

NOAA's seasonal forecasts:

A retrospective look at the
exceptional 2005 season and a look
ahead to 2006

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Outline

- Methodology for seasonal forecast
- Conditions in 2005
- Verification
- (Very) Tentative outlook for '06

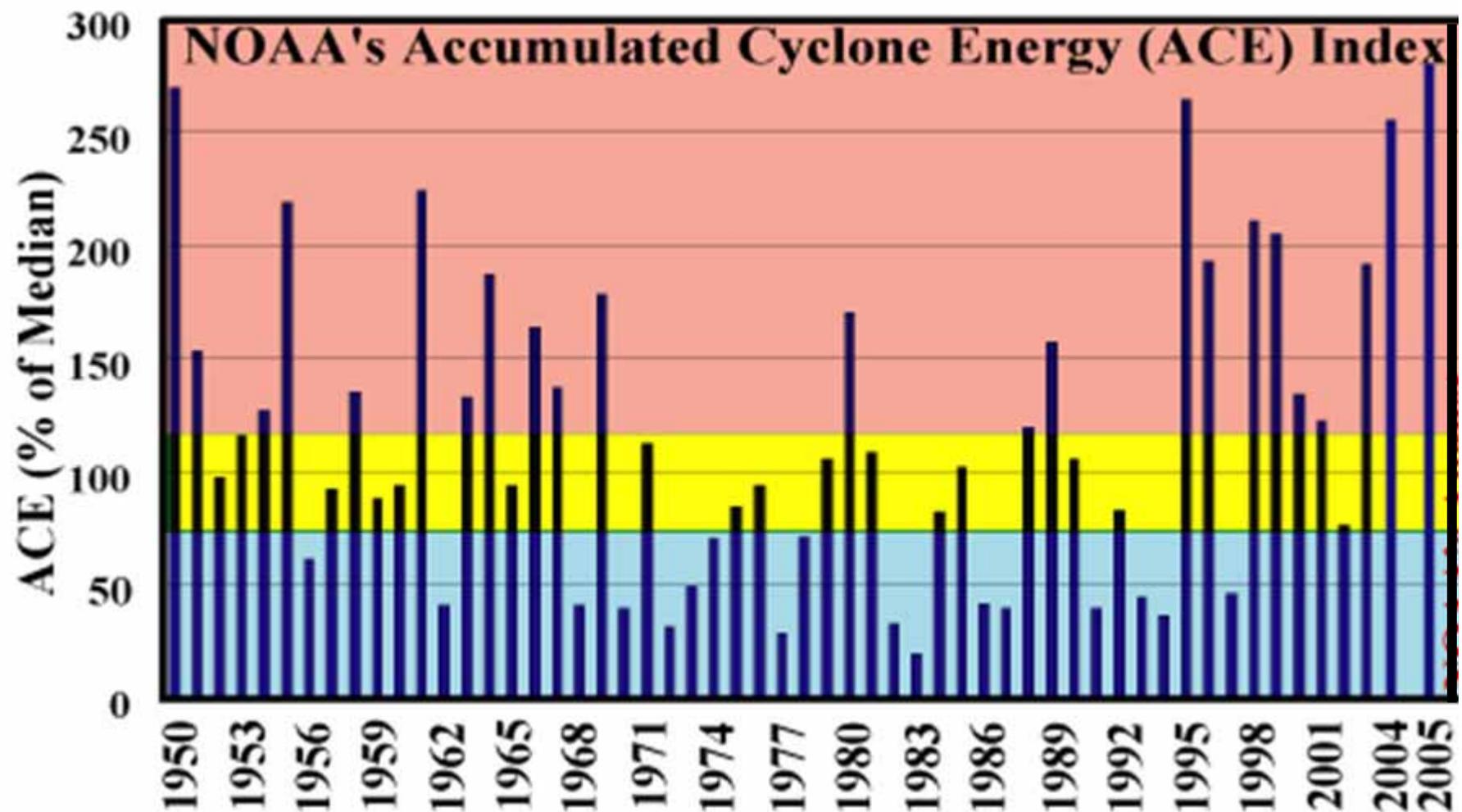
NOAA Forecast Methodology

- 1) Assess states of the on-going multi-decadal signal, ENSO, and Atlantic SSTs.
- 2) Use available CPC/CDC forecasts for ENSO/Atlantic SSTs, incorporate any analog techniques and assume persistence of upper-level conditions.
- 3) Predict range of overall activity and probabilities of above-, near-, and below-normal seasons.
- 4) Qualitative/Quantitative process.

A good measure of seasonal hurricane activity: “Accumulated Cyclone Energy”, or “ACE”

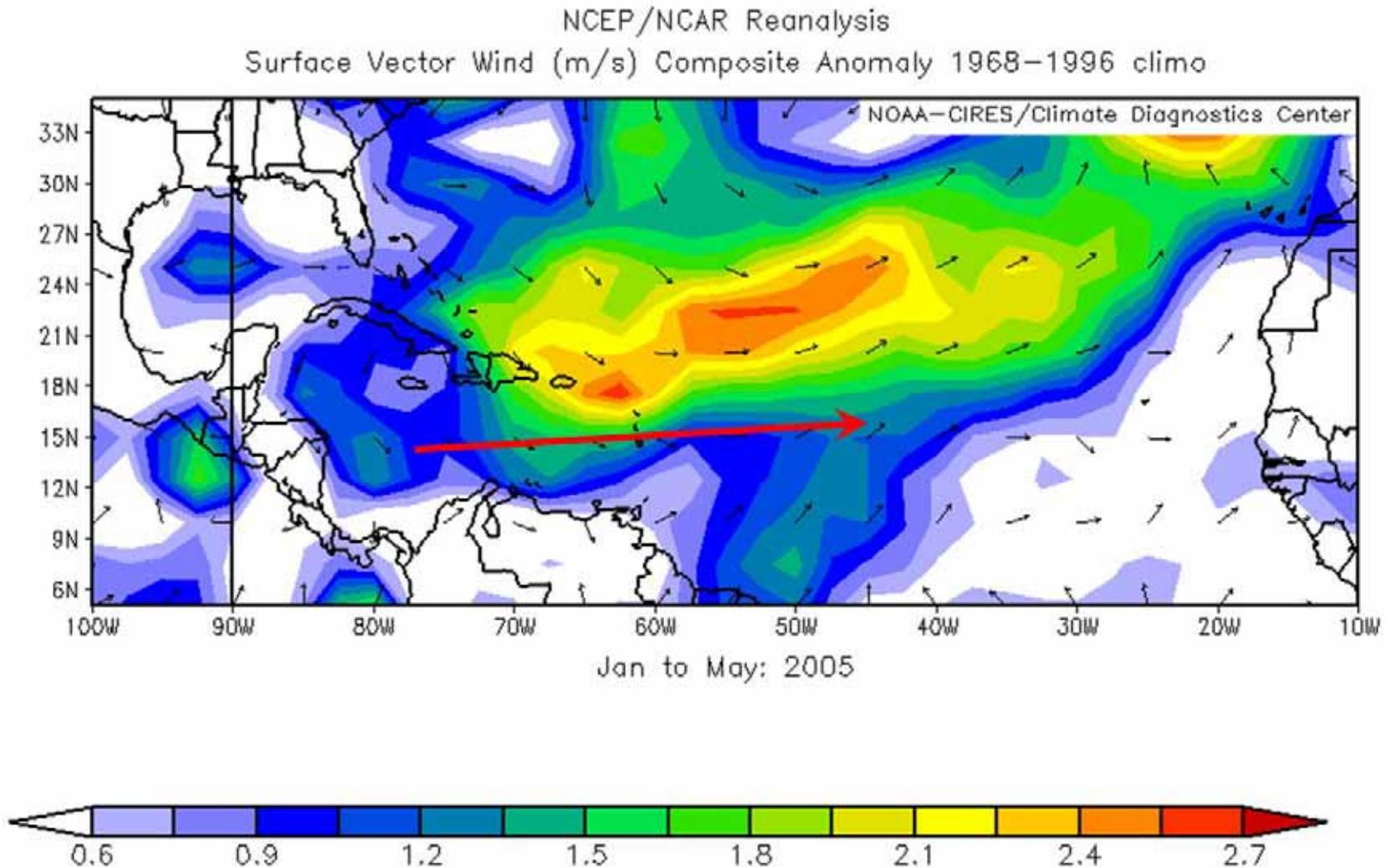
ACE is defined as the sum of the squares of the wind speed every six hours for all tropical and subtropical storms and hurricanes.

Therefore, ACE is maximized for long-lived, intense hurricanes, such as Ivan (2004).



NOAA's ACE index expressed as percent of the 1951-2000 median value. Definitions of season types are indicated by the background shading, with pink, yellow, and blue indicating above-, near-, and below-normal seasons, respectively.

