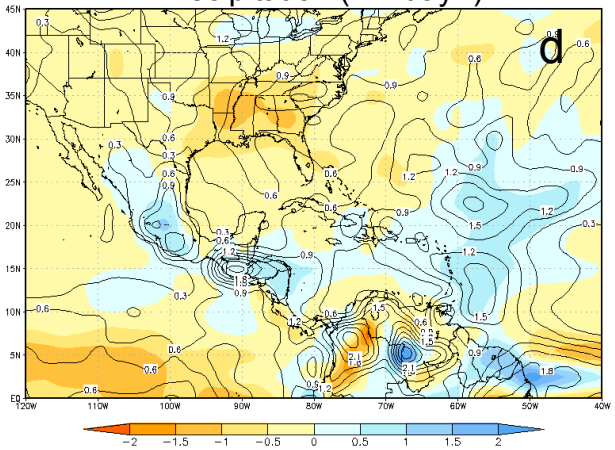
200 hPa winds ms^{-1}



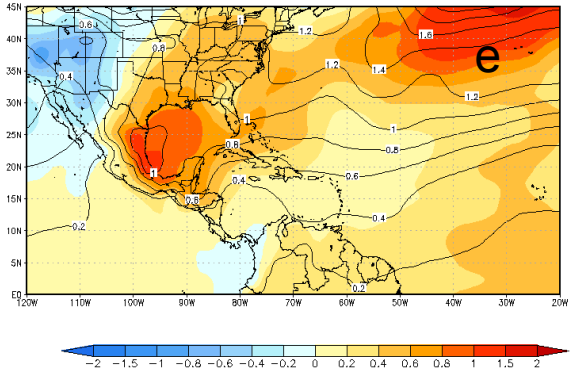
850 hPa winds ms^{-1}



Precipitation ($mmday^{-1}$)

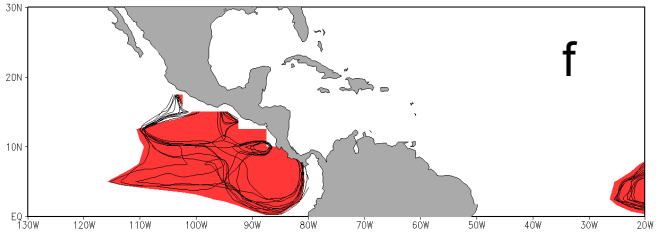


MSLP (hPa)

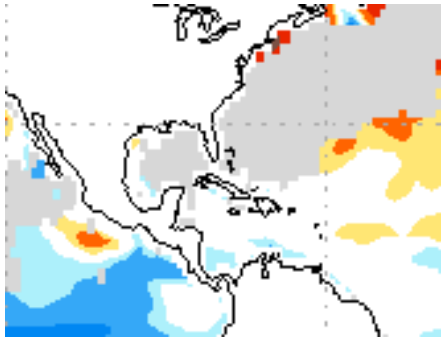


Contours are intra-ensemble spread and shading is anomaly of the ensemble mean in a, b, c, d, and e. In f model climatology of the 28.5^{0}C isotherm is shaded in red and the 28.5^{0}C isotherm from the individual ensemble forecasts are contoured.

28.5^{0}C isotherm of SST

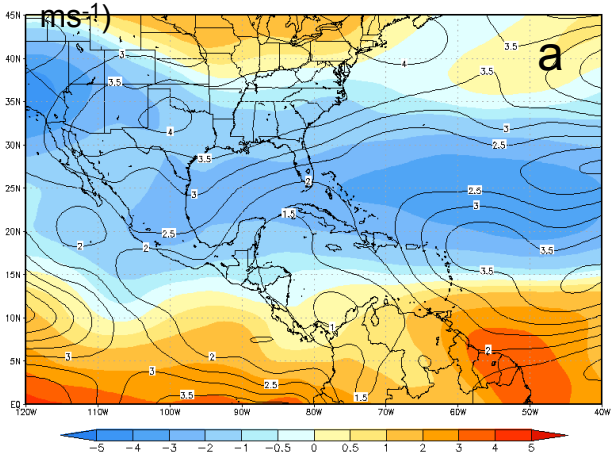


Skill masked SSTA for MAM2012 (ic: 201202)

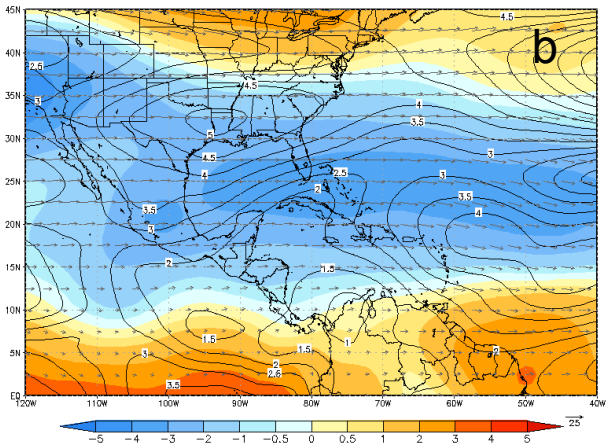


POAMA (Forecast for MAM2012; ic:201202)

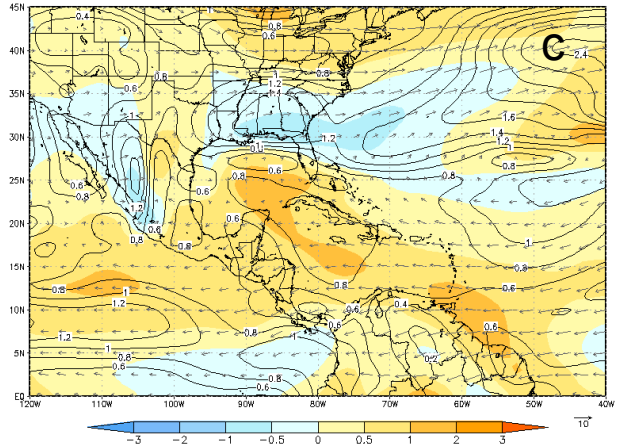
Vertical wind shear (200-850 hpa, in ms^{-1})



