



## Bracing for the 2010 Hurricane Season

Dr. Robert Chandler  
University of Central Florida

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# About Everbridge

- Leader in incident notification systems
- Everbridge has been a crucial part of our clients' hurricane preparedness plans, particularly Hurricane Ike
- Fast-growing global company with more than 1,000 clients in more than 100 countries
- Serve the Global 2000, healthcare systems, state and local government, federal government, military, financial services firms, and universities
- 100% focused on incident notification solutions that merge technology and expertise



technology + expertise



## Respond

Notify key audiences of an incident by accessing the Everbridge system via computer, phone or web-enabled device to launch a broadcast.



## Reach

Contact thousands in minutes. The Everbridge system cycles through all communication paths to deliver your message. Recipients confirm receipt or respond to the sender.



## Results

Get immediate results. Everbridge's real-time dashboard compiles and updates responses for quick, informed decision-making.

Everbridge Aware™

# Agenda

## Part 1: Presentation

- The latest outlook for the 2010 hurricane season
- How forecasts impact you
- How to improve hurricane preparedness
- Crafting effective warning and evacuation messages

## Part 2: Q&A

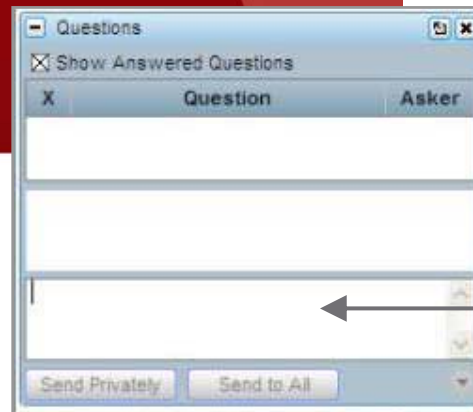


# Q&A

**Note:**  
slides are currently  
available to everyone on  
[blog.everbridge.com](http://blog.everbridge.com)



Webinar



A screenshot of a web interface titled "Questions". It features a checkbox labeled "Show Answered Questions" which is checked. Below this is a table with two columns: "Question" and "Asker". The table is currently empty. At the bottom of the interface are two buttons: "Send Privately" and "Send to All". An arrow points from the text "Use the Q&A function to submit your questions." to the empty table area.

X	Question	Asker
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Use the Q&A  
function to  
submit your  
questions.



technology + expertise



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# Bracing for the 2010 Hurricane Season

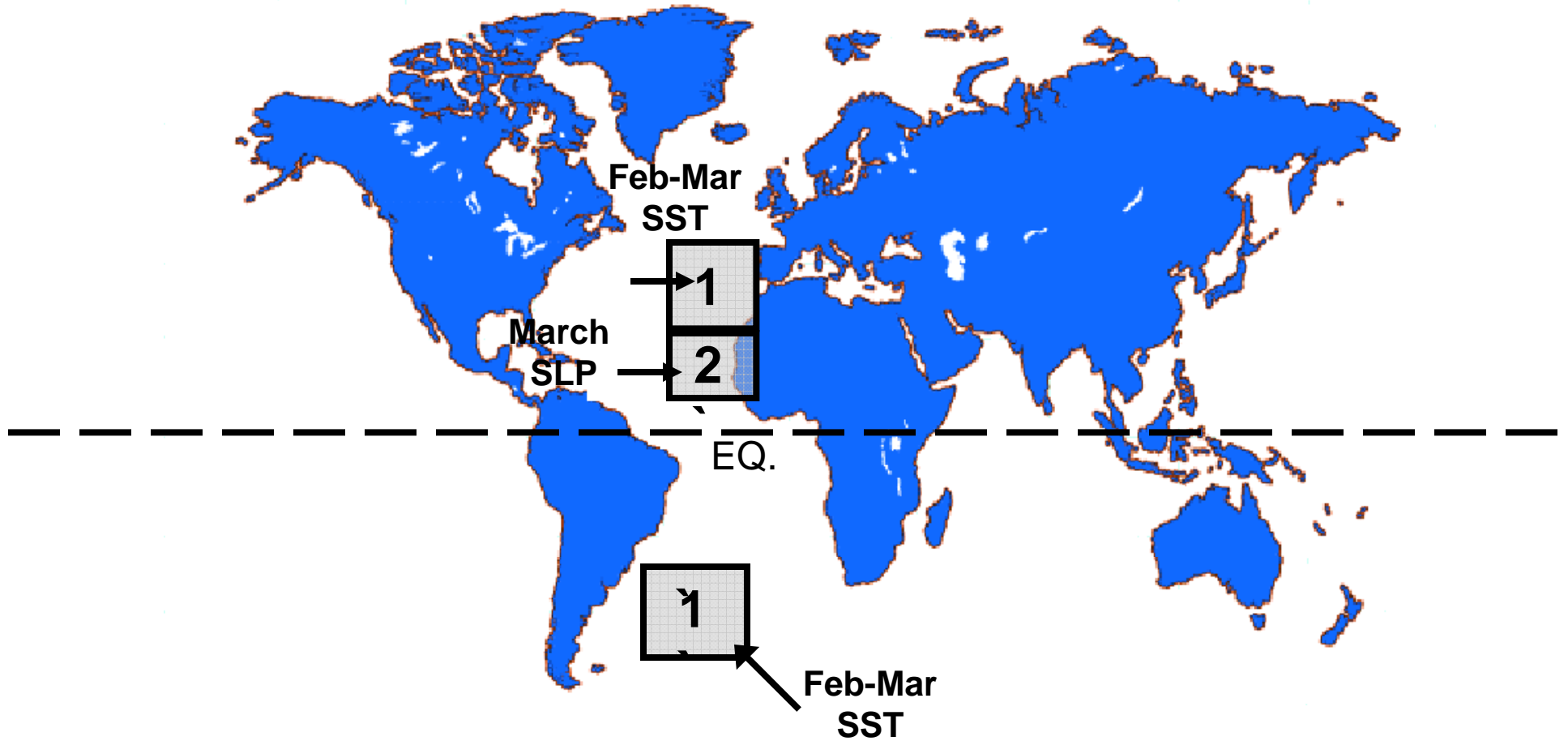
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Dr. Phil Klotzbach  
Colorado State University