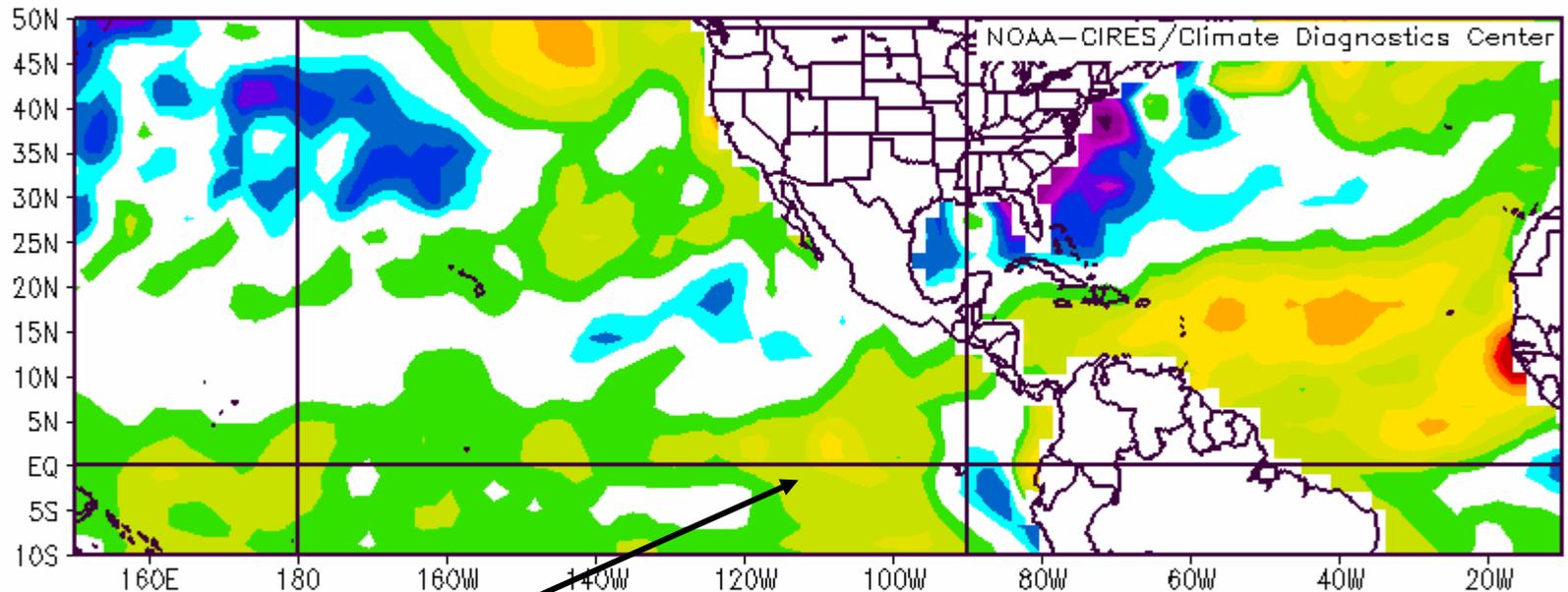
Tradewinds 50-70% of average during preceding winter/spring



Weakened tradewinds likely the main cause of record warmth in the deep tropical Atlantic Ocean before hurricane season

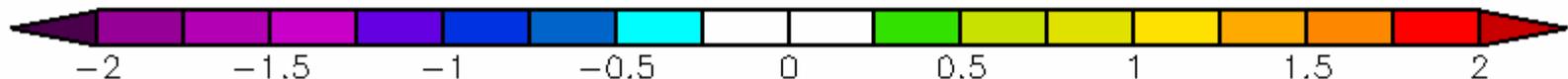
NCEP/NCAR Reanalysis

Surface Skin Temperature(SST) (C) Composite Anomaly 1968-1996 clima



Apr to May: 2005

Leftover El Niño



NOAA's 2005 Atlantic Hurricane Outlook

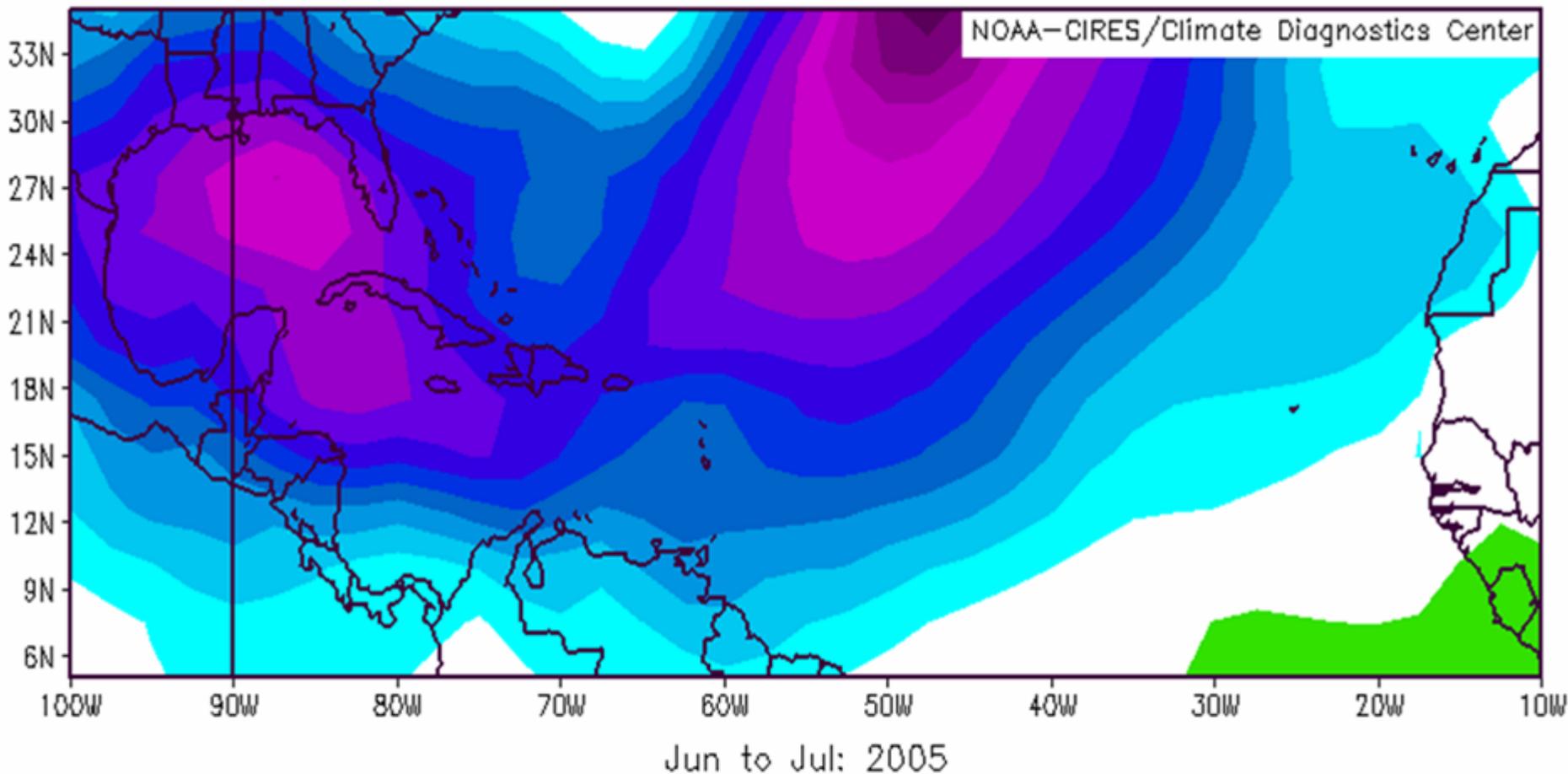
Issued 16 May 2005

<u>Season and Activity Type</u>	<u>2005 Outlook</u>	<u>2005 Observed</u>	<u>Climatological Mean</u>
Chance Above Normal	70%	Above Normal	33%
Chance Near Normal	20%		33%
Chance Below Normal	10 %		33%
Tropical Storms	12-15	27 *	11
Hurricanes	7-9	15*	6
Major Hurricanes	3-5	7	2
ACE % of Median	120%-190%	285%*	~100%