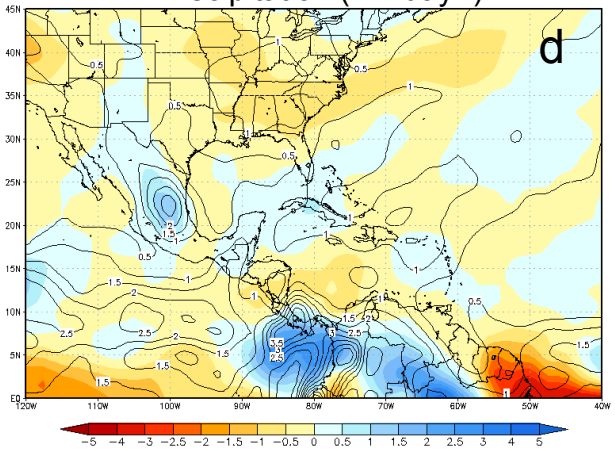
200 hPa winds ms^{-1}



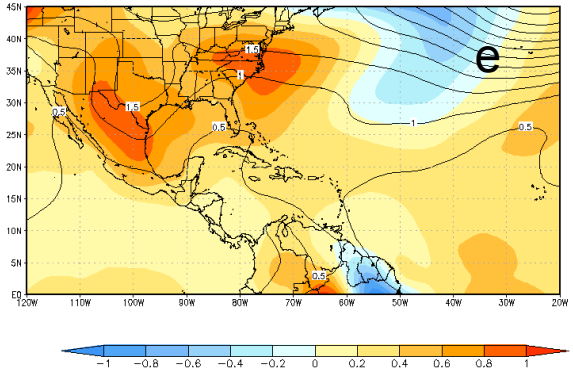
850 hPa winds ms^{-1}



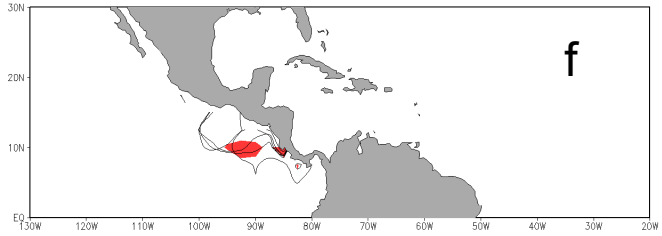
Precipitation ($mmday^{-1}$)



MSLP (hPa)



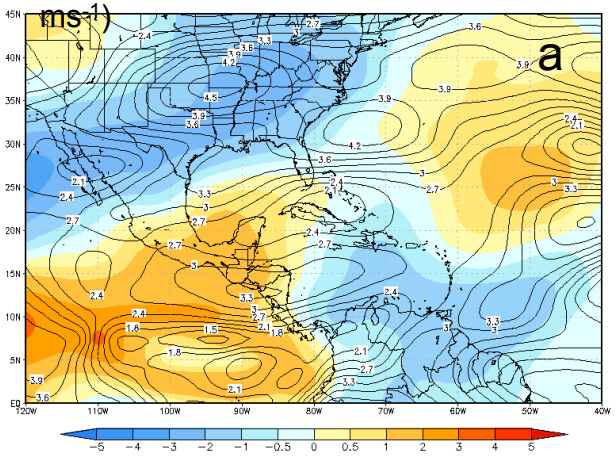
28.5^0C isotherm of SST



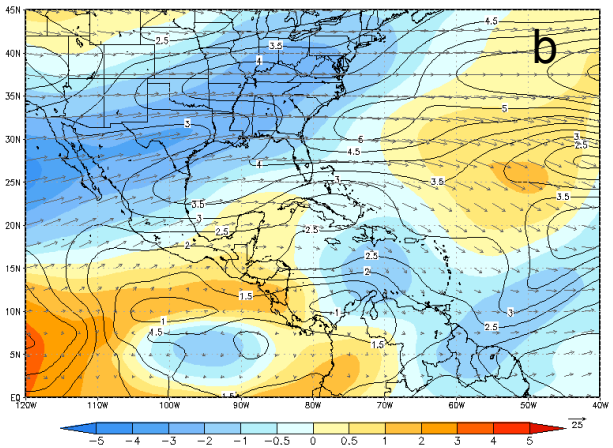
Contours are intra-ensemble spread and shading is anomaly of the ensemble mean in a, b, c, d, and e. In f model climatology of the 28.5^0C isotherm is shaded in red and the 28.5^0C isotherm from the individual ensemble forecasts are contoured.

CWB (Forecast for MAM2012; ic:201202)

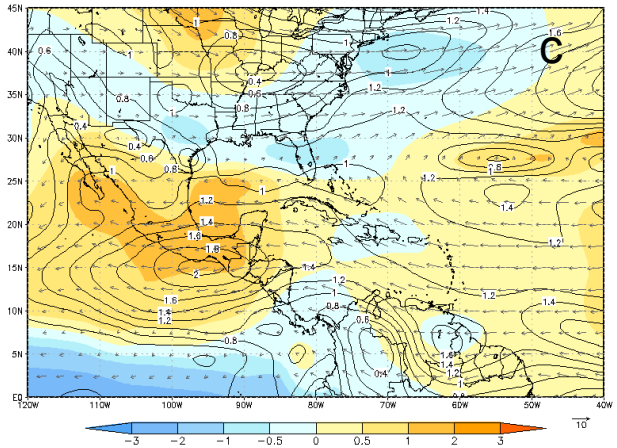
Vertical wind shear (200-850 hpa, in ms^{-1})



