Extended Range Forecast Update

Atlantic and U.S. Landfalling Tropical Cyclones 2000

Issued: 1st December, 1999

Summary

Atlantic hurricane activity and US landfall probability are expected to be slightly (0-10%) above average in 2000.

The TSUNAMI Initiative

TSUNAMI aims to improve the competitiveness of the UK insurance industry by using the UK science effort to improve the assessment of risk. TSUNAMI is funded by a consortium of companies from the UK insurance industry and the Treasury. Government funding is through the DTI's Sector Challenge and administered by the British Antarctic Survey, a component body of the Natural Environment Research Council.

Seasonal Prediction of Tropical Cyclones

This two year TSUNAMI-funded research project is establishing a new methodology for the long-range seasonal prediction of landfalling tropical cyclones in three ocean basins. These forecasts will offer improved lead-time and skill-level over that available currently.

Statistical methods are used to identify predictors of landfalling events. The predictions used in the forecast are a mix of current climate parameters and dynamical and statistical model predictions of climate parameters at the time of the 2000 Atlantic tropical cyclone season.

Project Team

This forecast is produced by Dr Mark Saunders and Dr Paul Rockett of the Benfield Greig Hazard Research Centre, University College London.

The project is endorsed by the Met. Office under the coordination of Mrs Alyson Bedford. We wish to thank Lance Garrard (TSUNAMI Director) and Mike Cooper (Insurance Industry Representative) for industrial liaison, Dr Richard Chandler (Department of Statistical Science, University College London) for statistical advice, Dr Mike Davey (Met. Office) for meteorological expertise, and Dr Chris Thorncroft (Meteorology Department, Reading University) for dynamical model research.

Reasons for Forecast Update

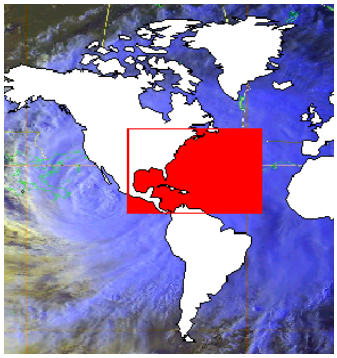
Our reasons for issuing an update on the 1st October 1999 extended range forecast are fourfold:

a) Further research on the complicated matter of how uncertainty in the predictors feeds through to affect the final forecast has led to a model improvement. This change is reflected in a changed shape to the forecast probability distribution.

b) Values for two of the predictors (ENSO and Guinea Rainfall) have altered since September 1999, these changes both enhancing forecast activity.

c) 1999 data are now available for inclusion in the forecast model.

d) We feel it is important for TSUNAMI members to have the latest forecast information.



Key for Tables and Graphs:

		Sustained Wind
TC	All Tropical Cyclones	>33 Kts
H	All Hurricanes	>63 Kts
IH	All Intense Hurricanes, Category 3-5	>95 Kts

'Average' Refers to the 1951-1999 Period

Forecasts

These forecasts are based on information available through November 1999:

1. Atlantic Total Numbers in 2000

			IH	**H**	**TC**
Average	1951-1999	Total 10 :	2.5	5.9	9.8
Actual	1999	Total 12 :	5	8	12
TSUNAMI 1/10/1999	2000	Total 8:	2 (±1)	5 (±2)	8 (±3)
TSUNAMI 1/12/1999	2000	Total 10 :	3 (±2)	6 (±3)	10 (±4)

- Tropical storm, hurricane and intense hurricane numbers are likely to be 0-10% above average. The differences from 'average' are not significant to within the model error.

- All sub-basins (Main Development Region, Caribbean, Gulf of Mexico, and Extra-tropical North Atlantic) are likely to witness similar slightly above average activity.

- Probability of at least 1 intense hurricane is 85%. (Average probability is 80%).