# 2010 forecast as of 7 April 2010

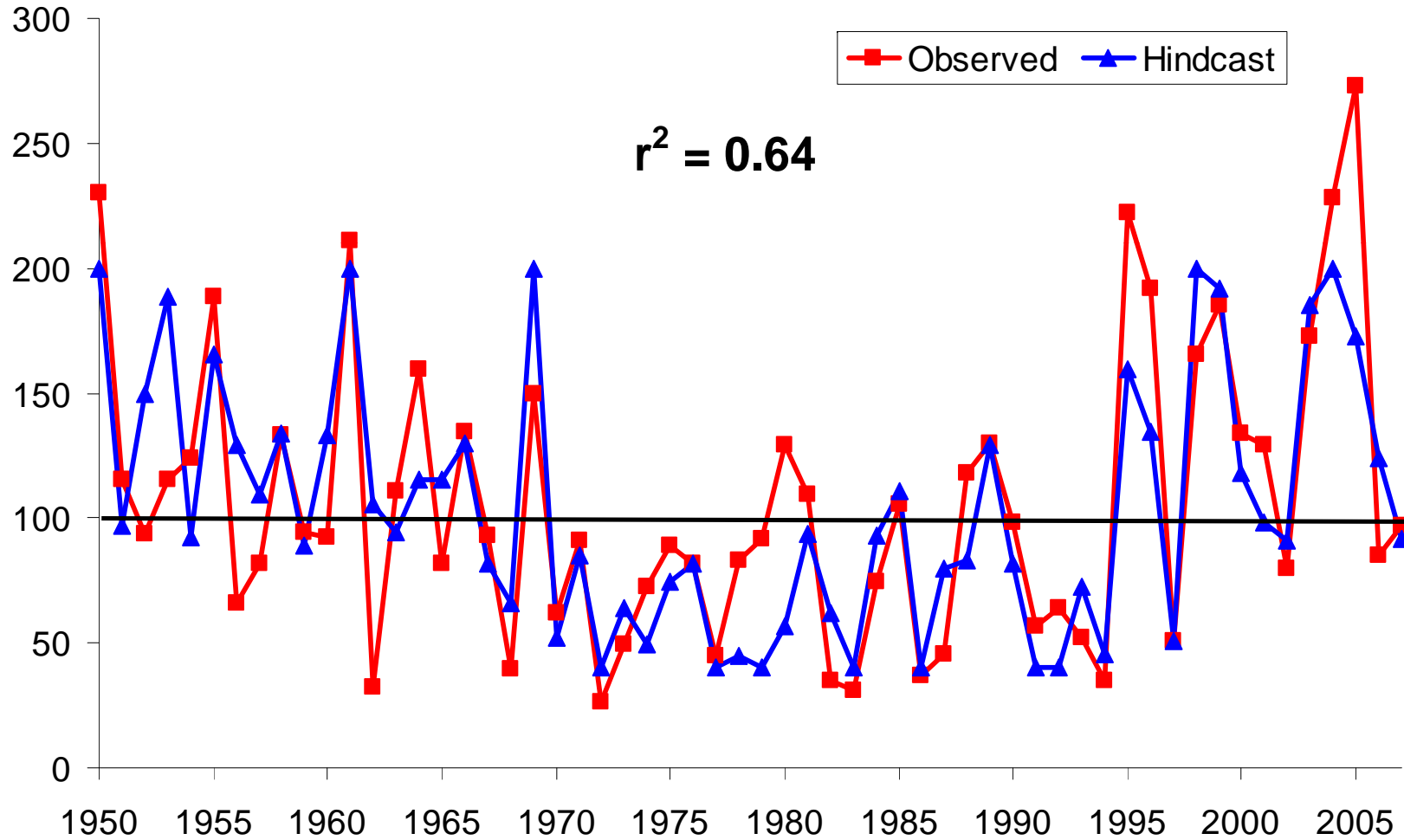
Forecast Parameter	Statistical Forecast	Analog Forecast	Final Forecast	1950-2000 Climatology
Named Storms (NS)	10.0	16.2	15	9.6
Named Storm Days (NSD)	48.7	86.1	75	49.1
Hurricanes (H)	5.9	10.2	8	5.9
Hurricane Days (HD)	23.0	42.1	35	24.5
Major Hurricanes (MH)	2.4	4.6	4	2.3
Major Hurricane Days (MHD)	5.6	10.5	10	5.0
Accumulated Cyclone Energy (ACE)	93	173	150	96
Net Tropical Cyclone Activity (NTC)	102	183	160	100