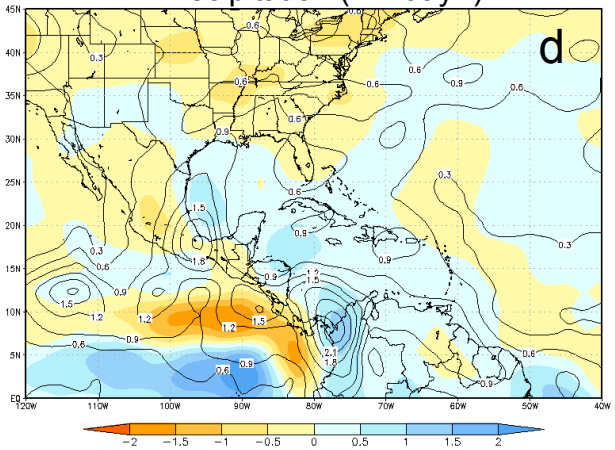
200 hPa winds ms^{-1}



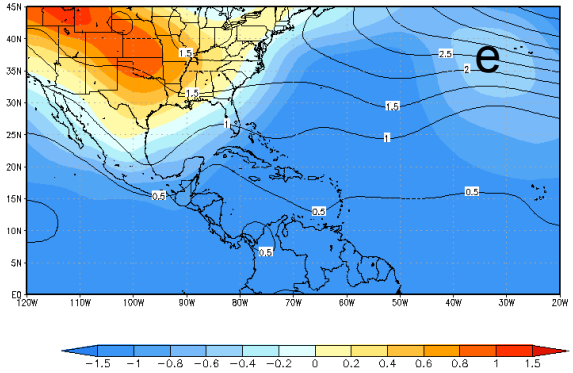
850 hPa winds ms^{-1}



Precipitation ($mmday^{-1}$)



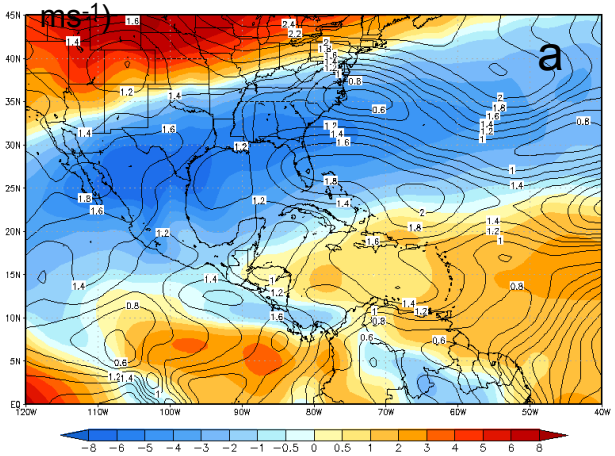
MSLP (hPa)



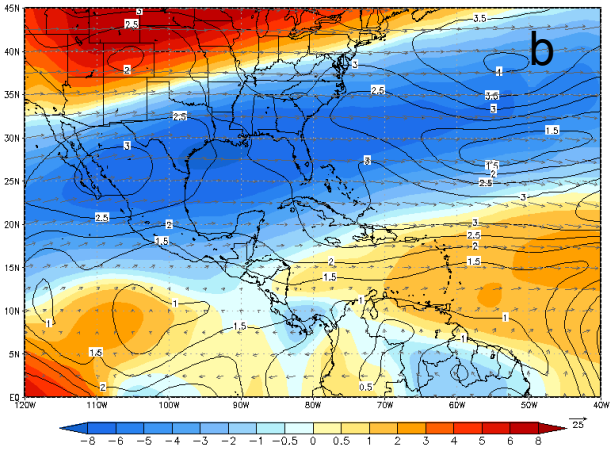
Contours are intra-ensemble spread and shading is anomaly of the ensemble mean in a, b, c, d, and e.

FCI-FSU (Forecast for MAM2012; ic:201202)

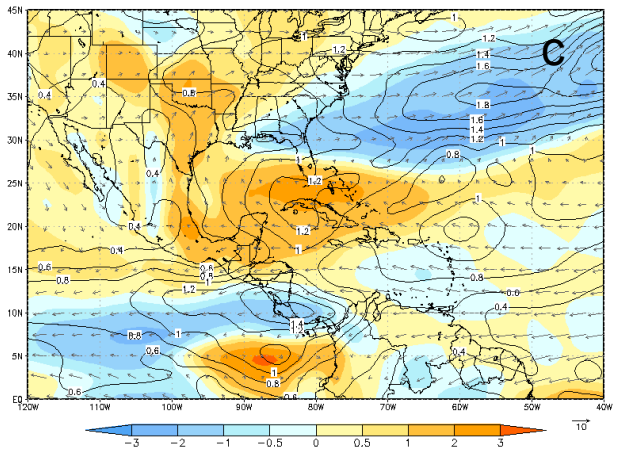
Vertical wind shear (200-850 hpa, in ms^{-1})



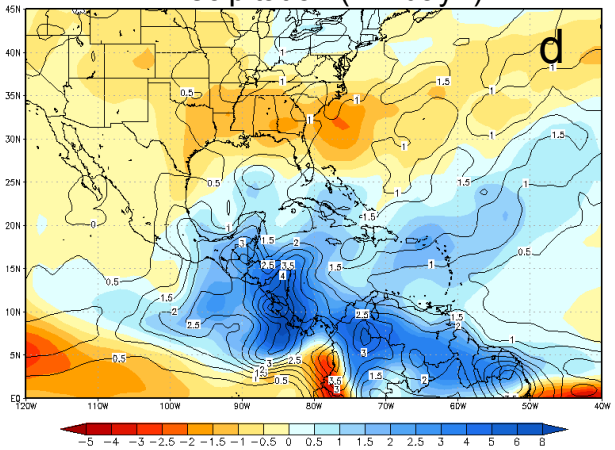
200 hPa winds ms^{-1}



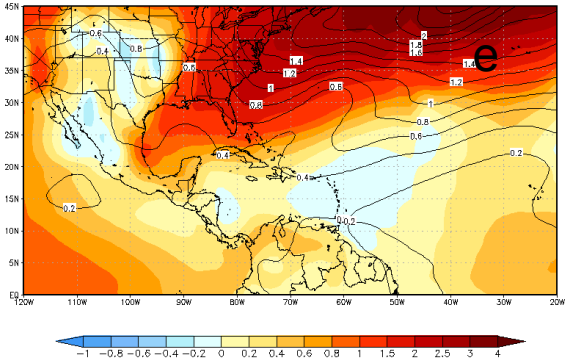
850 hPa winds ms^{-1}



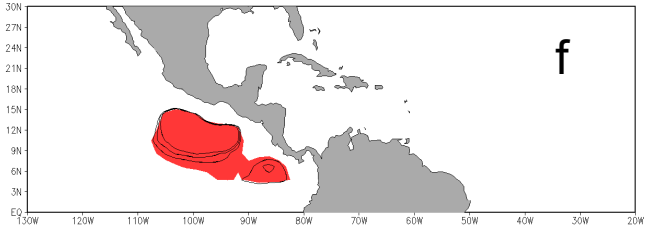
Precipitation ($mmday^{-1}$)