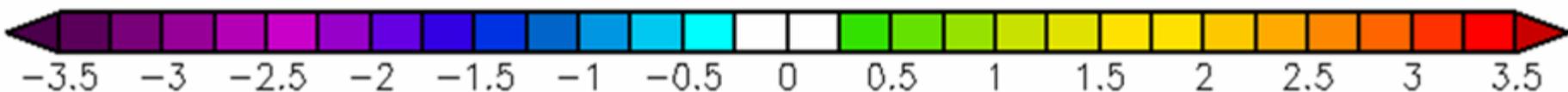
*All-time record

NCEP/NCAR Reanalysis

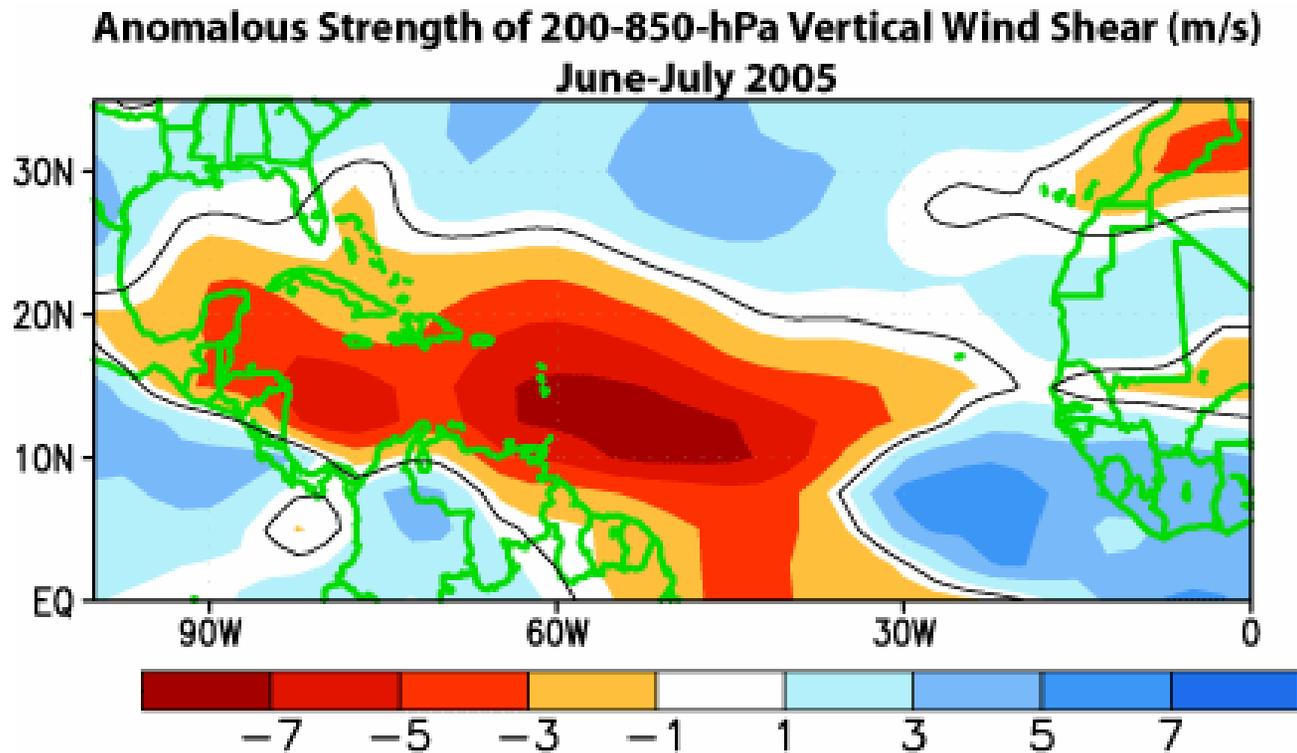
Sea Level Pressure (mb) Composite Anomaly 1968–1996 climo



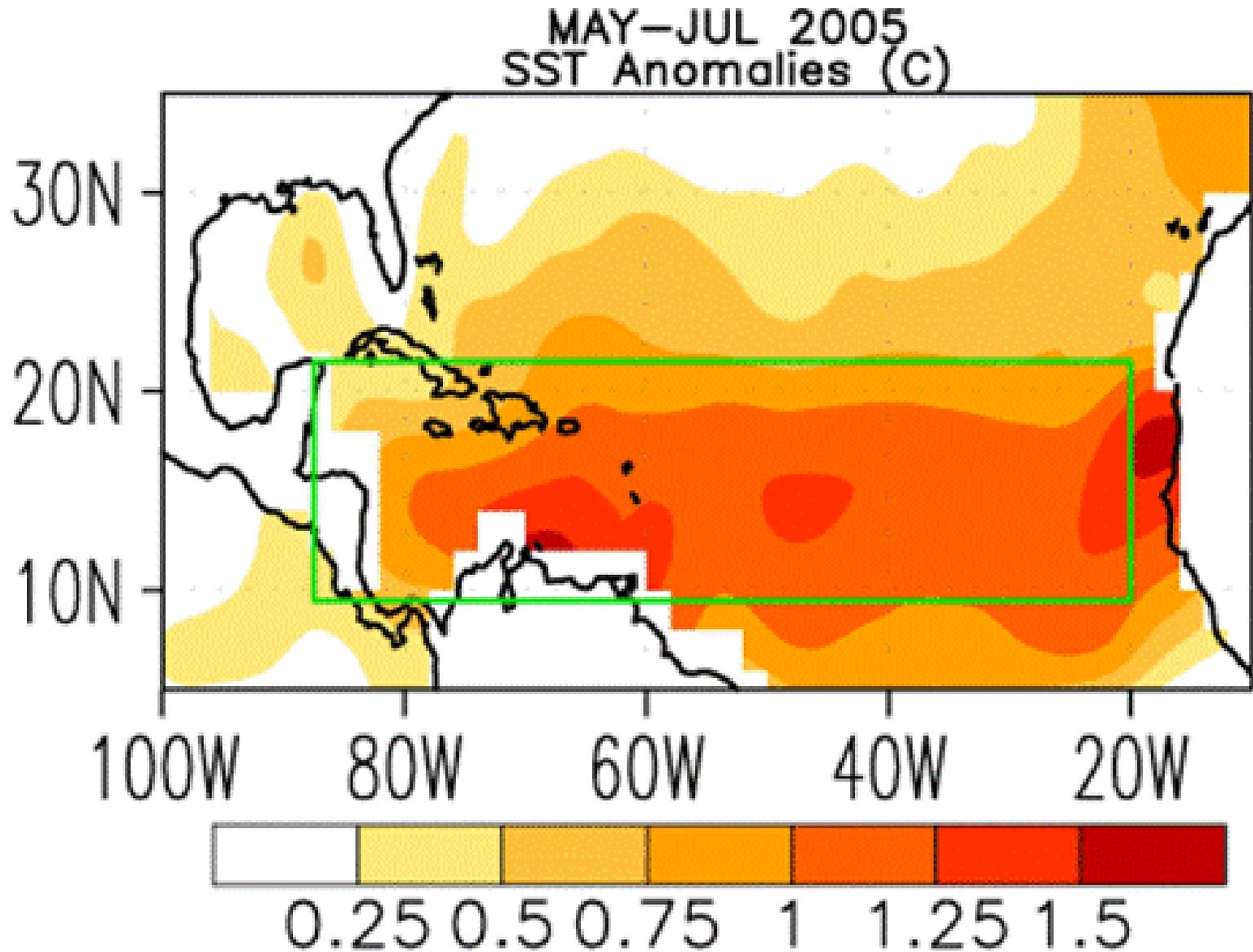
Lowest early season pressure anomalies ever