The main factors behind our forecast are the summer 2000 predictions for the persistence of a weak negative ENSO phase (Nino 3.4 anomaly ~ -0.1°C) and for slightly cooler than average (-0.2°C) sea surface temperatures in the tropical north Atlantic. The former factor is associated with increased Atlantic hurricane activity, the latter with decreased activity.

2. US Landfalling Activity in 2000

			IH	H	TC
Average	1951-1999	Total 3:	0.6	1.6	3.1
Actual	1999	Total 5:	1	3	5
TSUNAMI 1/10/1999	2000	Total 3:	0 (+1)	1 (±1)	3 (±2)
TSUNAMI 1/12/1999	2000	Total 3:	1 (±1)	2 (±1)	3 (±2)

- Landfalling tropical storm, hurricane and intense hurricane numbers to be slightly above average for the US as a whole. The differences from 'normal' are not significant to within the model error.

- Activity on the U.S. East Coast and U.S. Gulf Coast will also each be slightly above average.

- Chance of at least one intense hurricane strike on the US mainland:

  47% overall (average is 43%)

  28% for the U.S. East Coast (average is 19%)

  41% for the U.S. Gulf Coast (average is 33%).

The main environmental factors influencing landfalling activity in 2000 are similar to those affecting total numbers; namely weak La Nina conditions (enhancing factor for Gulf, East Coast and Caribbean landfalls) and slightly cooler than normal sea surface temperatures in the tropical and extra-tropical north Atlantic (depressing factor for U.S. East Coast landfalls).

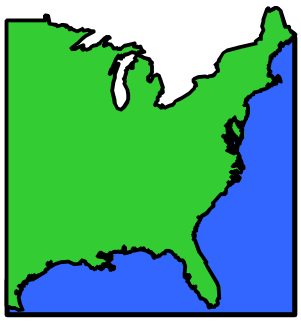
Future Tropical Cyclone Forecasts for TSUNAMI

A post season assessment on the 1999 Atlantic hurricane season and forecasts will be available on 7th December 1999.

An extended-range forecast for the NW Pacific seasonal typhoon activity and Asian strike probability in 2000 will be issued in early January 2000.

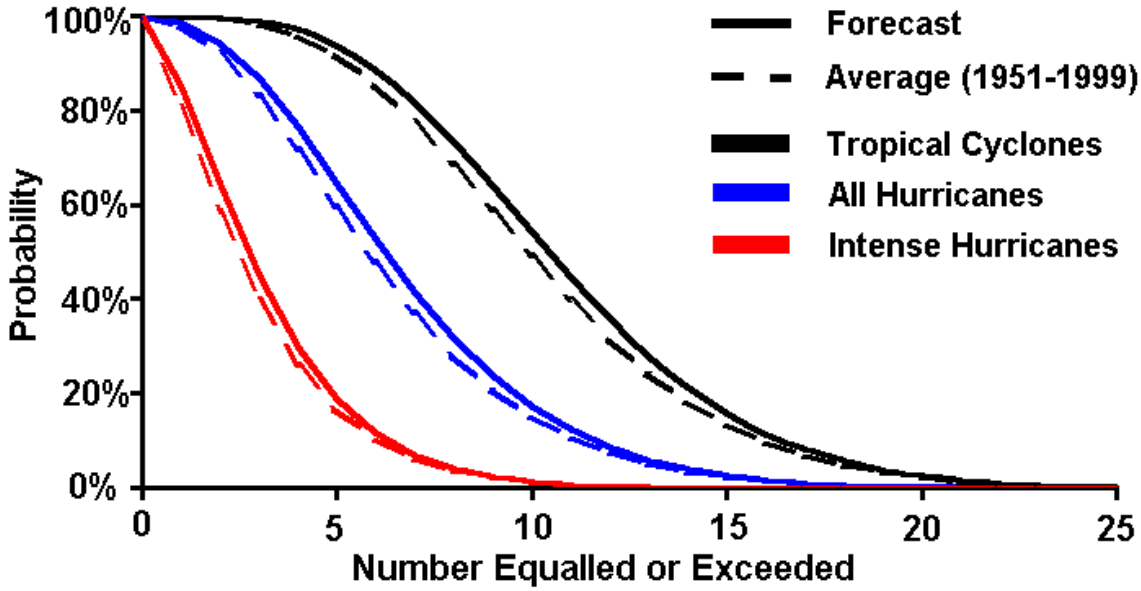
An extended-range forecast for the SW Pacific seasonal cyclone activity and Queensland strike probability in 2000/01 will be issued on 1st April 2000.