MSLP (hPa)



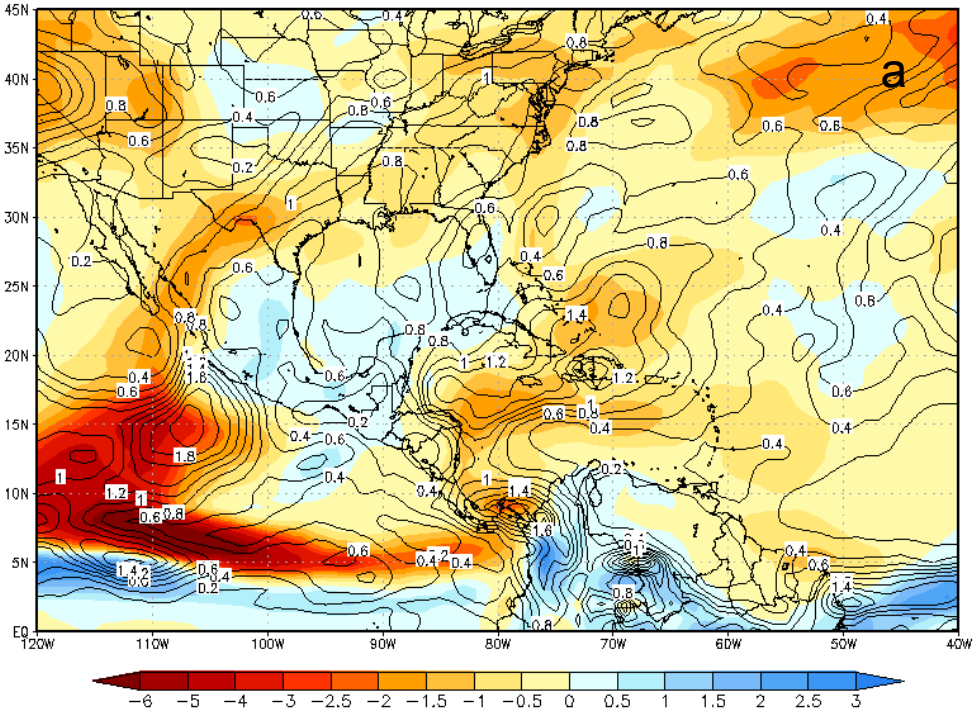
28.5^0C isotherm of SST



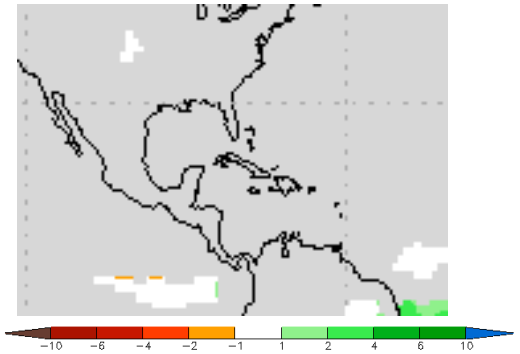
Contours are intra-ensemble spread and shading is anomaly of the ensemble mean in a, b, c, d, and e. In f model climatology of the 28.5^0C isotherm is shaded in red and the 28.5^0C isotherm from the individual ensemble forecasts are contoured.

COLA-RSMAS-CCSM3 (Forecast for MAM2012; ic:201202)

Precipitation (mmday^{-1})

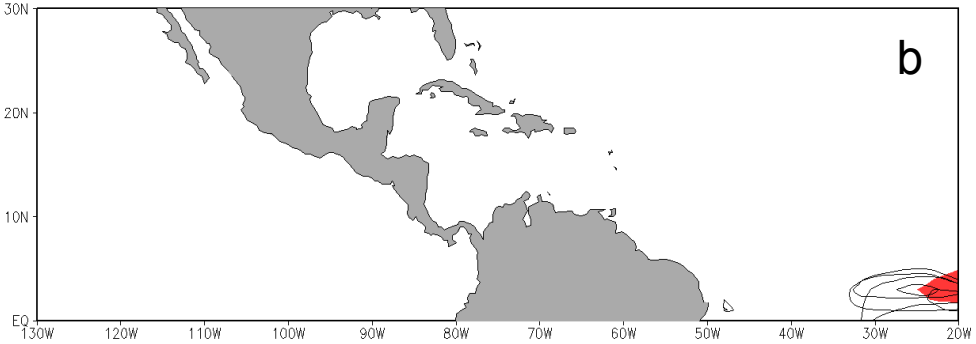


Skill masked rainfall anomalies for MAM2012 (ic: 201202)

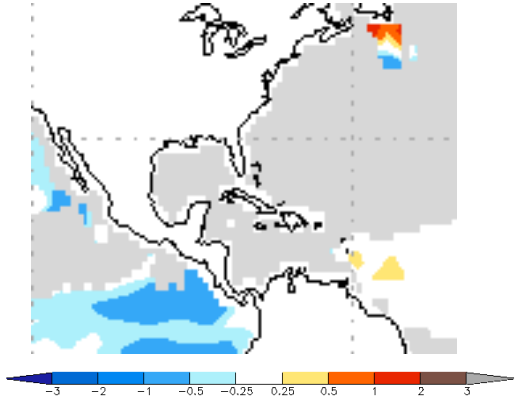


Contours are intra-ensemble spread and shading is anomaly of the ensemble mean in a. In b model climatology of the 28.5^{0}C isotherm is shaded in red and the 28.5^{0}C isotherm from the individual ensemble forecasts are contoured.