# New April forecast predictors



# New April forecast predictors

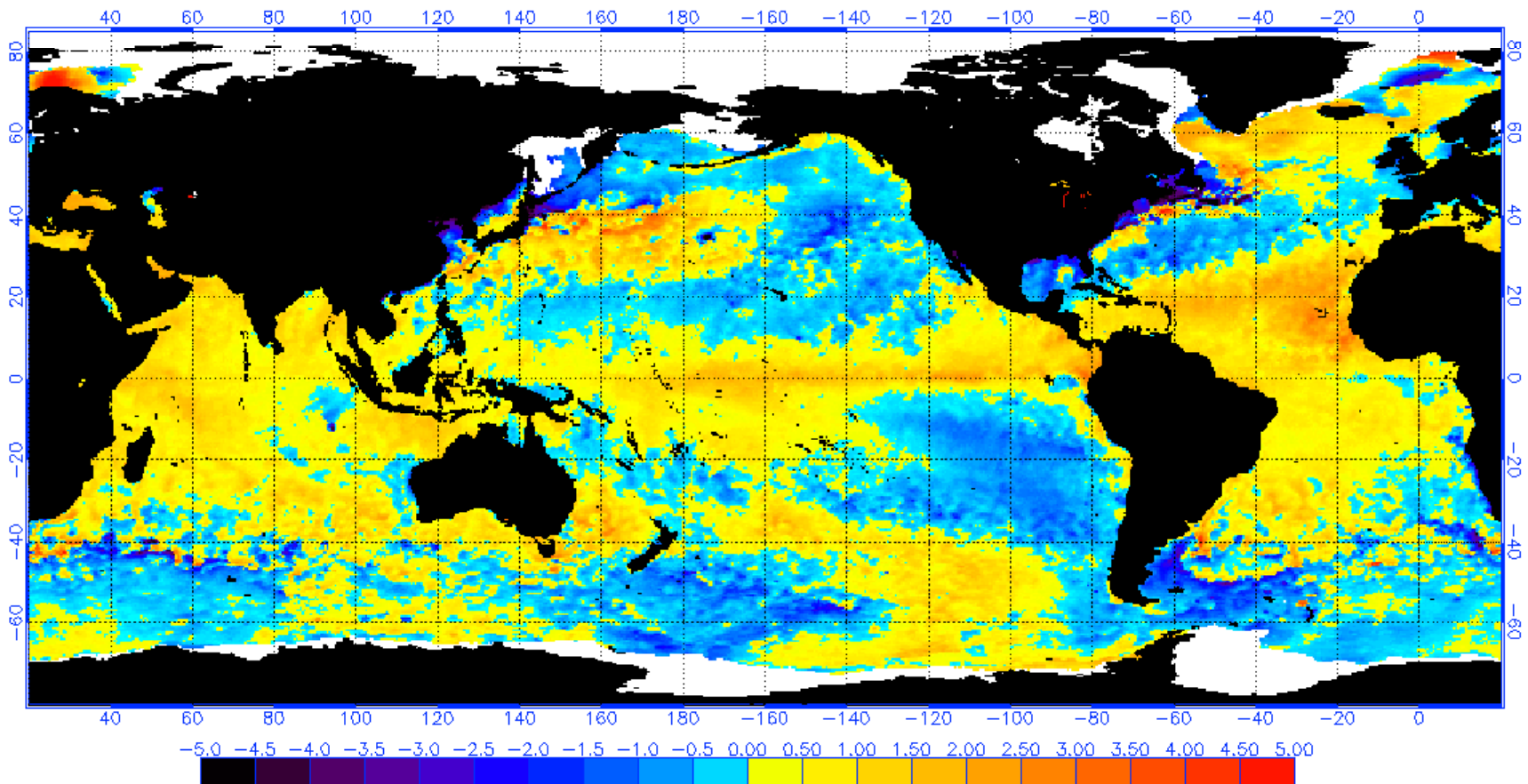
Hindcast vs. Observed NTC - 1 April - Rank Prediction Method