Total Number of Atlantic Tropical Cyclones

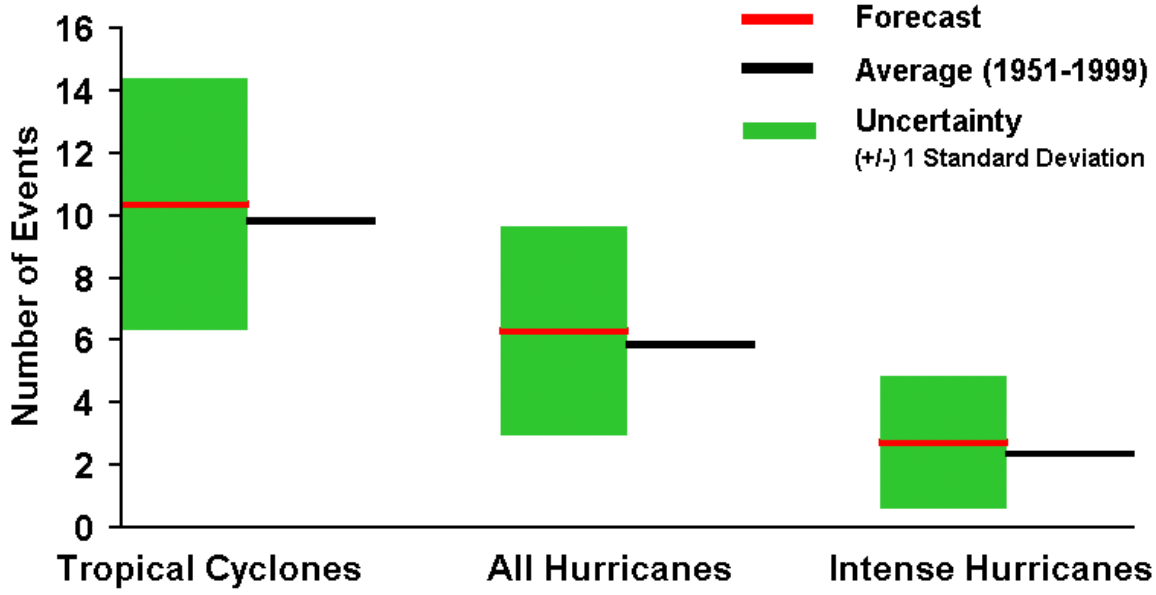


ATLANTIC TOTAL TC NUMBERS						
No. of events	Probability of N events					
	Forecast			Average		
	TC	H	IH	TC	H	IH
0	0%	1%	15%	0%	2%	20%
1	0%	4%	21%	0%	6%	22%
2	1%	8%	19%	1%	9%	19%
3	2%	10%	15%	2%	11%	14%
4	3%	12%	11%	4%	12%	9%
5	5%	12%	7%	6%	12%	6%
6	7%	11%	5%	8%	11%	4%
7	8%	10%	3%	9%	9%	2%
8	9%	8%	2%	10%	7%	2%
9	10%	6%	1%	10%	6%	1%
10	10%	5%	1%	9%	4%	1%
11	9%	4%	0%	8%	3%	0%
12	8%	3%	0%	7%	2%	0%
13	7%	2%	0%	6%	2%	0%
14	5%	1%	0%	5%	1%	0%
15	4%	1%	0%	4%	1%	0%
16	3%	1%	0%	3%	1%	0%
17	2%	0%	0%	2%	0%	0%
18	2%	0%	0%	2%	0%	0%
19	1%	0%	0%	1%	0%	0%