Extremely low early season shear



Warmest Sea-Surface Temperature Anomalies Ever

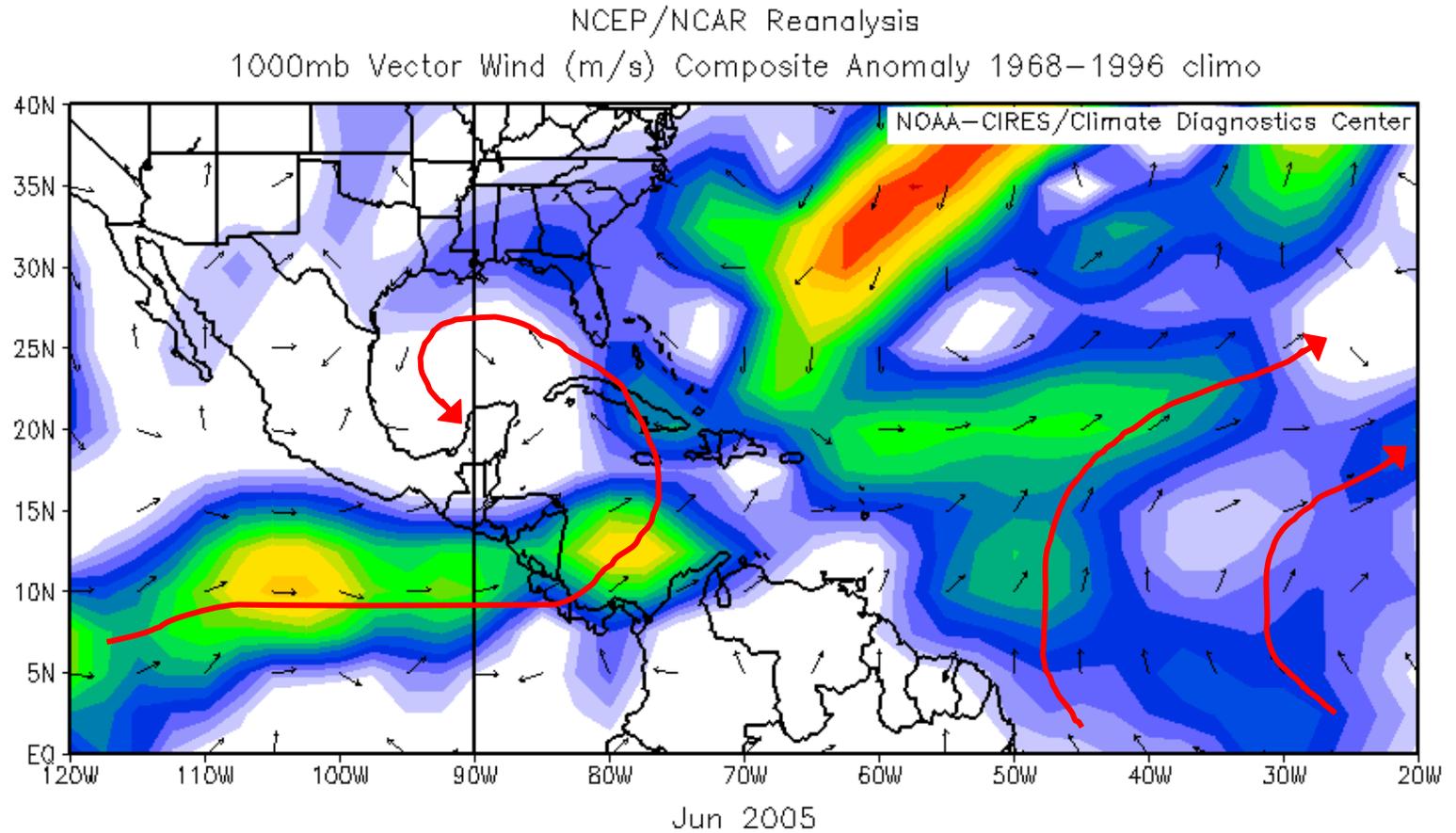


NOAA's 2005 Atlantic Hurricane Outlook

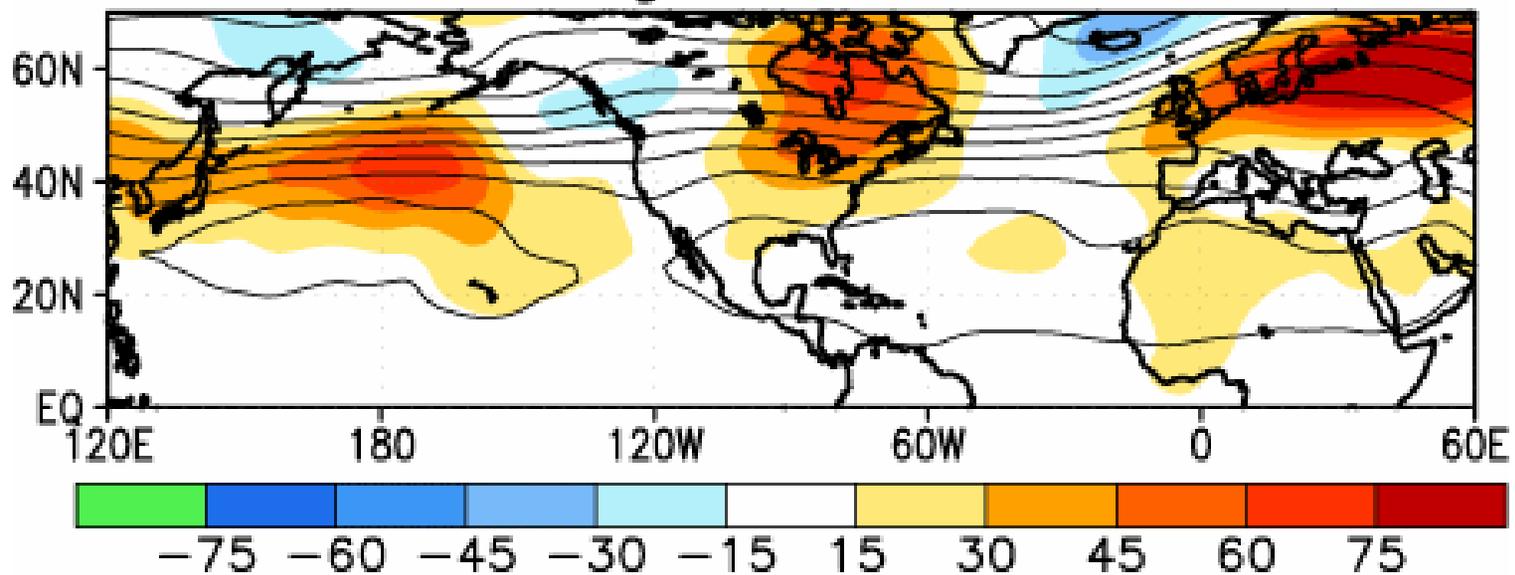
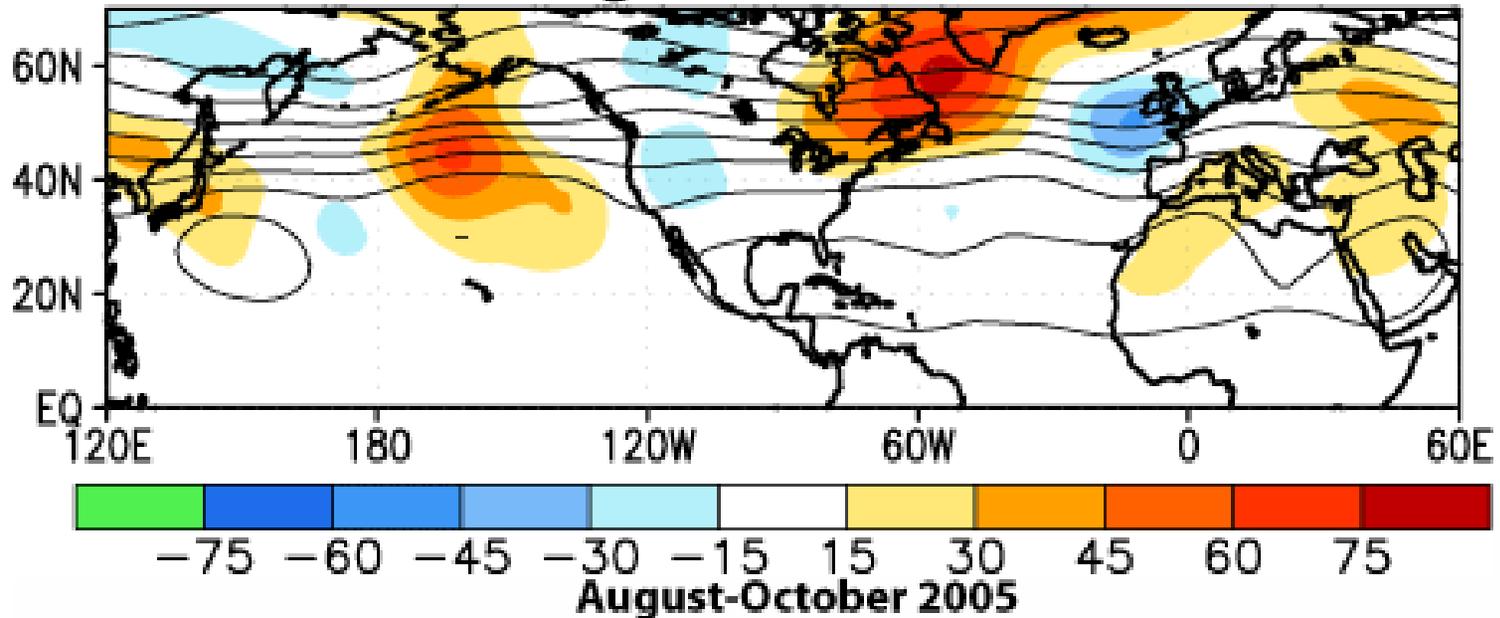
Issued 2 Aug 2005

<u>Season and Activity Type</u>	<u>2005 Outlook</u>	<u>2005 Observed</u>	<u>Climatological Mean</u>
Chance Above Normal	95%	Above Normal	33%
Chance Near Normal	5%		33%
Chance Below Normal	0 %		33%
Tropical Storms	18-21	27	11
Hurricanes	9-11	15	6
Major Hurricanes	5-7	7	2
ACE % of Median	180%-270%	285%	~100%

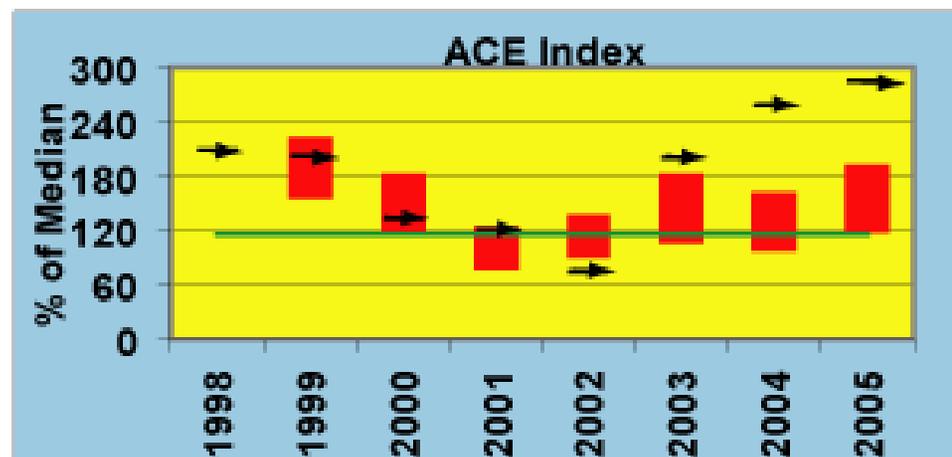
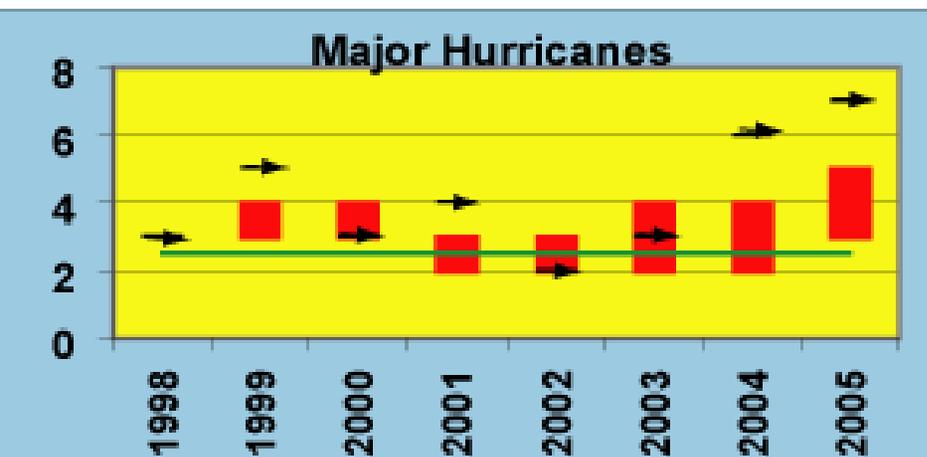
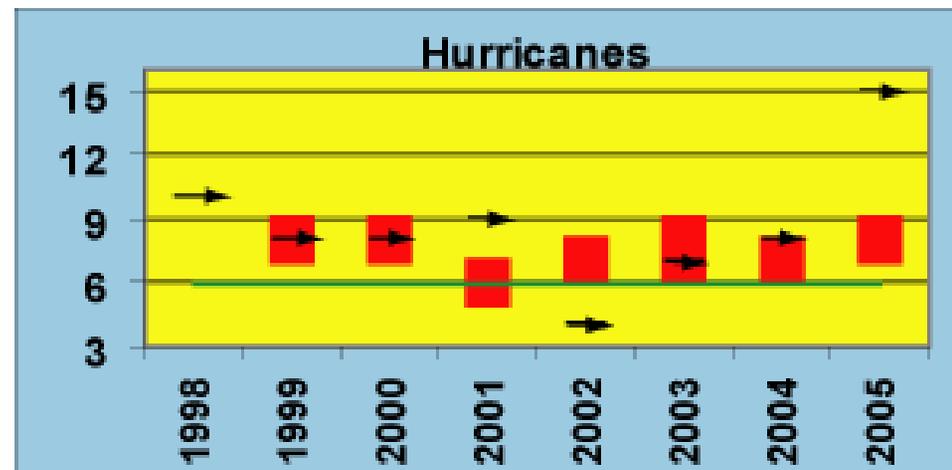
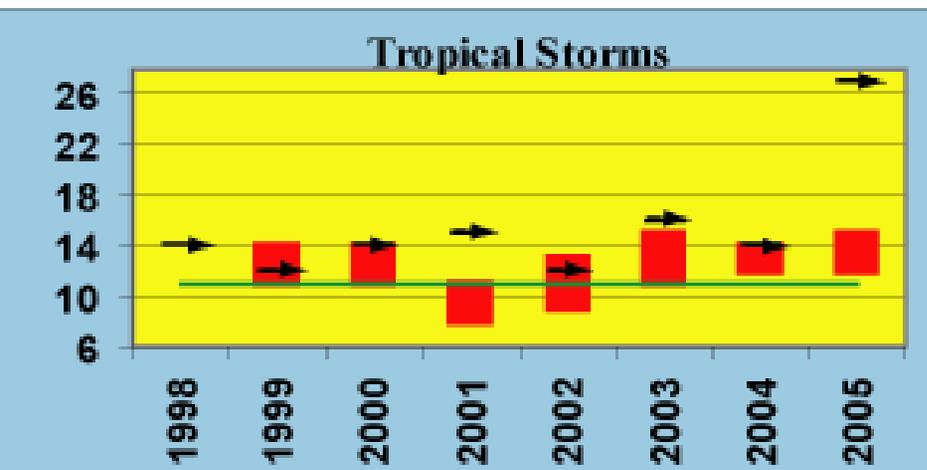
LOW-LEVEL CIRCULATION ANOMALIES FAVORED DEVELOPMENT/INTENSIFICATION IN THE WESTERN PART OF THE BASIN (?)