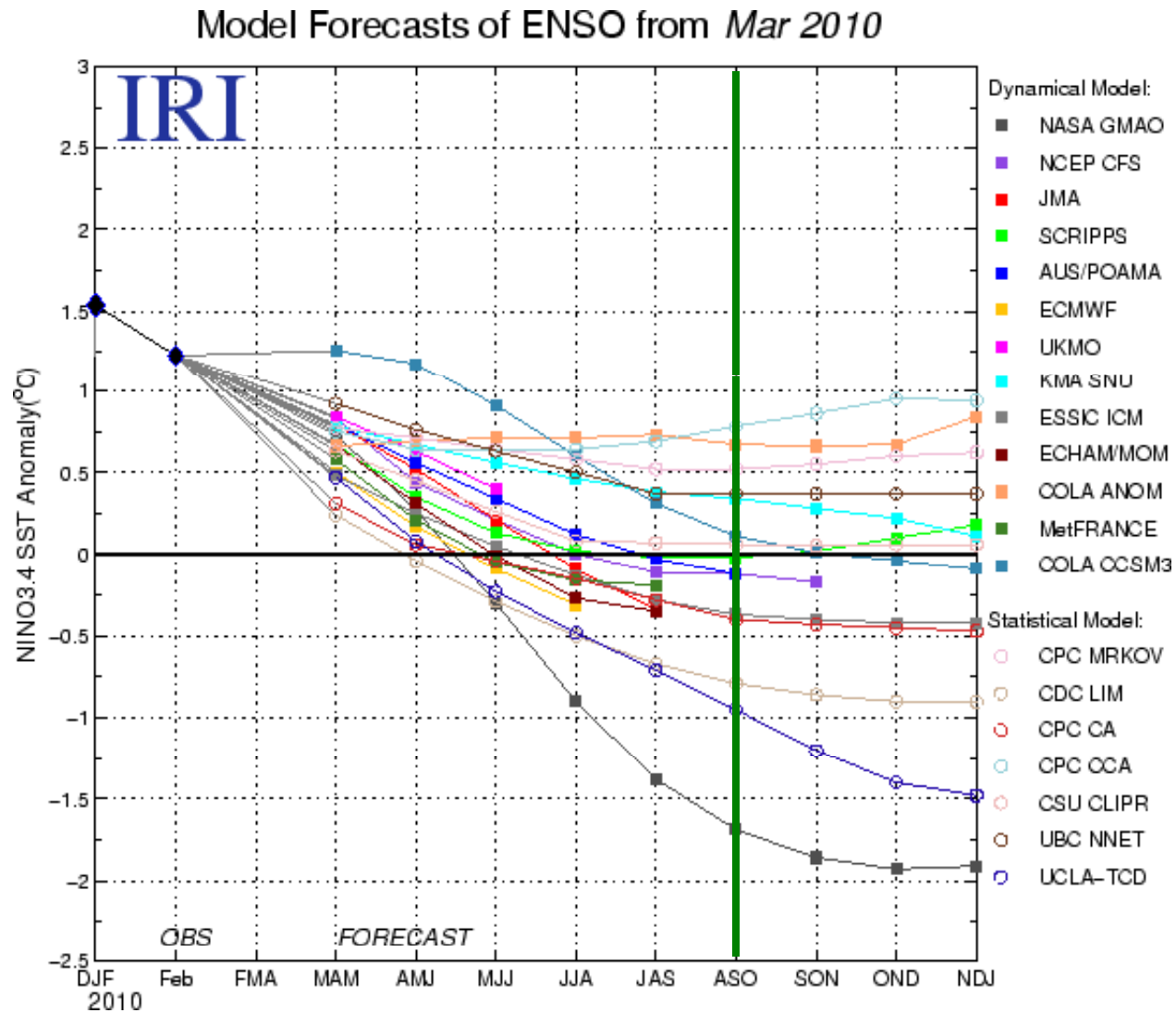


# New April forecast predictors

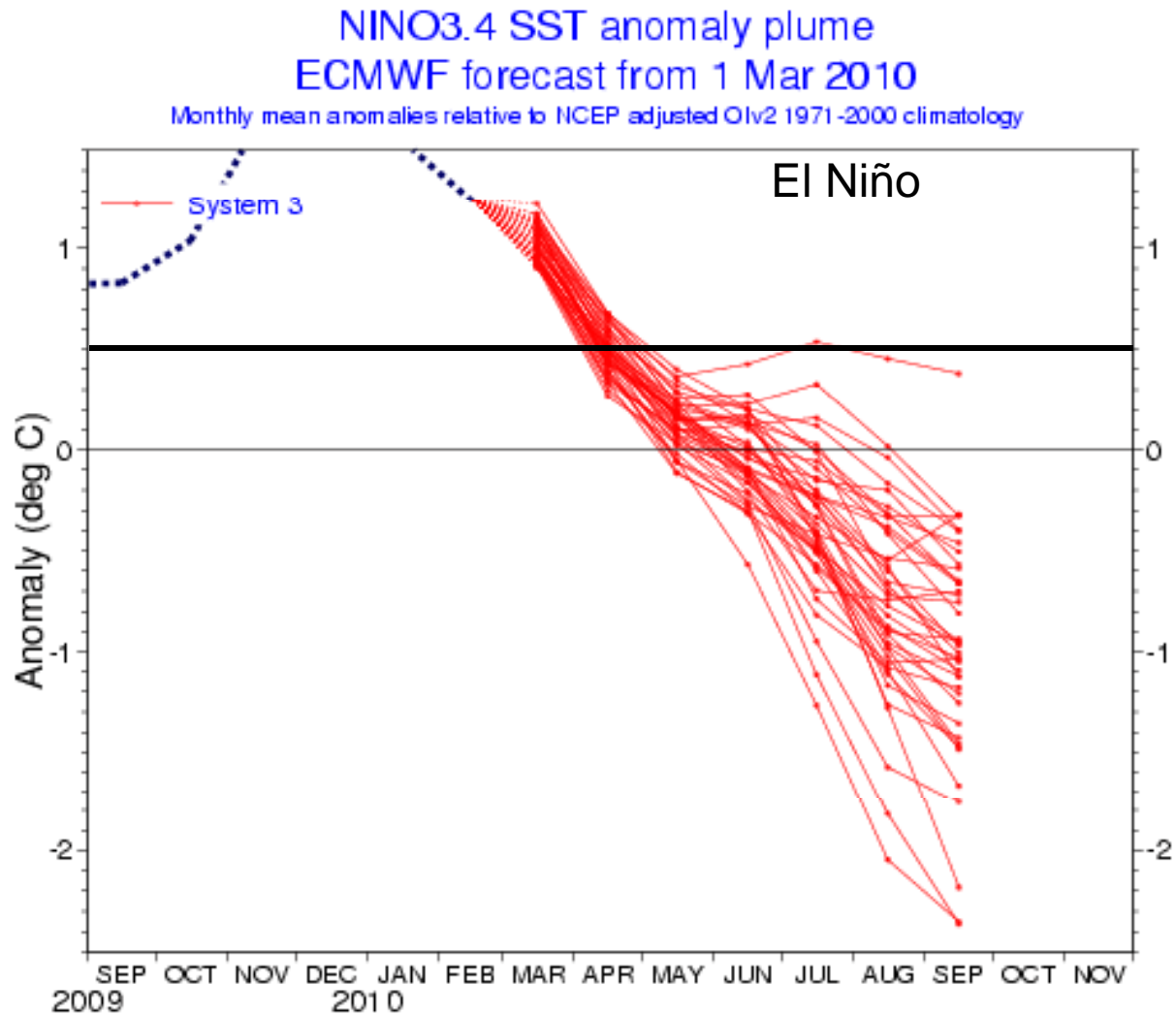
NOAA/NESDIS 50 KM GLOBAL ANALYSIS: SST Anomaly (degrees C), 4/5/2010  
(white regions indicate sea-ice)