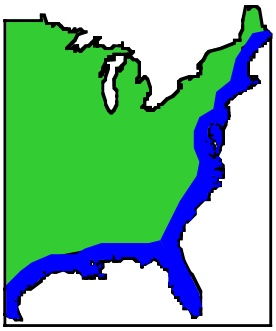
Cumulative Probability of Events



Frequency and Severity Distribution

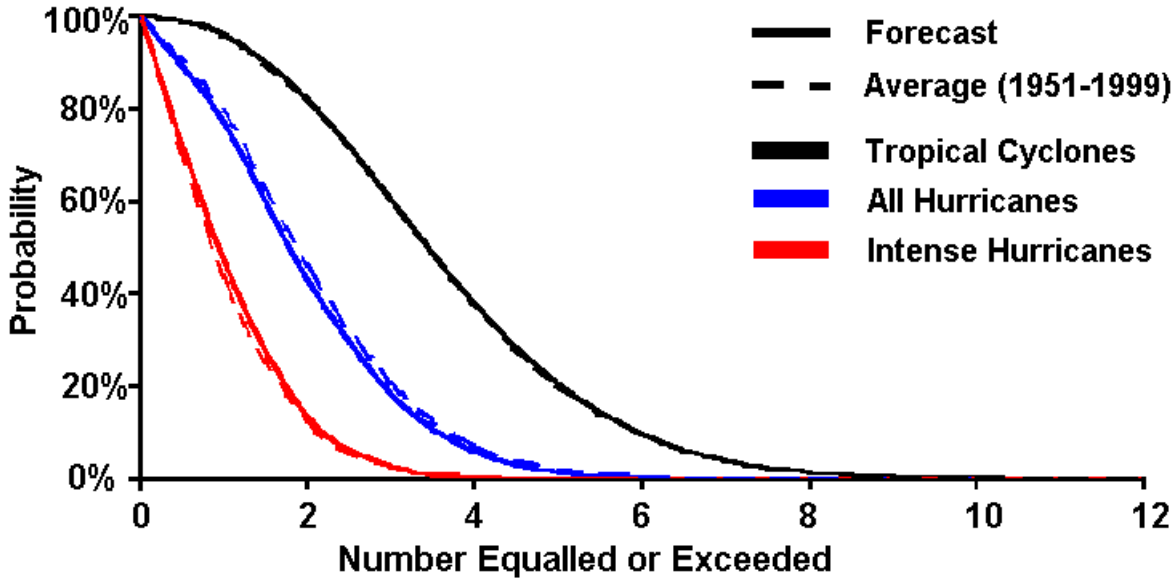


U.S.A. Landfalling Tropical Cyclones

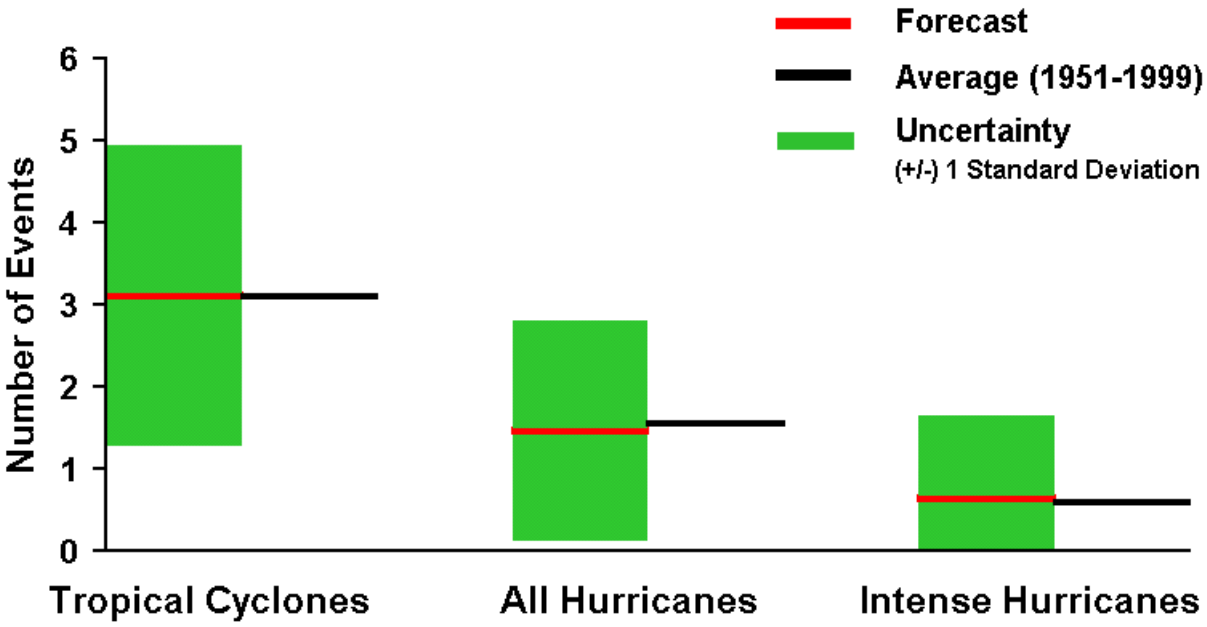


No. of events	US Landfalling Probability of N events					
	Forecast			Average		
	TC	H	IH	TC	H	IH
0	5%	23%	53%	5%	21%	57%
1	14%	34%	34%	14%	33%	31%
2	22%	25%	11%	22%	25%	10%
3	22%	12%	2%	22%	13%	2%
4	17%	4%	0%	17%	5%	0%
5	11%	1%	0%	11%	2%	0%
6	6%	0%	0%	6%	0%	0%
7	3%	0%	0%	3%	0%	0%
8	1%	0%	0%	1%	0%	0%
9	0%	0%	0%	0%	0%	0%
10	0%	0%	0%	0%	0%	0%
11	0%	0%	0%	0%	0%	0%
12	0%	0%	0%	0%	0%	0%