500-hPa Heights and Anomalies August-October 2004



NOAA's Atlantic Hurricane Season Forecast Verification For Outlooks Issued in May



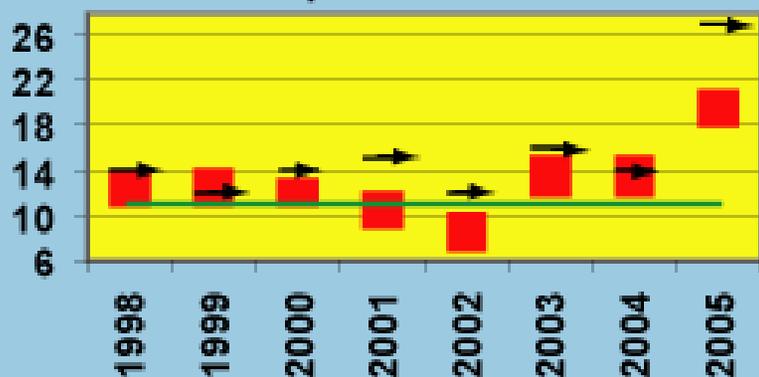
■ Predicted Range \rightarrow Observed

Green Bars for TS, H, MH denote the climatological means

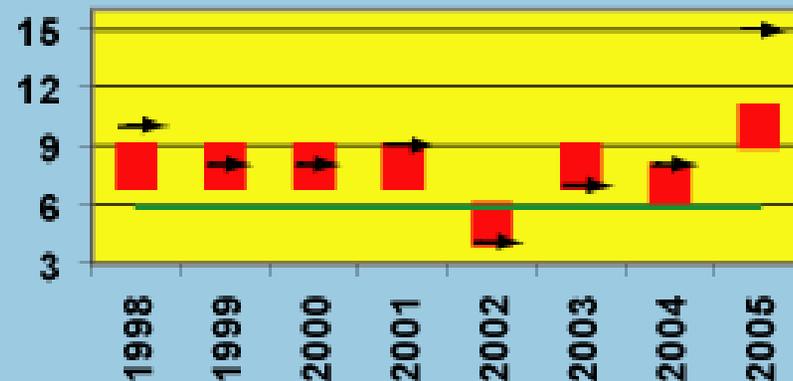
Green bar in ACE plot shows lower boundary for above-normal seasons

NOAA's Atlantic Hurricane Season Forecast Verification For Outlooks Issued in Early August

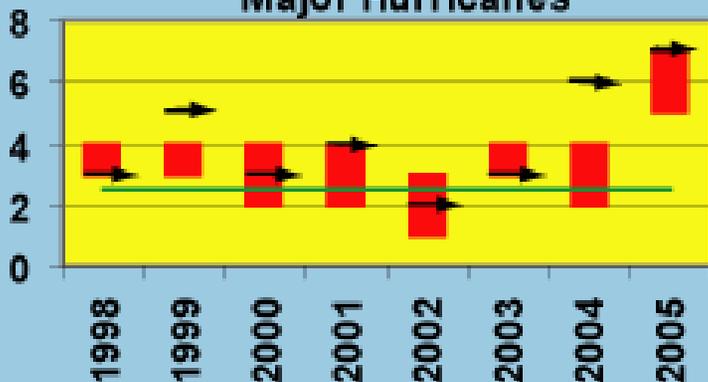
Tropical Storms



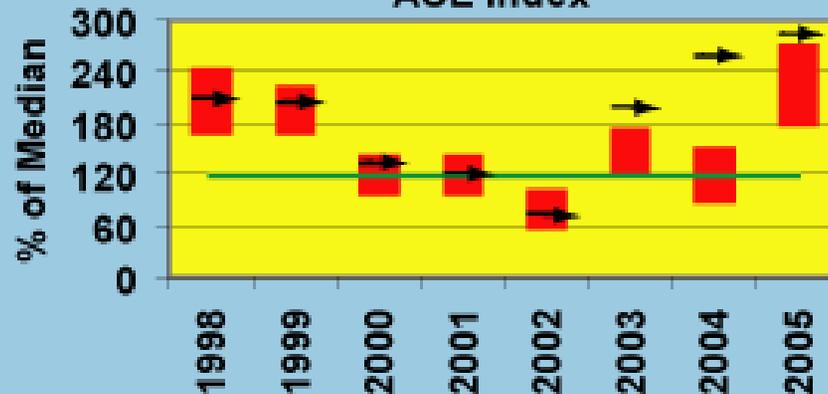
Hurricanes



Major Hurricanes



ACE Index



■ Predicted Range \rightarrow Observed

Green Bars for TS, H, MH denote the climatological means

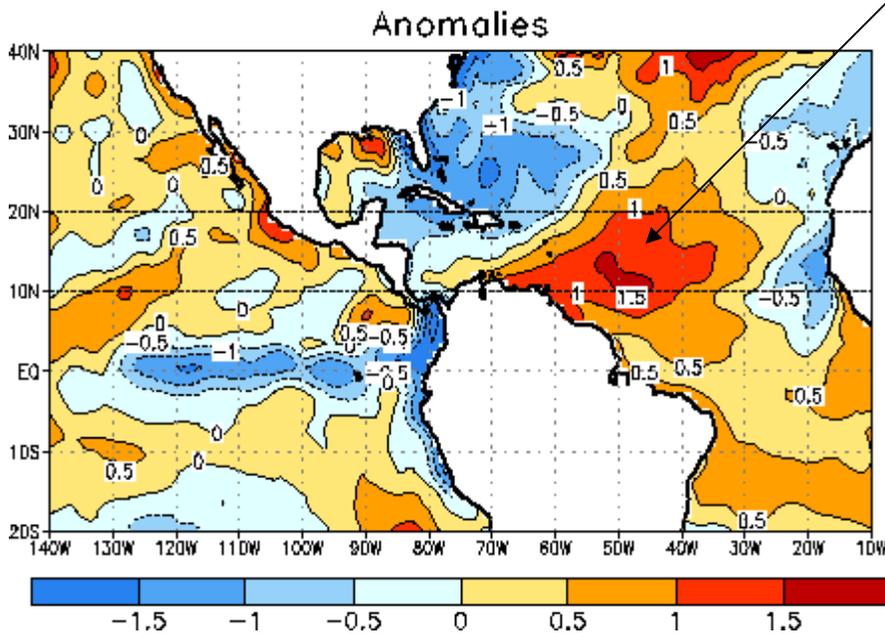
Green bar in ACE plot shows lower boundary for above-normal seasons