# New April forecast predictors



# New April forecast predictors



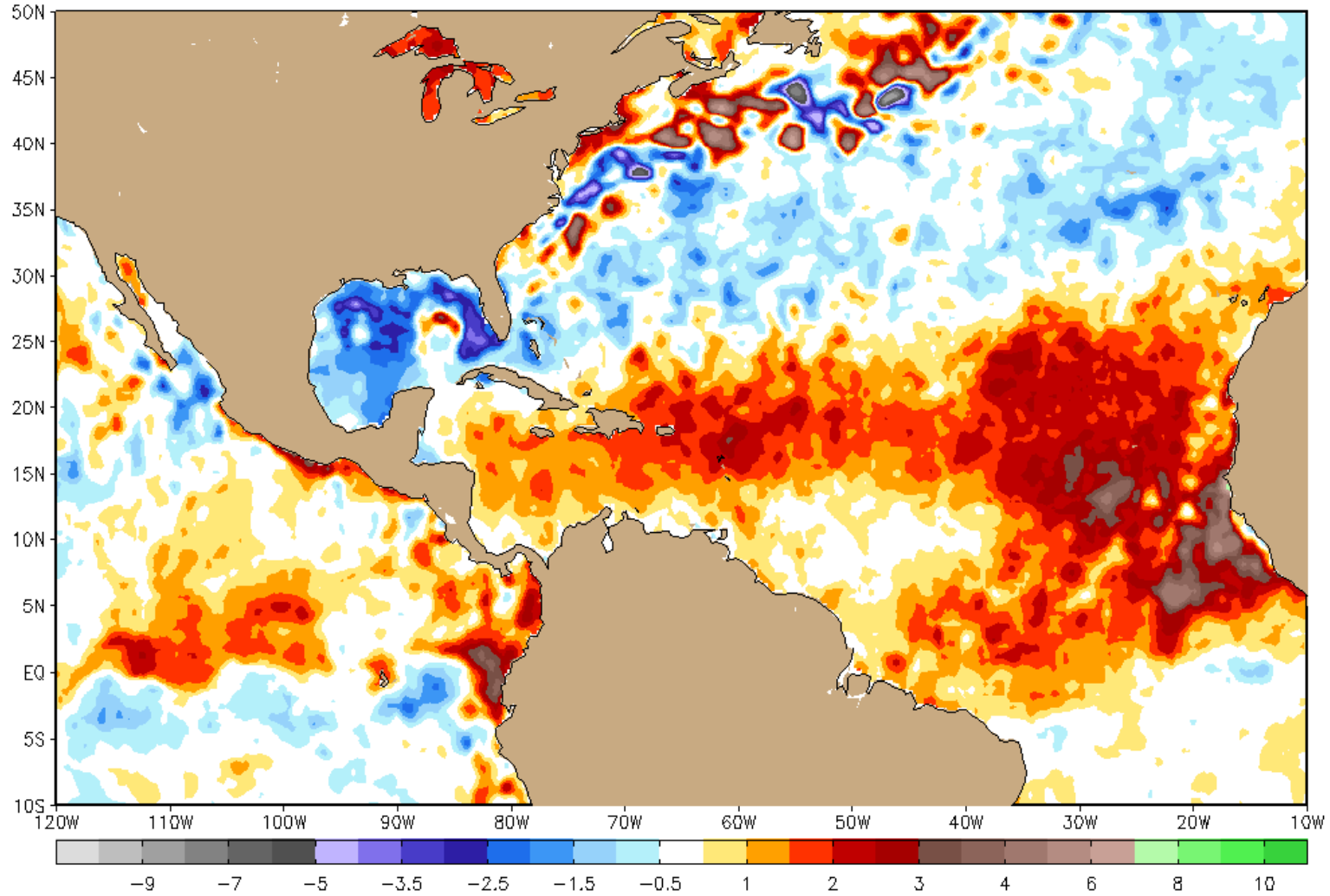
Forecast issue date: 15 Mar 2010

ECMWF

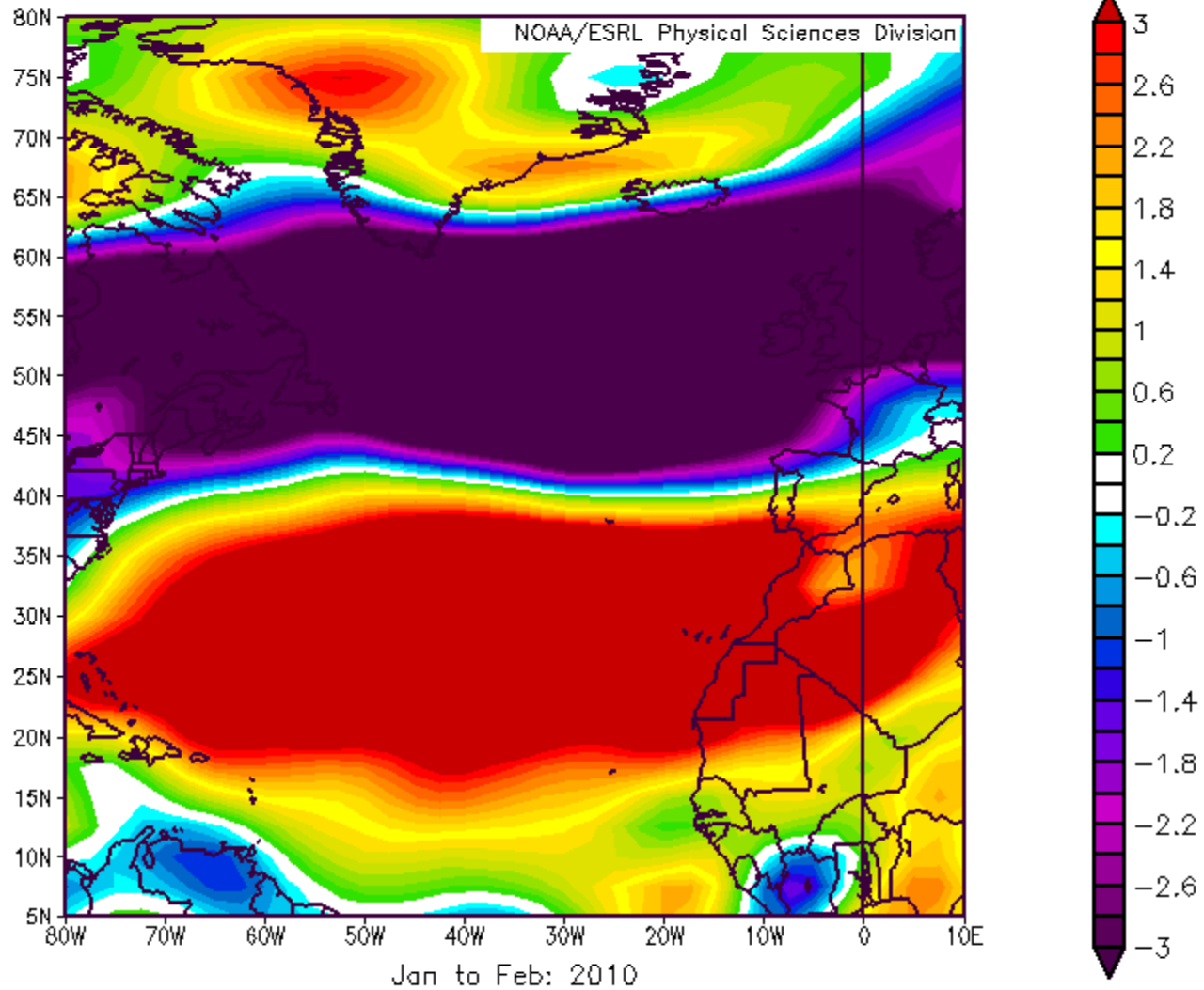
# El Niño years and following years in active TC eras (1950-2009)

Year	MEI	NTC		Year	MEI	NTC
1951	0.81	148		1952	0.15	103
1957	1.13	86		1958	0.27	144
1963	0.72	116		1964	-1.34	184
1965	1.37	86		1966	-0.01	140
1997	2.63	54		1998	-0.52	169
2002	0.86	83		2003	0.44	175
2006	0.88	85		2007	-0.88	99
<b>Average</b>	<b>1.20</b>	<b>94</b>			<b>-0.27</b>	<b>145</b>
				<b>Year 2 – Year 1</b>	<b>-1.47</b>	<b>+51</b>
2009	0.90	69		2010	???	???