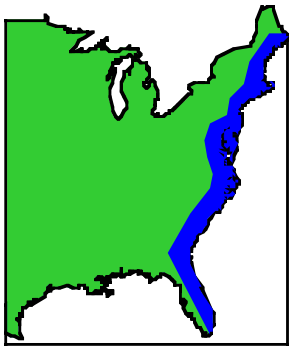
Cumulative Probability of Events



Frequency and Severity Distribution

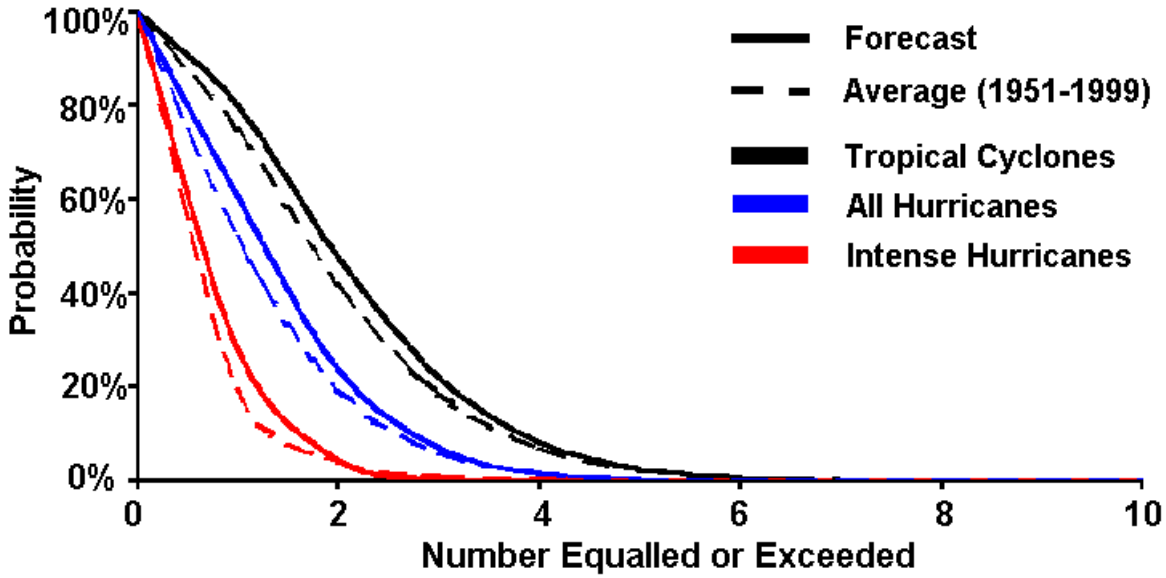


East Coast Landfalling Tropical Cyclones

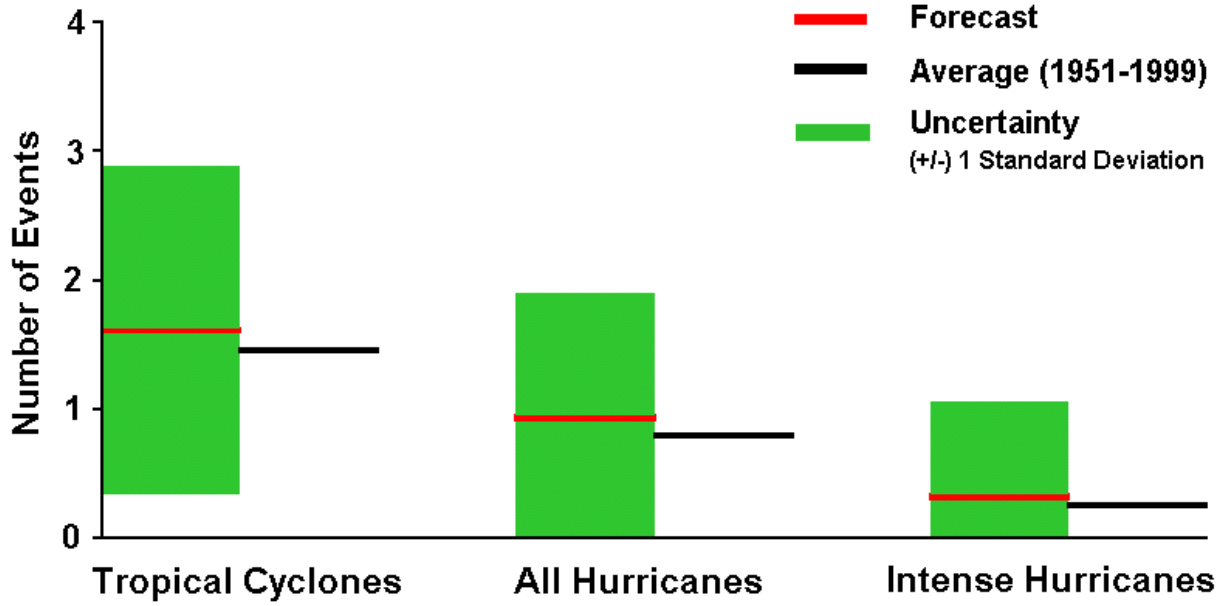


No. of events	US East Coast Probability of N events					
	Forecast			Average		
	TC	H	IH	TC	H	IH
0	20%	40%	72%	25%	48%	81%
1	32%	37%	23%	33%	32%	15%
2	26%	17%	4%	23%	13%	3%
3	14%	5%	0%	12%	4%	1%
4	6%	1%	0%	5%	1%	0%
5	2%	0%	0%	2%	0%	0%
6	0%	0%	0%	0%	0%	0%
7	0%	0%	0%	0%	0%	0%
8	0%	0%	0%	0%	0%	0%
9	0%	0%	0%	0%	0%	0%
10	0%	0%	0%	0%	0%	0%
11	0%	0%	0%	0%	0%	0%
12	0%	0%	0%	0%	0%	0%