2006 Forecast?

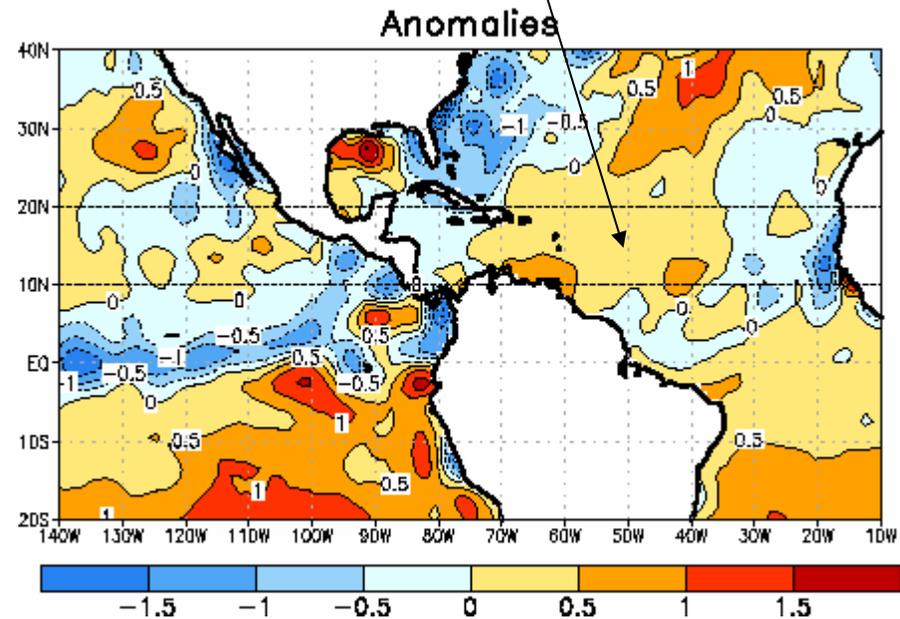
Atlantic SSTs are a little warmer than average.

But nowhere near as warm as last year!

Early March 2005



Early March 2006

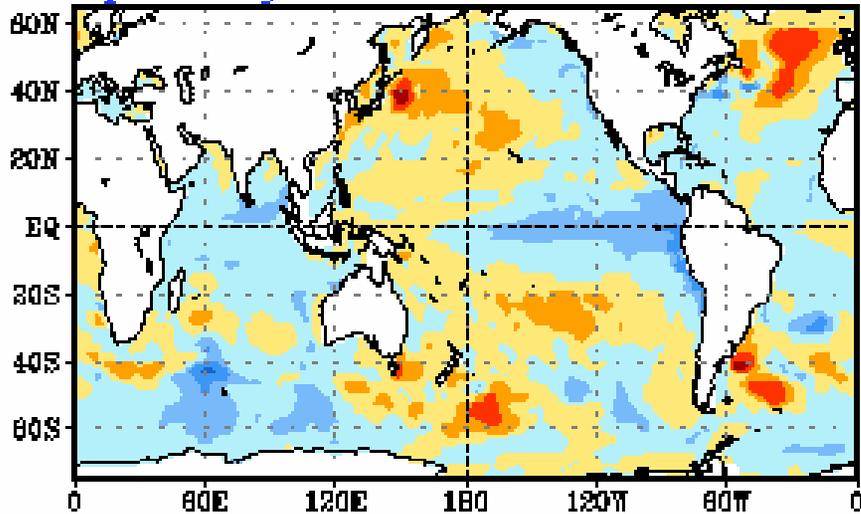


Climate Forecast System (CFS)

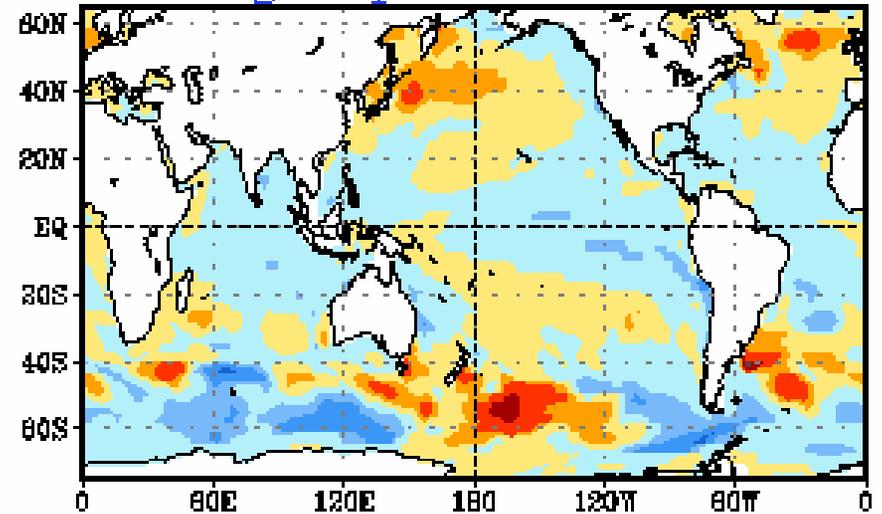
- Coupled global model (T62L64)
- Integrate for 10 months with 60 ensemble members
- Objective predictions of 200 mb streamfunction, vertical wind shear and SSTs.
- Shown to have skill comparable with statistical models in Nino 3.4 SST hindcasts
- Hints of skill in forecasting year-to-year changes in important parameters that control hurricane variability

CFS Seasonal Forecasts of SST from Mar 17

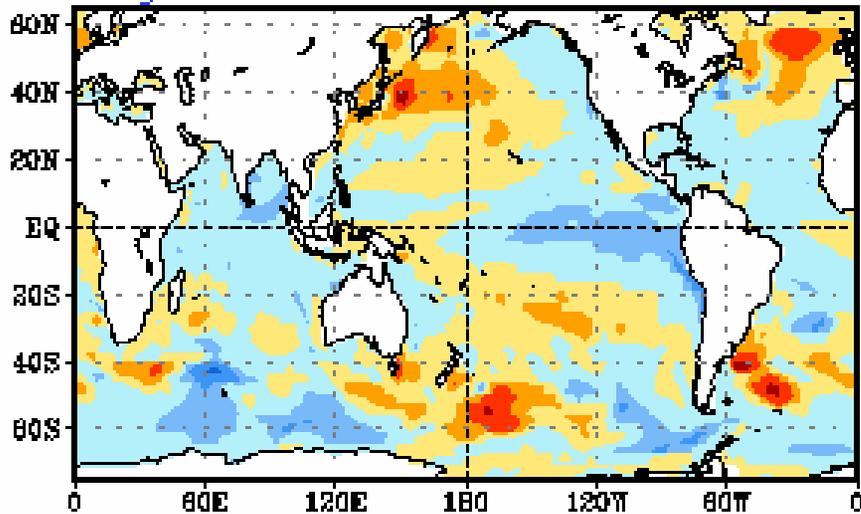
Apr-May-Jun 2006



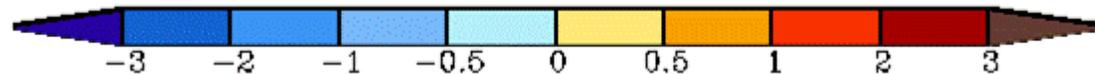
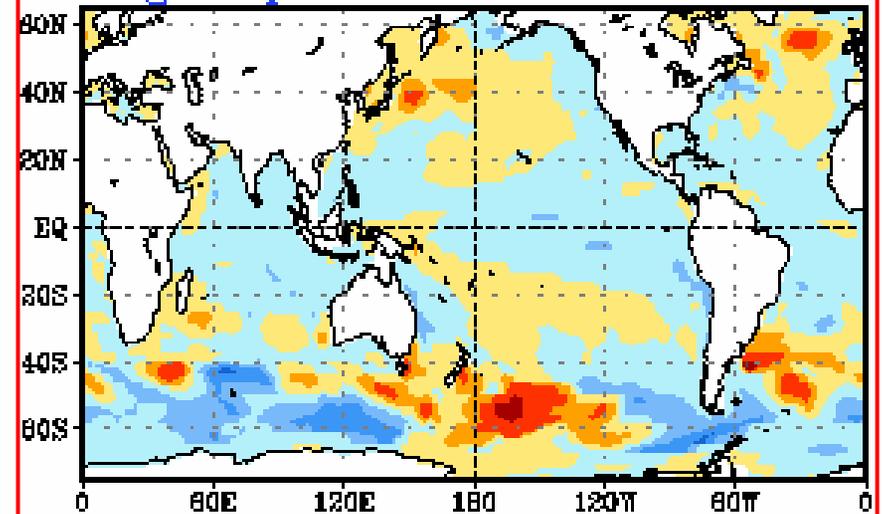
Jul-Aug-Sep 2006