NOAA AVHRR SST DIFFERENCES (C) 2010 - 2009 00Z05APR2009 (3-day averages)



NCEP/NCAR Reanalysis  
925mb Zonal Wind (m/s) Composite Anomaly 1968–1996 clima



# Best analog years for 2010 (April forecast)

	<b>NS</b>	<b>NSD</b>	<b>H</b>	<b>HD</b>	<b>MH</b>	<b>MHD</b>	<b>ACE</b>	<b>NTC</b>
1958	10	55.50	7	30.25	5	9.50	121	144
1966	11	64.00	7	41.75	3	8.75	145	140
1969	18	91.50	12	40.00	5	6.75	166	182
1998	14	88.00	10	48.50	3	9.50	182	169
2005	28	131.50	15	49.75	7	17.75	250	279
<b>Mean</b>	<b>16.2</b>	<b>86.10</b>	<b>10.2</b>	<b>42.10</b>	<b>4.6</b>	<b>10.50</b>	<b>173</b>	<b>183</b>
<b>2010 Forecast</b>	<b>15</b>	<b>75</b>	<b>8</b>	<b>35</b>	<b>4</b>	<b>10</b>	<b>150</b>	<b>160</b>

# 2010 Forecast schedule

Date	9 Dec.	7 Apr.	2 June	4 Aug.
Seasonal Forecast	X	X	X	X



# Hurricane probabilities

Probabilities for at least one major (category 3-4-5) hurricane landfall in each of the following areas for 2010.

69%

52%

Entire U.S.  
coastline

45%

31%

U.S. East Coast  
including including  
Peninsula Florida

44%

30%

Gulf Coast from  
the Florida  
Panhandle westward  
to Brownsville

58%

42%

Caribbean  
10 - 20°N,  
60 - 88°W

■ Average for last century

<http://www.e-transit.org/hurricane>

## Landfalling hurricane web application

In partnership with the GeoGraphics Laboratory  
Bridgewater State College, Bridgewater MA

# State probabilities

- Climatological and current-year probabilities of a hurricane and major hurricane impacting each coastal state



# Caribbean/Central America probabilities

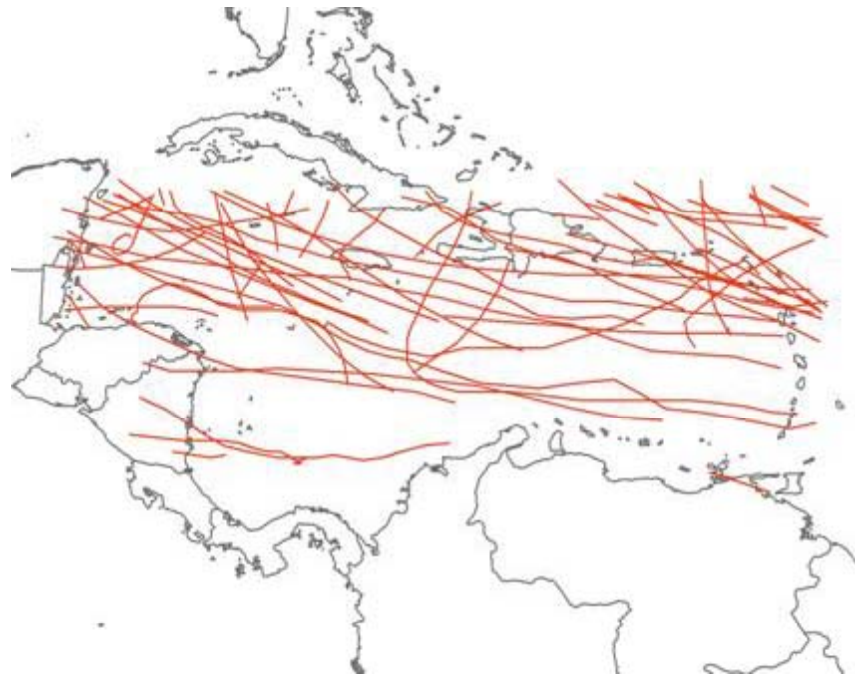


• Climatological and current-year probabilities of a named storm, hurricane and major hurricane within 50 miles and 100 miles of each island or landmass