28.5^{0}C isotherm of SST

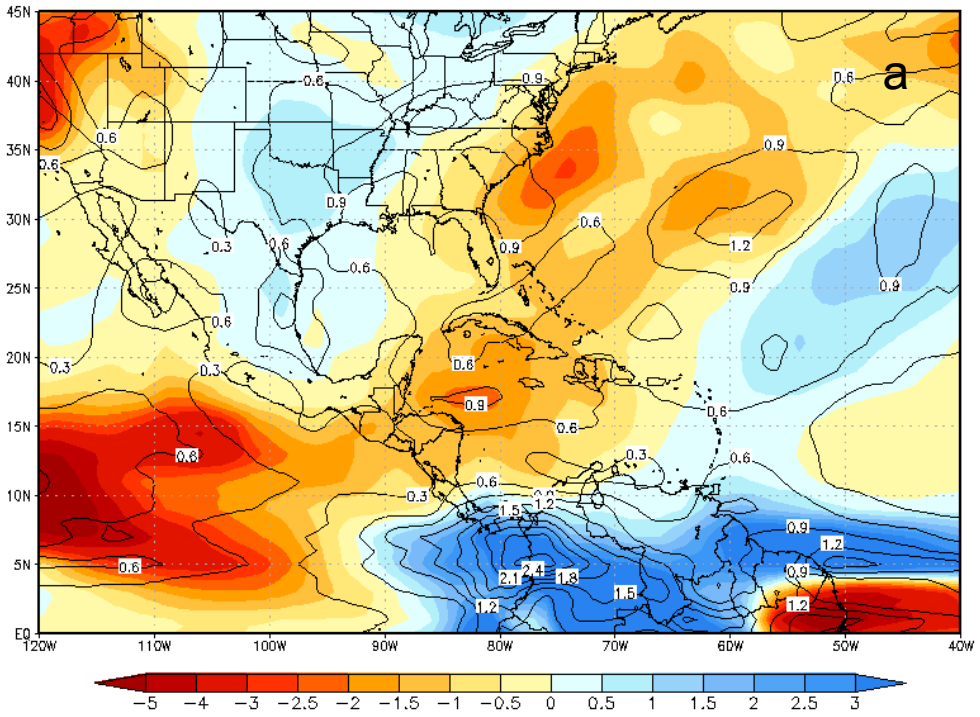


Skill masked SSTA for MAM2012 (ic: 201202)

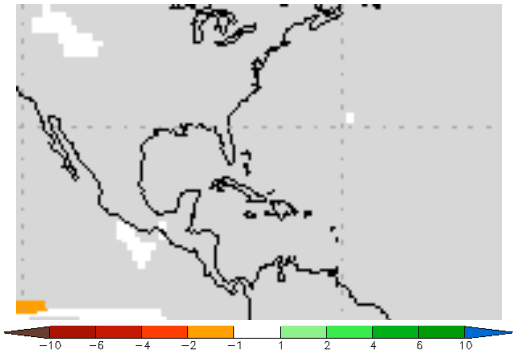


GFDL-C2Mp1 (Forecast for MAM2012; ic:201202)

Precipitation (mmday^{-1})

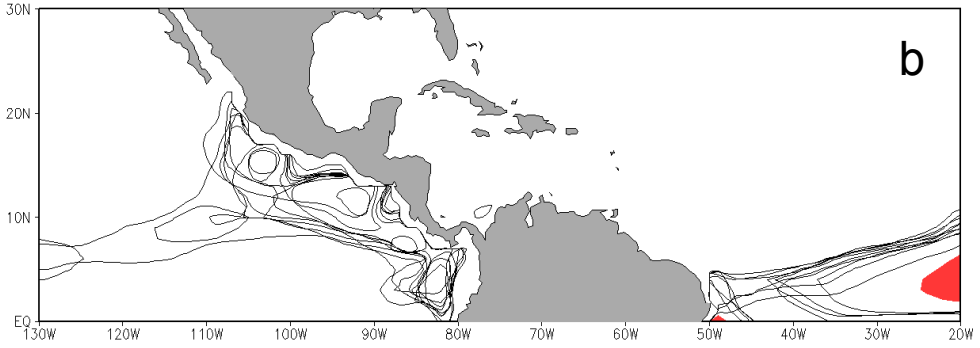


Skill masked rainfall anomalies for MAM2012 (ic: 201202)

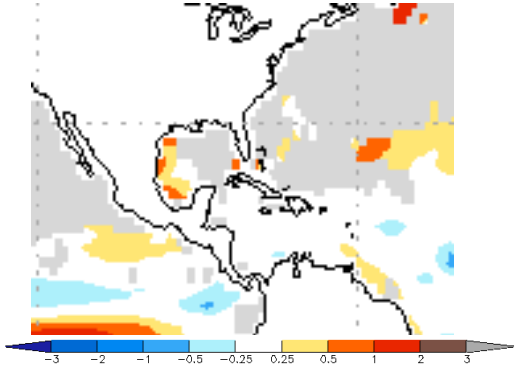


Contours are intra-ensemble spread and shading is anomaly of the ensemble mean in a. In b model climatology of the 28.5^{0}C isotherm is shaded in red and the 28.5^{0}C isotherm from the individual ensemble forecasts are contoured.