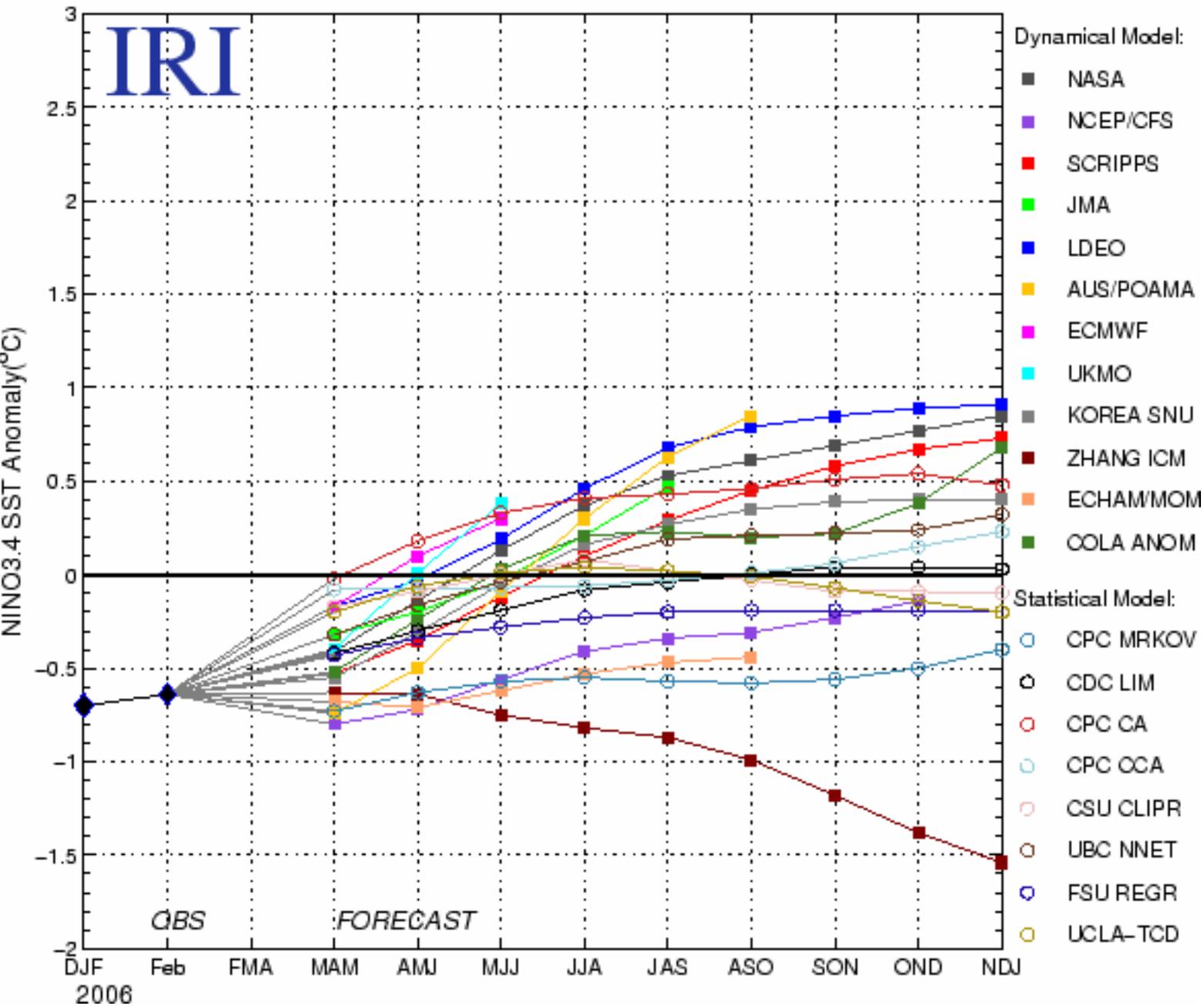
May-Jun-Jul 2006



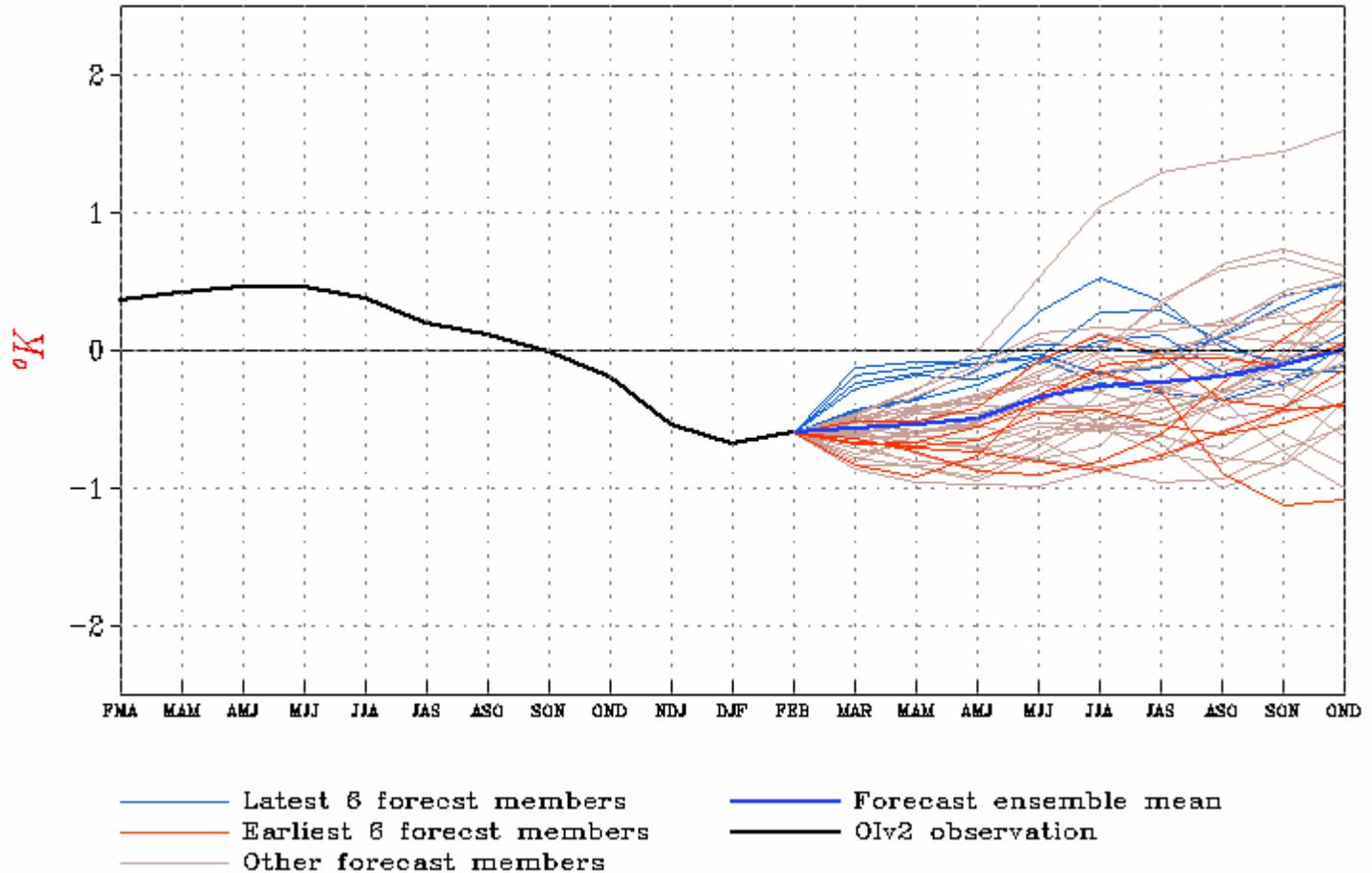
Aug-Sep-Oct 2006



Latest Nino 3.4 SST guidance

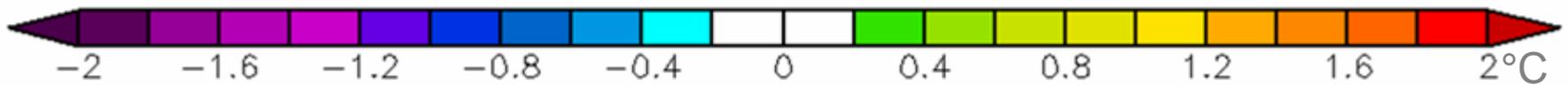
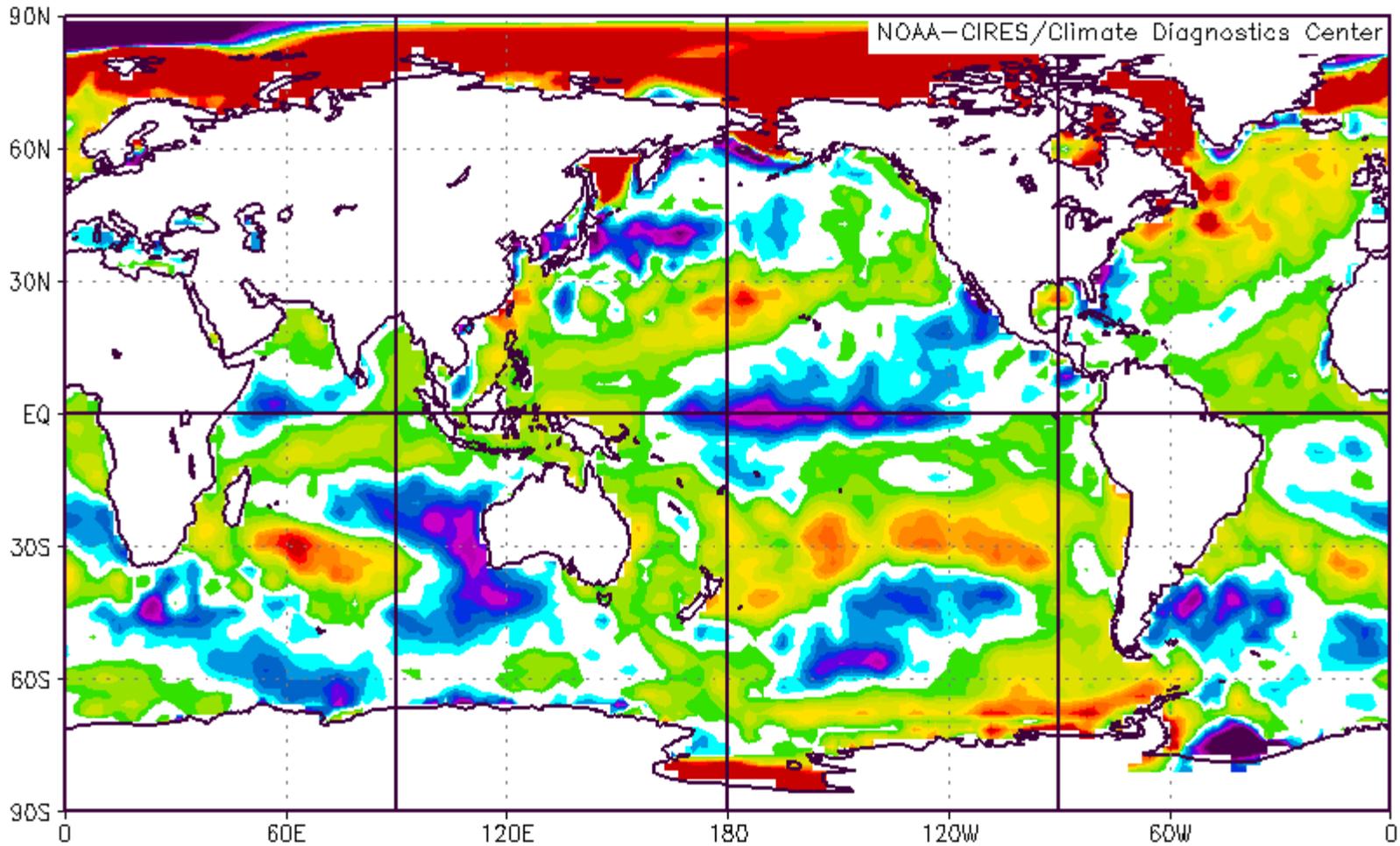