• 50-Year probabilities

**58**  
hurricanes

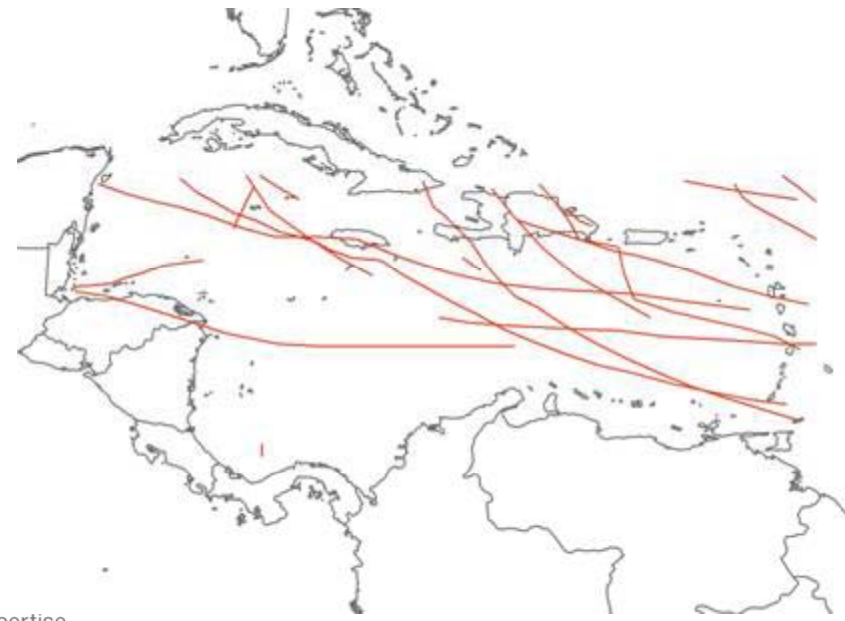
**117.25**  
hurricane days



**25 strongest  
La Niña ASO  
(1900 - 2008)**

**18**  
hurricanes

**34.25**  
hurricane days



**25 strongest  
El Niño ASO  
(1900 - 2008)**

**28.25**

hurricane days



**Top 5**  
**June forecasts**  
(1984 - 2009)

**3.25**

hurricane days

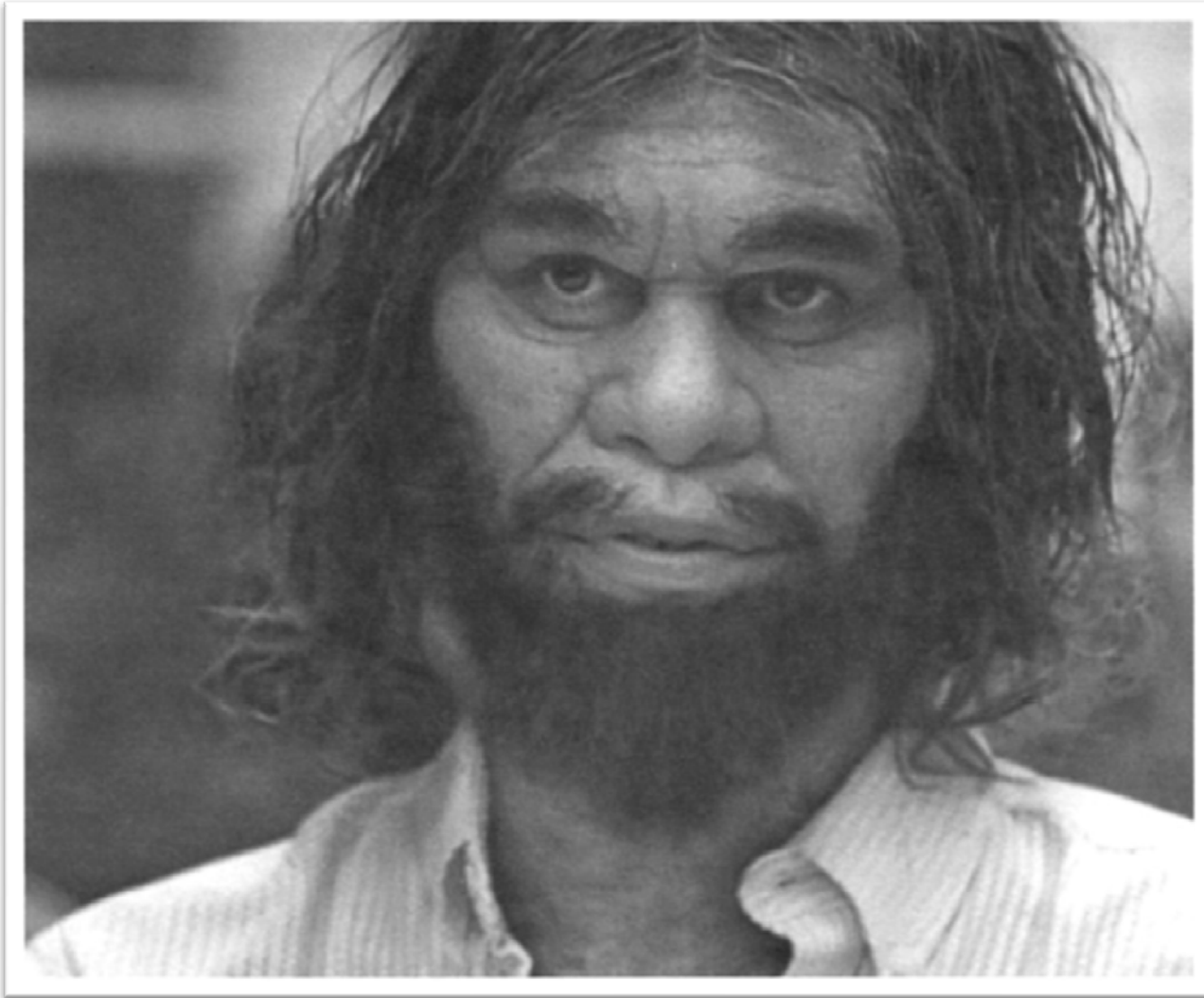


**Bottom 5**  
**June forecasts**  
(1984 - 2009)

# Current year and climatological probabilities (1900 - 2000)

Country	H Prob. (50 miles)	MH Prob. (50 miles)
The Bahamas	61% (45%)	36% (24%)
Cuba	60% (44%)	33% (22%)
Haiti	32% (21%)	15% (9%)
Jamaica	26% (17%)	10% (7%)
Mexico	60% (44%)	24% (15%)
Nicaragua	17% (11%)	9% (6%)
Puerto Rico	24% (15%)	8% (5%)

*Climatological probabilities are in parentheses*



Not so easy a caveman could do it.





# Bracing for the 2010 Hurricane Season

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Dr. Robert Chandler  
University of Central Florida

# Early thoughts on the 2010 season

“With the start of the 2010 hurricane season just around the corner, the forecast of above-average seasonal activity today by Colorado State University's Hurricane Forecast Team should serve as a reminder to start preparing for hurricane season. All Floridians should ‘*Get A Plan!*’ and be prepared for any disaster.”

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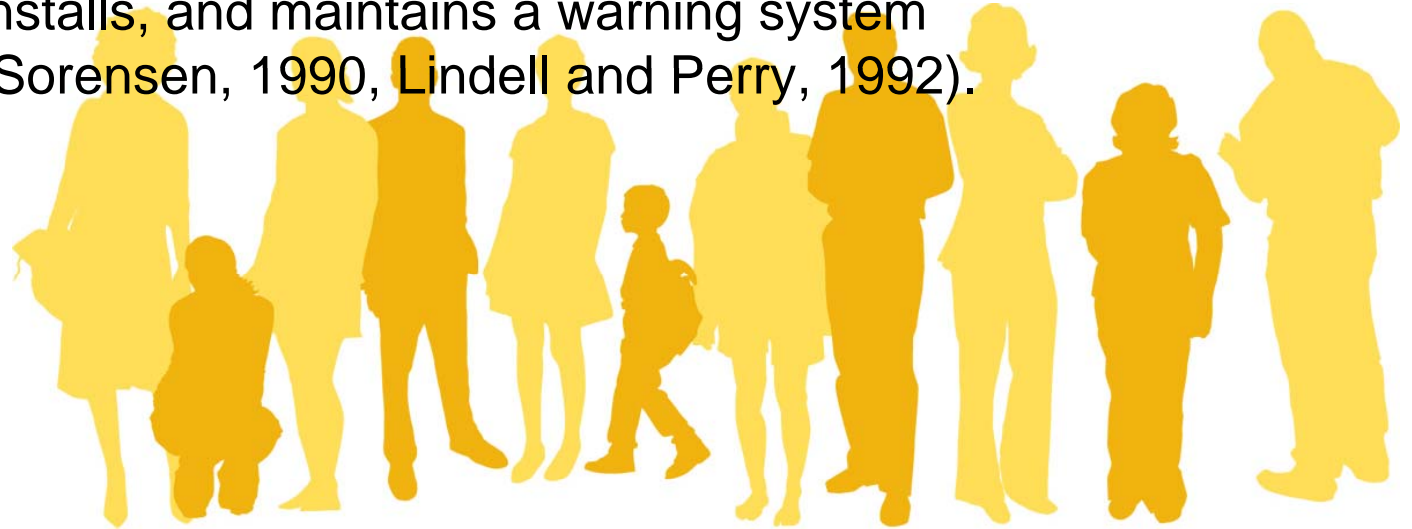
Excerpt from David Halstead, Interim Director of the Florida Division of Emergency Management regarding The 2010 hurricane outlook announced by Colorado State University's Hurricane Forecast Team on April 7, 2010