28.5^{0}C isotherm of SST

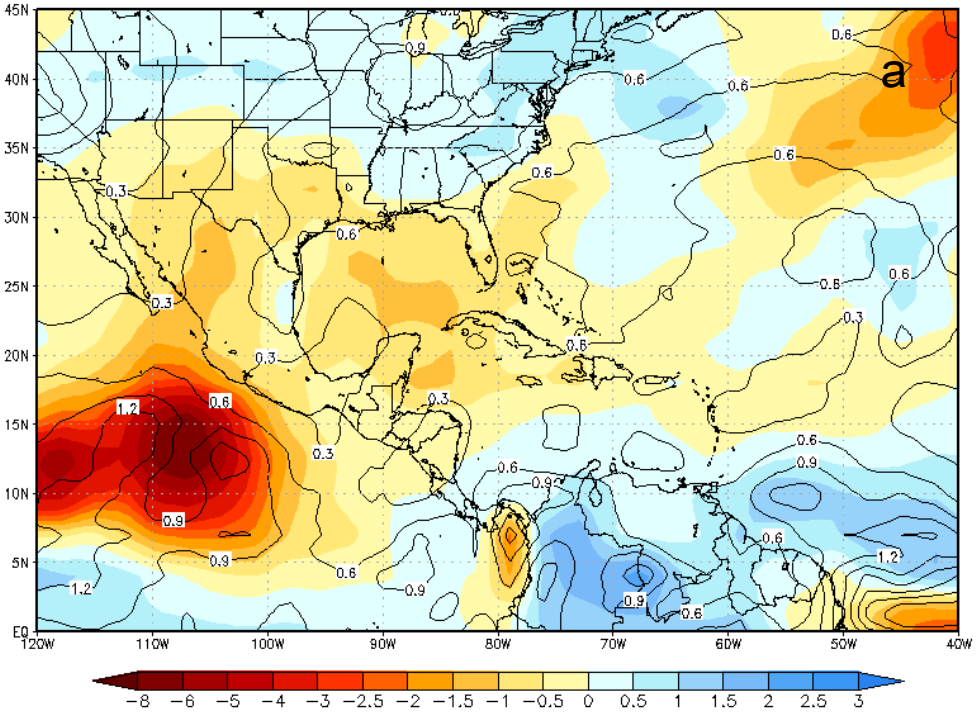


Skill masked SSTA for MAM2012 (ic: 201202)

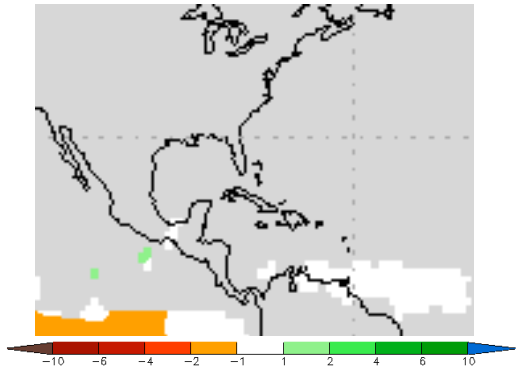


IRI-ECHAM4p5 (Anomaly Coupled; Forecast for MAM2012; ic:201202)

Precipitation (mmday^{-1})

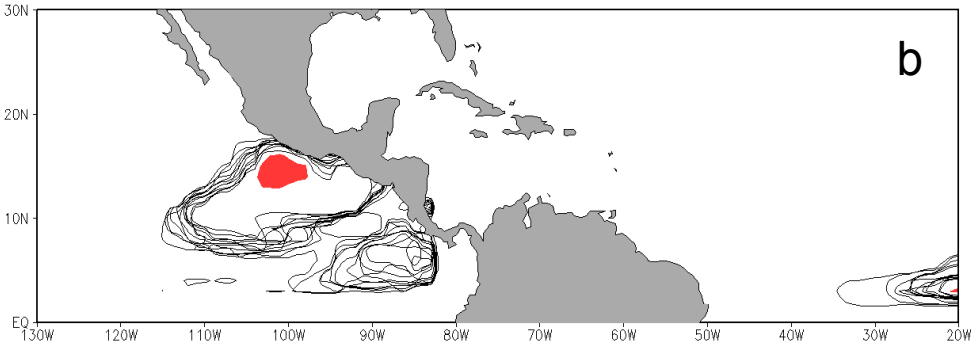


Skill masked rainfall anomalies for MAM2012 (ic: 201202)

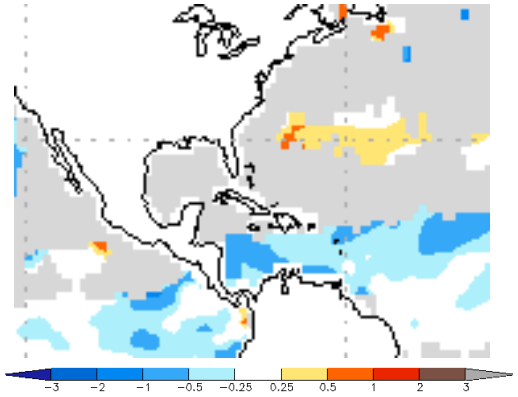


Contours are intra-ensemble spread and shading is anomaly of the ensemble mean in a. In b model climatology of the 28.5^{0}C isotherm is shaded in red and the 28.5^{0}C isotherm from the individual ensemble forecasts are contoured.

28.5^{0}C isotherm of SST

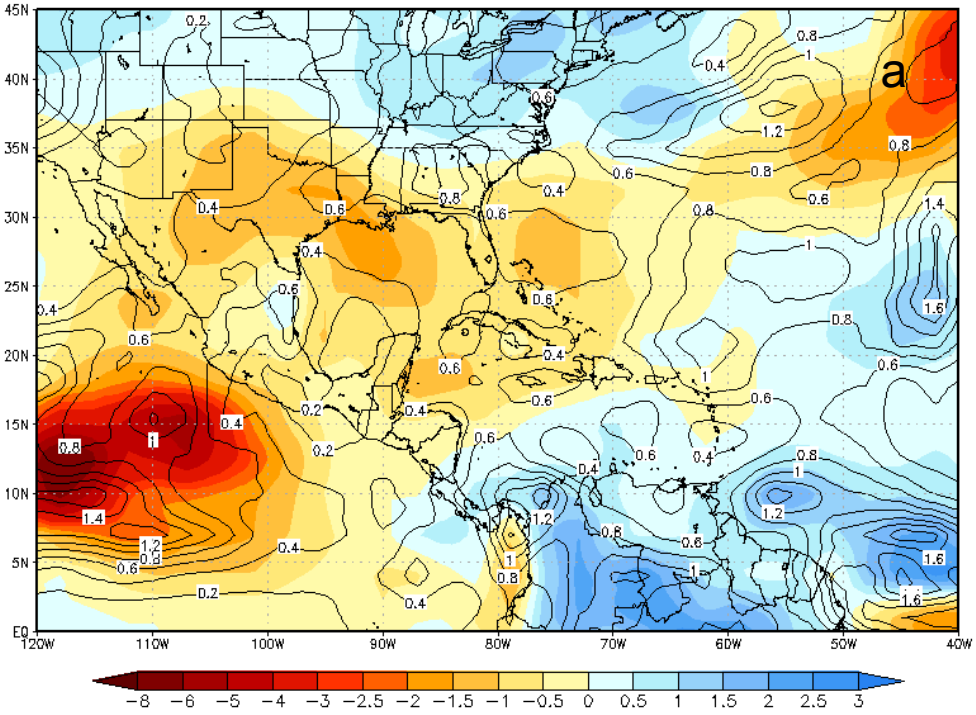


Skill masked SSTA for MAM2012 (ic: 201202)

