



# March Forecast Update for Atlantic Hurricane Activity in 2006

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by Professor Mark Saunders and Dr Adam Lea  
Benfield Hazard Research Centre, UCL (University College London), UK

## Forecast Summary

### TSR slightly lowers its forecast but continues to predict another active Atlantic hurricane season in 2006.

The TSR (Tropical Storm Risk) March forecast update for Atlantic hurricane activity in 2006 continues to anticipate an active season to high probability. Based on current and projected climate signals, Atlantic basin and US landfalling tropical cyclone activity are forecast to be close to 40% above the 1950-2005 norm in 2006. There is a high (~74%) likelihood that activity will be in the top one-third of years historically. The forecast spans the period from 1st June to 30th November 2006 and employs data through to the end of February 2006. TSR's two predictors are the forecast July-September 2006 trade wind speed over the Caribbean and tropical North Atlantic, and the forecast August-September 2006 sea surface temperature in the tropical North Atlantic. The former influences cyclonic vorticity (the spinning up of storms) in the main hurricane track region, while the latter provides heat and moisture to power incipient storms in the main track region. At present TSR anticipates both predictors having a slight to moderate enhancing effect on activity. Monthly updated forecasts will be issued through to August 2006.

### Atlantic ACE Index and System Numbers in 2006

		ACE Index	Intense Hurricanes	Hurricanes	Tropical Storms
TSR Forecast ( $\pm$ FE)	2006	144 ( $\pm$ 47)	3.5 ( $\pm$ 1.7)	7.8 ( $\pm$ 2.6)	14.6 ( $\pm$ 4.1)
56yr Climate Norm ( $\pm$ SD)	1950-2005	102 ( $\pm$ 61)	2.7 ( $\pm$ 2.0)	6.2 ( $\pm$ 2.6)	10.3 ( $\pm$ 4.0)
Forecast Skill at this Lead	1996-2005	38%	20%	28%	19%

- Key: ACE Index = Accumulated Cyclone Energy Index = Sum of the Squares of 6-hourly Maximum Sustained Wind Speeds (in units of knots) for all Systems while they are at least Tropical Storm Strength. ACE Unit =  $\times 10^4$  knots<sup>2</sup>.
- Intense Hurricane = 1 Minute Sustained Wind > 95Kts = Hurricane Category 3 to 5.
- Hurricane = 1 Minute Sustained Wind > 63Kts = Hurricane Category 1 to 5.
- Tropical Storm = 1 Minute Sustained Wind > 33Kts.
- SD = Standard Deviation.
- FE (Forecast Error) = Standard Deviation of Errors in Replicated Real Time Forecasts 1986-2005.
- Forecast Skill = Percentage Improvement in Mean Square Error over Running 10-year Prior Climate Norm from Replicated Real Time Forecasts 1996-2005.

There is a 74% probability that the 2006 Atlantic hurricane season ACE index will be above average (defined as an ACE index value in the upper tercile historically (>113)), a 20% likelihood it will be near-normal (defined as an ACE index value in the middle tercile historically (67 to 113) and only a 6% chance it will be below-normal (defined as an ACE index value in the lower tercile historically (<67)). The 56-year period 1950-2005 is used for climatology.

- Key: Terciles = Data groupings of equal (33.3%) probability corresponding to the upper, middle and lower one-third of values historically (1950-2005).
- Upper Tercile = ACE index value greater than 113.
- Middle Tercile = ACE index value between 67 and 113.
- Lower Tercile = ACE index value less than 67.

## ACE Index & Numbers Forming in the MDR, Caribbean Sea and Gulf of Mexico in 2006

		ACE Index	Intense Hurricanes	Hurricanes	Tropical Storms
TSR Forecast ( $\pm$ FE)	2006	117 ( $\pm$ 43)	3.2( $\pm$ 1.4)	5.7 ( $\pm$ 2.0)	10.1 ( $\pm$ 3.2)
56yr Climate Norm ( $\pm$ SD)	1950-2005	79 ( $\pm$ 60)	2.3 ( $\pm$ 1.8)	4.3 ( $\pm$ 2.5)	7.1 ( $\pm$ 3.5)
Forecast Skill at this Lead	1996-2005	45%	32%	45%	38%

The Atlantic hurricane Main Development Region (MDR) is the region 10°N - 20°N, 20°W - 60°W between the Cape Verde Islands and the Caribbean Lesser Antilles. A storm is defined as having formed within this region if it reached at least tropical depression status while in the area.

There is a 73% probability that in 2006 the MDR, Caribbean Sea and Gulf of Mexico ACE index will be above average (defined as an ACE index value in the upper tercile historically ( $>91$ )), a 24% likelihood it will be near-normal (defined as an ACE index value in the middle tercile historically (35 to 91) and only a 3% chance it will be below-normal (defined as an ACE index value in the lower tercile historically ( $<35$ )). The 56-year period 1950-2005 is used for climatology.