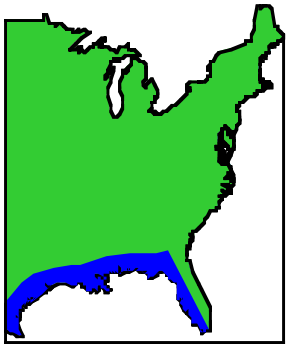
Cumulative Probability of Events



Frequency and Severity Distribution

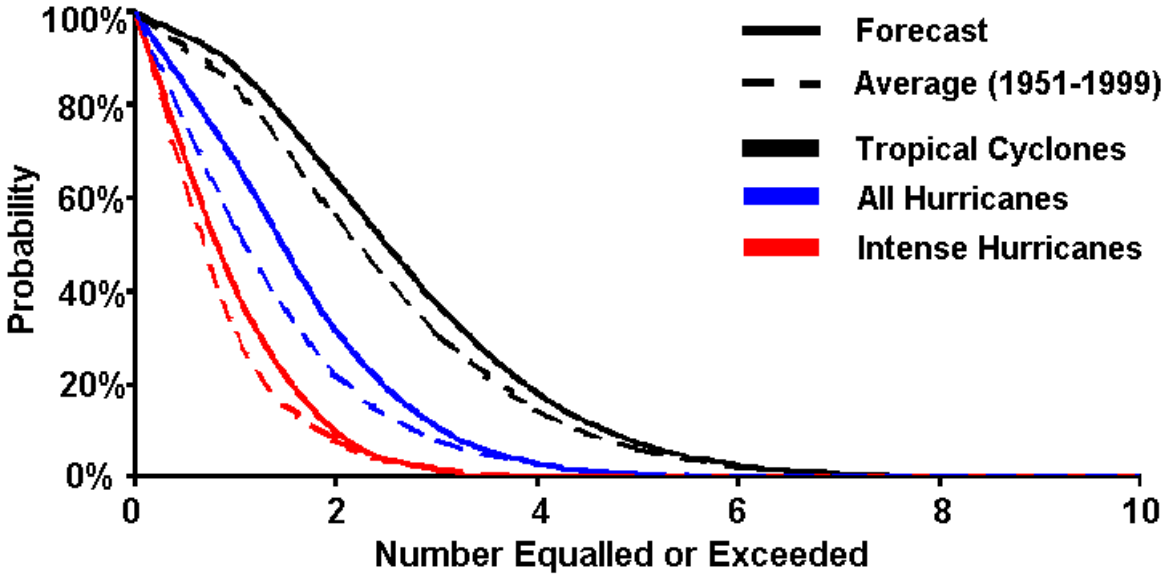


Gulf Coast Landfalling Tropical Cyclones



No. of events	US Gulf Coast					
	Probability of N events					
	Forecast			Normal		
	TC	H	IH	TC	H	IH
0	12%	32%	59%	15%	43%	67%
1	25%	36%	31%	28%	36%	27%
2	27%	21%	8%	27%	16%	5%
3	19%	8%	1%	17%	4%	1%
4	11%	2%	0%	8%	1%	0%
5	5%	1%	0%	3%	0%	0%
6	2%	0%	0%	1%	0%	0%
7	1%	0%	0%	0%	0%	0%
8	0%	0%	0%	0%	0%	0%
9	0%	0%	0%	0%	0%	0%
10	0%	0%	0%	0%	0%	0%
11	0%	0%	0%	0%	0%	0%
12	0%	0%	0%	0%	0%	0%

Cumulative Probability of Events



Frequency and Severity Distribution