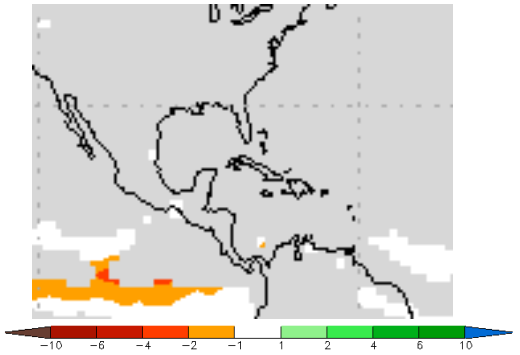


IRI-ECHAM4p5 (Direct Coupled; (Forecast for MAM2012; ic:201202)

Precipitation (mmday^{-1})

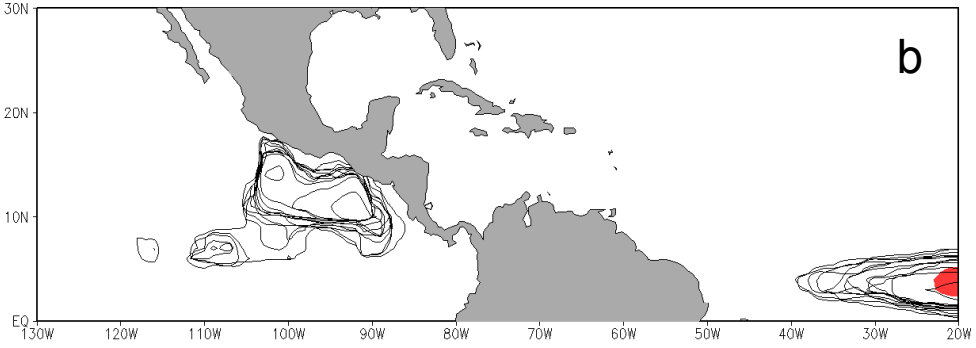


Skill masked rainfall anomalies for MAM2012 (ic: 201202)

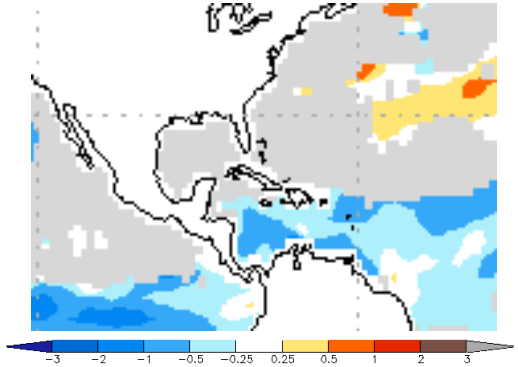


Contours are intra-ensemble spread and shading is anomaly of the ensemble mean in a. In b model climatology of the 28.5^{0}C isotherm is shaded in red and the 28.5^{0}C isotherm from the individual ensemble forecasts are contoured.

28.5^{0}C isotherm of SST



Skill masked SSTA for MAM2012 (ic: 201202)