# How to get people to take this seriously

- Communicate early and often before disaster strikes
  - Raise awareness and understanding of the threat (e.g. differences in watch v. warning; statistical probability of a hurricane landfall; understanding hurricane intensity, wind, surge, and other risks, etc.)
  - Preparation and mitigation
  - Vigilance and threat monitoring
  - Avoidance of threat – Evacuation Messages\* (We'll focus on some aspects of hurricane evacuation/warning messages in subsequent slides)
- Must be prepared to deliver clear and specific messages quickly to keep pace with the time-sensitive nature of a approaching hurricane.
- Constituents must be reached, be able to comprehend the message, and be empowered to respond appropriately

# The psychology of evacuation

- Evacuation is rarely an individual process. Even in single person households, the first response to the initial evacuation warning is to seek further information on the validity of the threat or consult with a friend, co-worker, neighbor, family member or relative (Drabek and Stephenson, 1971).
- Evacuations work best if a community plans, organizes, develops, installs, and maintains a warning system (Mileti and Sorensen, 1990, Lindell and Perry, 1992).



# Warning response

*Perry and Lindell (1992, 2004)*

- Risk identification: Does the threat exist?
- Risk assessment: Is protection needed?
- Risk reduction: Is protection feasible?
- Protective response: What action to take?



# Perceptions of risk

- People perceive risks differently.
- Unknown risks are perceived to be greater than risks that are well understood.
- Past experience with hurricanes played a vital role in whether news reports were taken seriously
- “Do the risks of being caught in Katrina outweigh the benefits of keeping my job.” Some people persuaded not to leave jobs, contributing to familiar feeling and lack of danger

*From Public Warning Response to Hurricane Katrina:  
A Preliminary Analysis by Bill Donner of the University of Delaware*

## Perceptions of risk, cont'd

- During Hurricane Ike, more than a million Texans fled for safety but tens of thousands decided to “wait and see”
- During Hurricane Rita three years earlier, there was almost 100 percent compliance with the mayor’s mandatory evacuation



# Example warning: Katrina

*...DEVASTATING DAMAGE EXPECTED...*

*WATER SHORTAGES WILL MAKE HUMAN SUFFERING INCREDIBLE BY MODERN STANDARDS.*

*MOST OF THE AREA WILL BE UNINHABITABLE FOR WEEKS...PERHAPS LONGER.*

*ONCE TROPICAL STORM AND HURRICANE FORCE WINDS ONSET...DO NOT VENTURE OUTSIDE!*

*Excerpts from Hurricane Katrina warning from National Weather Service, New Orleans, LA*





# Like people, all warnings are not the same

- Different audiences prefer different channels
- Be aware of cultural factors
- Warnings must be:
  - Specific
  - Accurate
  - Certain
  - Consistent
  - Clear

*From Emerging Hurricane Evacuation Issues:  
Hurricane Floyd and South Carolina Natural Hazards Rev. Volume 3, Issue 1, pp. 12-18  
(February 2002)*

# Making evacuation messages effective

- Evacuation Messages need to achieve all four message components to be effective
  1. inform,
  2. express urgency,
  3. provide specific behavioral instructions, and
  4. give the next step – confirmation/reply etc.
- They should front load key information into the first 30 words/30 seconds
- They should be written at or below a 6th-grade reading level
- They should be written using readability ease rules
- They need to be sensitive to the needs of different demographic groups including languages, co-cultural groups, needs agenda, etc.

# Incident Notification for Hurricanes

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Marc Ladin

VP of Marketing, Everbridge



# Incident notification solutions address common hurricane communication challenges

- **Communicate quickly, easily, and efficiently** with large numbers of people in minutes, not hours, making sure that information about evacuation, utilities, and road conditions is received
- **Use all contact paths** especially when regional or local communication infrastructure is damaged or not working
- **Ensure two-way communications** to know who may need immediate rescue assistance
- **Reduce miscommunications and control rumors** with accurate, consistent messages (3P = 1N)
- **Free key personnel** to perform critical tasks by automating manual, time-intensive, error-prone processes
- **Satisfy regulatory requirements** with extensive and complete reporting of delivery attempts and two-way acknowledgements from recipients

# The Everbridge difference

technology + expertise = empowerment

technology + expertise = confidence

technology + expertise = solution

technology + expertise = **your success**

Everbridge, the world's recognized leader in incident notification systems, merges technology with industry expertise to help millions of people communicate in a crisis, manage operational incidents, and connect on a daily basis.

# Clients brace for the storm with Everbridge

- Galveston, TX used the Everbridge system during Hurricane Ike to conduct evacuations and provide reentry instructions to residents.
- Numerous clients across the Gulf region, utilized Everbridge to help navigate Hurricane Katrina.
- The Bank of Hawaii tracked and reported on five hurricanes threatening their shores.
- Kentucky Farm Bureau Insurance was able to assemble their team and coordinate their response the day after Hurricane Ike.
- During Hurricane Gustav, the U.S. Coast Guard Auxiliary notified more than 1,900 volunteers in minutes and confirmed their locations.

# Q&A

**Note:**  
slides are currently  
available to everyone on  
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Webinar

X	Question	Asker

Send Privately   Send to All

Use the Q&A  
function to  
submit your  
questions.



technology + expertise

# Missed anything?

Never fear, the recording and slides from today's webinar are just a click away.

[blog.everbridge.com](http://blog.everbridge.com)



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**Item Number (Schedule II): 26.1**

**Activity Group: A**

**1 Point** for each webinar



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## Communication resources

White papers, case studies, literature

[everbridge.com/resources](http://everbridge.com/resources)

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