## USA Landfalling ACE Index and Numbers in 2006

		ACE Index	Hurricanes	Tropical Storms
TSR Forecast ( $\pm$ FE)	2006	3.7 ( $\pm$ 1.7)	2.1 ( $\pm$ 1.5)	4.5 ( $\pm$ 2.0)
56yr Climate Norm ( $\pm$ SD)	1950-2005	2.5 ( $\pm$ 2.2)	1.5 ( $\pm$ 1.3)	3.1 ( $\pm$ 2.0)
Forecast Skill at this Lead	1996-2005	41%	23%	14%

Key: ACE Index = Accumulated Cyclone Energy Index = Sum of the Squares of hourly Maximum Sustained Wind Speeds (in units of knots) for all Systems while they are at least Tropical Storm Strength and over the USA Mainland (reduced by a factor of 6). ACE Unit =  $\times 10^4$  knots<sup>2</sup>.

Landfall Strike Category = Maximum 1 Minute Sustained Wind of Storm Directly Striking Land.  
USA Mainland = Brownsville (Texas) to Maine.

USA landfalling intense hurricanes are not forecast since we have no skill at any lead.

There is a 73% probability that in 2006 the USA landfalling ACE index will be above average (defined as a USA ACE index value in the upper tercile historically ( $>2.63$ )), a 20% likelihood it will be near-normal (defined as a USA ACE index value in the middle tercile historically (1.14 to 2.63) and only a 7% chance it will be below-normal (defined as a USA ACE index value in the lower tercile historically ( $<1.14$ )). The 56-year period 1950-2005 is used for climatology.

## Caribbean Lesser Antilles Landfalling Numbers in 2006

		ACE Index	Intense Hurricanes	Hurricanes	Tropical Storms
TSR Forecast ( $\pm$ FE)	2006	2.1 ( $\pm$ 1.2)	0.4 ( $\pm$ 0.4)	0.7 ( $\pm$ 0.6)	1.6( $\pm$ 0.9)
56yr Climate Norm ( $\pm$ SD)	1950-2005	1.4 ( $\pm$ 2.0)	0.3 ( $\pm$ 0.5)	0.4 ( $\pm$ 0.7)	1.1 ( $\pm$ 1.0)
Forecast Skill at this Lead	1996-2005	9%	10%	19%	0%

Key: ACE Index = Accumulated Cyclone Energy Index = Sum of the Squares of hourly Maximum Sustained Wind Speeds (in units of knots) for all Systems while they are at least Tropical Storm Strength and within the boxed region (10°N-18°N,60°W-63°W) (reduced by a factor of 6). ACE Unit =  $\times 10^4$  knots<sup>2</sup>.

Landfall Strike Category = Maximum 1 Minute Sustained Wind of Storm Directly Striking Land.  
Lesser Antilles = Island Arc from Anguilla to Trinidad Inclusive.

## Key Predictors for 2006

The key factors behind the TSR forecast for an above-average hurricane season in 2006 are the anticipated moderate enhancing effect of July-September forecast trade winds at 925mb height over the Caribbean Sea and tropical North Atlantic region (7.5°N - 17.5°N, 30°W - 100°W), and anticipated slight enhancing effect of August-September forecast sea surface temperature for the Atlantic MDR (10°N - 20°N, 20°W - 60°W). The current forecasts for these predictors are  $0.46 \pm 0.75 \text{ ms}^{-1}$  (down from last month's value of  $0.83 \pm 0.74 \text{ ms}^{-1}$ ) weaker than normal (1976-2005 climatology), and  $0.09 \pm 0.28^\circ\text{C}$  (down from last month's value of  $0.22 \pm 0.28^\circ\text{C}$ ) warmer than normal (1976-2005 climatology). The forecast skills (assessed for the period 1986-2005) for these predictors at this lead are 35% and 36% respectively. The main reason for the forecast for hurricane activity in 2006 falling from 70% above-norm (February forecast) to 40% above-norm (March forecast) is that August-September sea surface temperatures in the tropical North Atlantic are now anticipated to be cooler than thought previously.

## Further Information and Next Forecast

Further information about TSR forecasts, verifications and hindcast skill as a function of lead time may be obtained from the TSR web site <http://tropicalstormrisk.com>. The next TSR monthly forecast update for the 2006 Atlantic hurricane season will be issued on the 4th April 2006.