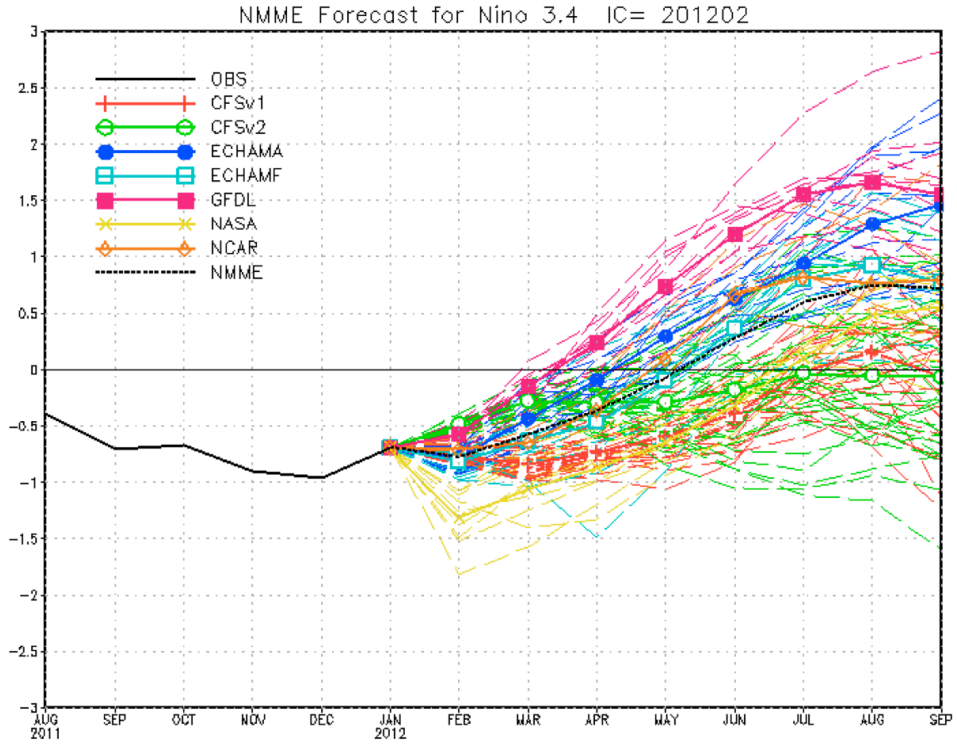
Summary of Model Forecasts

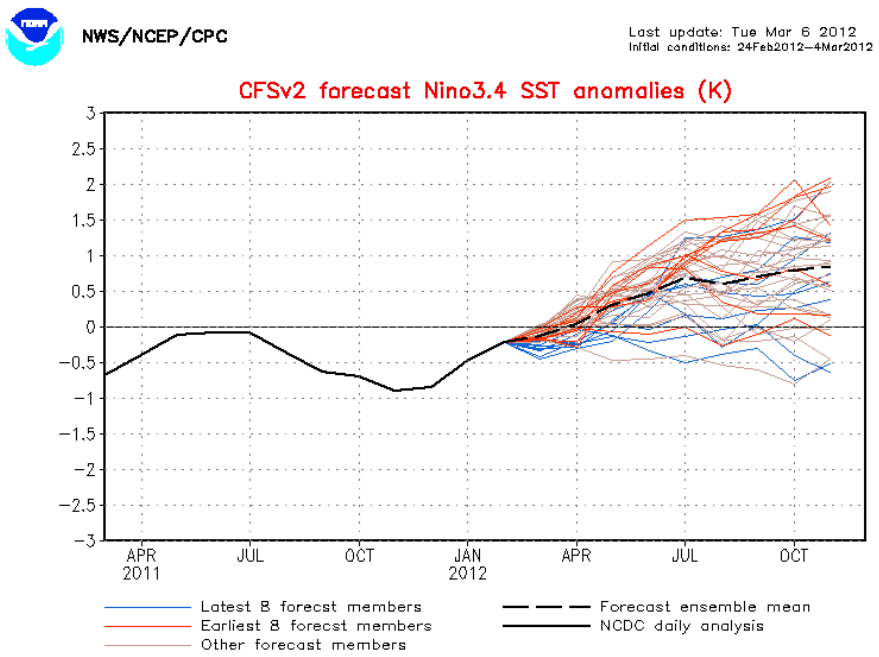
Feature	NCEP CFS v1	NASA GMAO	CCSM 3	CWB	POAMA	FCI-FSU	GFDL-CM2p1	IRI-ECHAM4p5 (anomaly)	IRI-ECHAM4p5 (direct)	Model's CONSEN.
East Pacific warm pool area SST anomaly	Cold	Cold	Cold	Not Avail.	Cold	Cold	Warm	Cold	Cold	Large

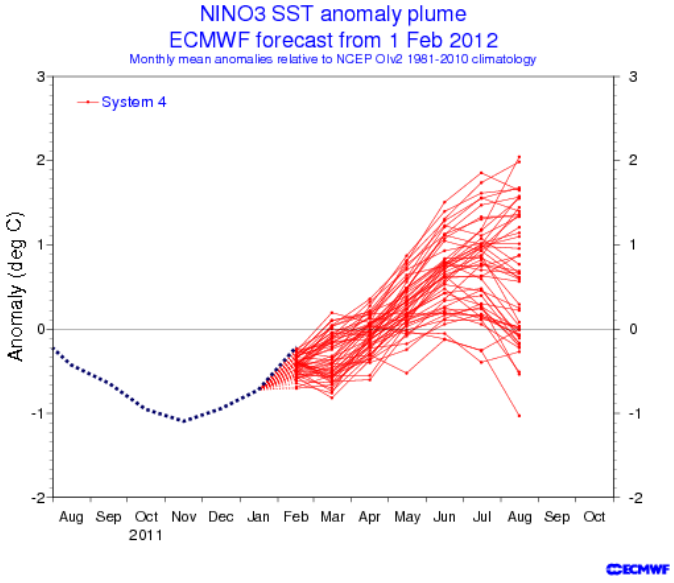
A majority of the models are showing that E. Pacific part of the western hemisphere warm pool (WHWP) is going to be colder than usual in MAM 2012. This would suggest that the evolution of the Atlantic warm pool (AWP) of the WHWP in the subsequent summer and fall seasons will more likely be weaker (smaller) than normal.

We are not discussing the SST forecast in the tropical Atlantic or rainfall forecast from these models at this time, as they seem to have very poor skill in the seasonal hindcasts for this season of MAM.

Beyond Spring 2012 forecast







The mean NMME initialized in beginning of February 2012 suggests that the present cold conditions over Nino3.4 region will change to warm conditions (~1.0C) by the next season. Similar forecasts seem to be emanating from the ECMWF model and the most recently initialized (24 Feb-4 Mar) CFSv2 runs. However it may be noted that ENSO influence on AWP in the summer is usually after ENSO peaks in the boreal winter.

Heuristic model forecasts

If we interpret the model forecasts and the current conditions then we anticipate the **likelihood** of the following to happen in MAM 2012 based on our understanding (and research) of the AWP impacts on remote and local climate:

a) A slightly stronger than normal Bermuda/North Atlantic subtropical high
b) A cold East North tropical Pacific of western hemisphere warm pool in MAM 2012
c) However, we note that the Nino3 region is experiencing a transition with the diminishing of the La Nina associated cold anomaly.

According to IASCLIP research (Lee et al., 2012, in review) this "trans-Niño" pattern (from cold to warm) enhances the moisture transport from Intra-Americas Seas to the central plains, which may turn out to be optimal for tornados, as we are witnessing.

Based on a), and b) above we anticipate the **likelihood** of the following to happen in MAM 2012:

i) Slightly below normal rainfall over southern Mexico
ii) Smaller than normal AWP in the subsequent summer season
iii) Large (small) AWP favors less (more) southerly moisture flux across the gulf coast in summer. Therefore, for the situation we are projecting (small summer AWP) would then entail increased probability of dry conditions east of the Rockies **is less than would otherwise be the case** and that the **possibility** of late spring/early summer floods **is greater**.
iv)If Nino3.4 region passes the threshold and becomes a warm ENSO event by August and in addition we have a small AWP year (as indicated by the discussion heretofore), we could most likely anticipate a weaker than usual Atlantic hurricane season.

Lee, S.-K., R. Atlas, D. B. Enfield, C. Wang, and H. Liu, 2012:Is there an optimal ENSO pattern that increases U. S. tornado activity? J. Climate, Under review