Forecast *Nino3.4* SST anomalies from CFS

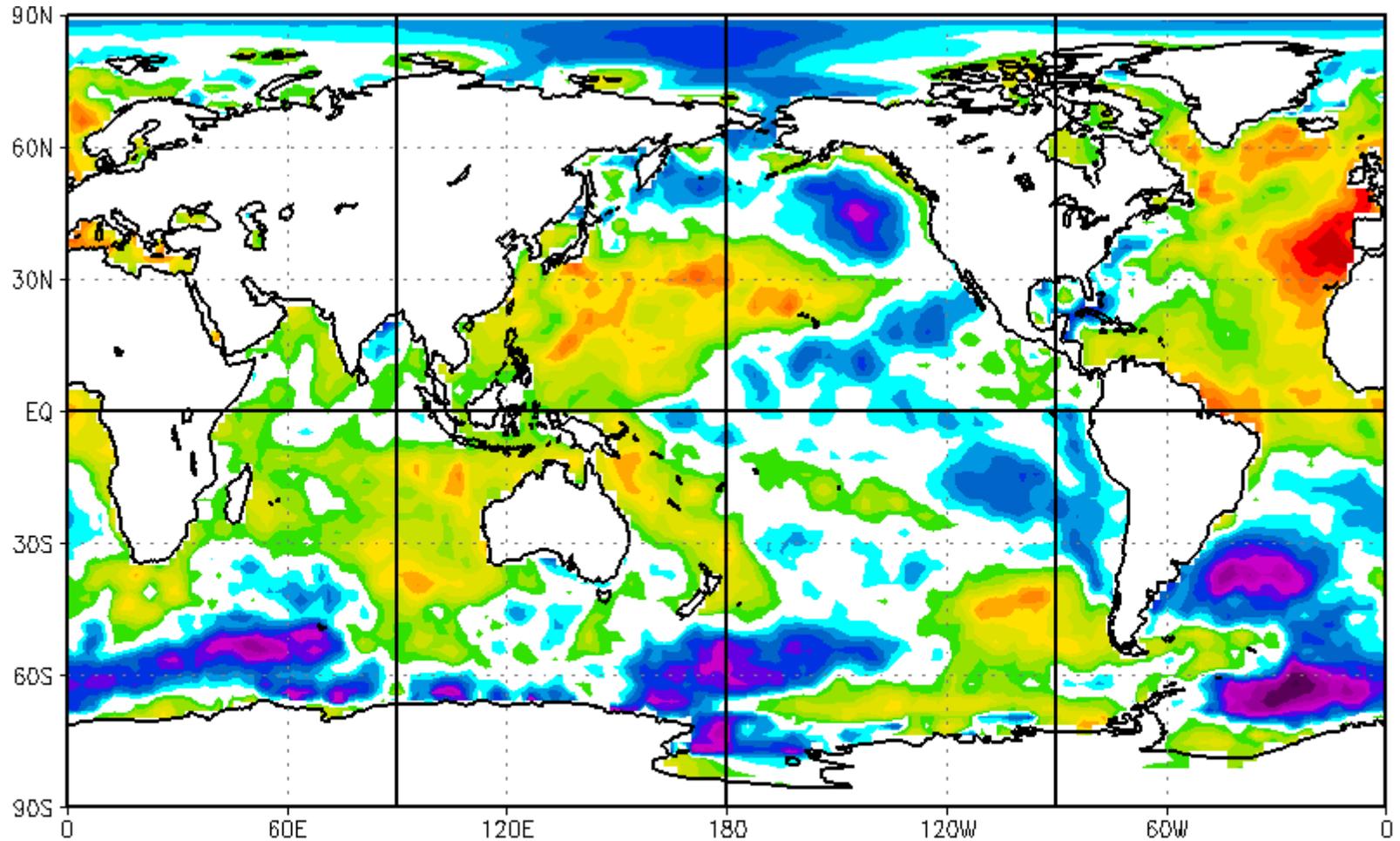


ENSO neutral conditions forecast by the CFS

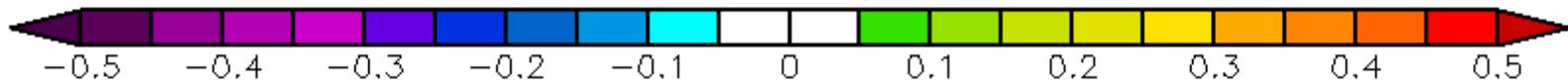
February 2006 SST anomalies



Correlations of Feb SSTs to next season's ACE



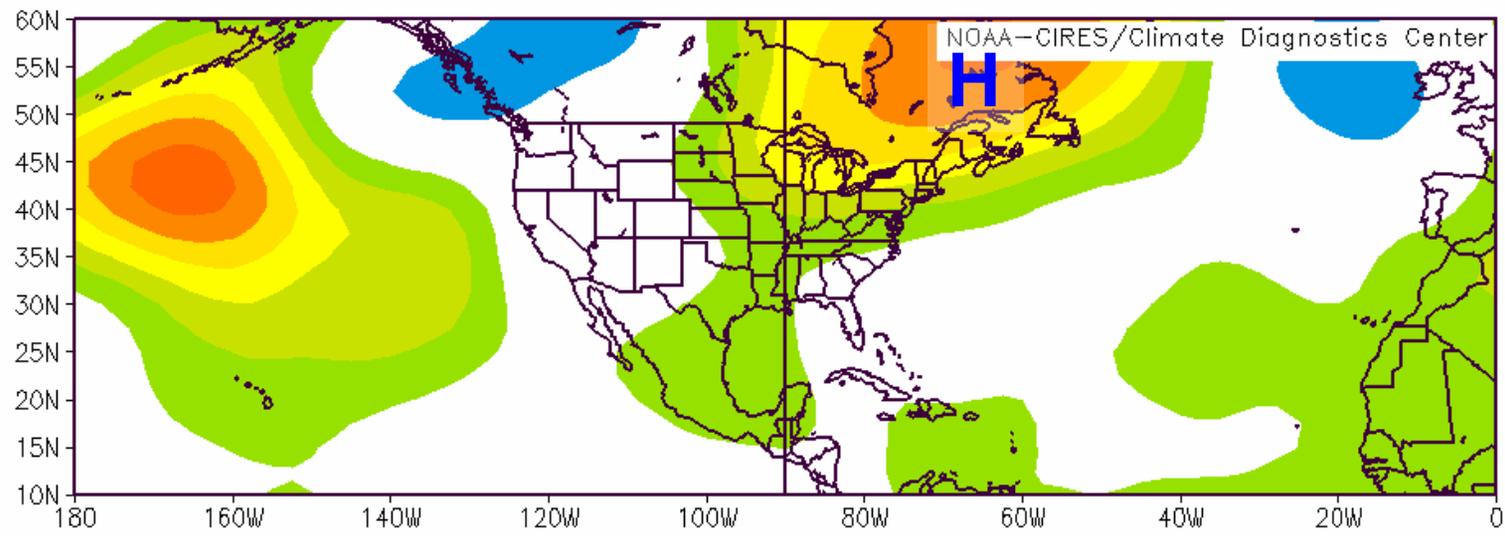
Feb 1950 to 2004; Surface SST
Seasonal Correlation w/ Feb seasonalace.txt



Summary

- 2005 forecasts were too low; verifying numbers were at all-time record levels.
- Early season indications strongly supported NOAA's August near-record forecast.
- 2006 hurricane season – preliminary indications are for above normal activity, but probably not at the levels seen in 2005 (or 2004?)
- Long-wave steering pattern in 2006?

NCEP/NCAR Reanalysis
500mb Geopotential Height (m) Composite Anomaly 1968-1996 climo



Aug to Oct: 2004,2005