## Appendix - Predictions from Previous Months

### 1. Atlantic ACE Index and System Numbers

<b>Atlantic ACE Index and System Numbers 2006</b>					
		ACE Index	Intense Hurricanes	Hurricanes	Named Tropical Storms
Average Number ( $\pm$ SD) (1950-2005)		102 ( $\pm$ 61)	2.7 ( $\pm$ 2.0)	6.2 ( $\pm$ 2.6)	10.3 ( $\pm$ 4.0)
TSR Forecasts ( $\pm$ FE)	6 Mar 2006	144 ( $\pm$ 47)	3.5 ( $\pm$ 1.7)	7.8 ( $\pm$ 2.6)	14.6 ( $\pm$ 4.1)
	6 Feb 2006	172 ( $\pm$ 53)	4.1 ( $\pm$ 1.7)	9.1 ( $\pm$ 2.9)	16.4 ( $\pm$ 4.5)
	4 Jan 2006	170 ( $\pm$ 59)	4.0 ( $\pm$ 1.8)	8.8 ( $\pm$ 2.8)	16.2 ( $\pm$ 4.3)
	6 Dec 2005	162 ( $\pm$ 60)	3.9 ( $\pm$ 1.8)	8.5 ( $\pm$ 2.8)	15.7 ( $\pm$ 4.5)
Gray Forecast	6 Dec 2005	-	5	9	17

### 2. MDR, Caribbean Sea and Gulf of Mexico ACE Index and Numbers

<b>MDR, Caribbean Sea and Gulf of Mexico ACE Index and Numbers 2006</b>					
		ACE Index	Intense Hurricanes	Hurricanes	Named Tropical Storms
Average Number ( $\pm$ SD) (1950-2005)		79 ( $\pm$ 60)	2.3 ( $\pm$ 1.8)	4.3 ( $\pm$ 2.5)	7.1 ( $\pm$ 3.5)
TSR Forecasts ( $\pm$ FE)	6 Mar 2006	117 ( $\pm$ 43)	3.2 ( $\pm$ 1.4)	5.7 ( $\pm$ 2.0)	10.1 ( $\pm$ 3.2)
	6 Feb 2006	146 ( $\pm$ 47)	3.8 ( $\pm$ 1.4)	7.0 ( $\pm$ 2.3)	11.9 ( $\pm$ 3.5)
	4 Jan 2006	144 ( $\pm$ 59)	3.7 ( $\pm$ 1.6)	6.7 ( $\pm$ 2.6)	11.8 ( $\pm$ 4.1)
	6 Dec 2005	136 ( $\pm$ 60)	3.3 ( $\pm$ 1.6)	6.4 ( $\pm$ 2.7)	11.3 ( $\pm$ 4.2)

### 3. US ACE Index and Landfalling Numbers

<b>US Landfalling Numbers 2006</b>				
		ACE Index	Hurricanes	Named Tropical Storms
Average Number ( $\pm$ SD) (1950-2005)		2.5 ( $\pm$ 2.2)	1.5 ( $\pm$ 1.3)	3.1 ( $\pm$ 2.0)
TSR Forecasts ( $\pm$ FE)	6 Mar 2006	3.7 ( $\pm$ 1.7)	2.1 ( $\pm$ 1.5)	4.5 ( $\pm$ 2.0)
	6 Feb 2006	4.5 ( $\pm$ 1.9)	2.4 ( $\pm$ 1.5)	5.2 ( $\pm$ 2.0)
	4 Jan 2006	4.4 ( $\pm$ 1.7)	2.4 ( $\pm$ 1.3)	5.1 ( $\pm$ 1.9)
	6 Dec 2005	4.2 ( $\pm$ 1.8)	2.3 ( $\pm$ 1.3)	4.9 ( $\pm$ 1.9)

### 4. Lesser Antilles ACE Index and Landfalling Numbers

<b>Lesser Antilles Landfalling Numbers 2006</b>					
		ACE Index	Intense Hurricanes	Hurricanes	Named Tropical Storms
Average Number (SD) (1950-2005)		1.4 ( $\pm$ 2.0)	0.3 ( $\pm$ 0.5)	0.4 ( $\pm$ 0.7)	1.1 ( $\pm$ 1.0)
TSR Forecasts ( $\pm$ FE)	6 Mar 2006	2.1 ( $\pm$ 1.2)	0.4 ( $\pm$ 0.4)	0.7 ( $\pm$ 0.6)	1.6 ( $\pm$ 0.9)
	6 Feb 2006	2.6 ( $\pm$ 1.1)	0.4 ( $\pm$ 0.4)	0.8 ( $\pm$ 0.6)	1.9 ( $\pm$ 0.9)
	4 Jan 2006	2.6 ( $\pm$ 2.4)	0.4 ( $\pm$ 0.4)	0.8 ( $\pm$ 0.6)	1.8 ( $\pm$ 1.1)
	6 Dec 2005	2.5 ( $\pm$ 2.4)	0.4 ( $\pm$ 0.4)	0.7 ( $\pm$ 0.6)	1.8 ( $\pm$ 1.1)

