



# August Forecast Update for Atlantic Hurricane Activity in 2006

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## Forecast Summary

### TSR continues to predict another active Atlantic hurricane season in 2006.

The TSR (Tropical Storm Risk) August forecast update for Atlantic hurricane activity in 2006 continues to anticipate an active season to high probability. However, as stated previously, activity will be notably below the record-breaking levels seen in 2005. Based on current and projected climate signals, Atlantic basin tropical cyclone activity is forecast to be about 40% above the 1950-2005 norm in 2006. There is a high (84%) likelihood that activity will be in the top one-third of years historically. US landfalling tropical cyclone activity is forecast to be 30% above norm in 2006. The forecast spans the period from 1st June to 30th November 2006 and employs data through to the end of July 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. TSR anticipates both predictors will have a moderate enhancing effect on activity in 2006.

### Atlantic ACE Index and System Numbers in 2006

		ACE Index	Intense Hurricanes	Hurricanes	Tropical Storms
TSR Forecast ( $\pm$ FE)	2006	145 ( $\pm$ 32)	3.5 ( $\pm$ 1.2)	7.9 ( $\pm$ 1.2)	15.9 ( $\pm$ 2.3)
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	72%	53%	79%	79%

- 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 Long Term Prior Climate Norm (back to 1950) from Replicated Real Time Forecasts 1996-2005.

There is an 84% 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 15% likelihood it will be near-normal (defined as an ACE index value in the middle tercile historically (67 to 113) and only a 1% 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	118 ( $\pm$ 50)	3.2( $\pm$ 1.4)	5.7 ( $\pm$ 1.5)	9.2 ( $\pm$ 1.9)
56yr Climate Norm ( $\pm$ SD)	1950-2005	79 ( $\pm$ 60)	2.3 ( $\pm$ 1.9)	4.3 ( $\pm$ 2.5)	7.1 ( $\pm$ 3.4)
Forecast Skill at this Lead	1996-2005	46%	42%	71%	71%

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 74% 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	3.2 ( $\pm$ 1.5)	2.0 ( $\pm$ 1.2)	4.2 ( $\pm$ 1.9)
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	43%	44%	42%

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 59% 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 30% 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 an 11% 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.

## 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 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  $0.30 \pm 0.43 \text{ ms}^{-1}$  (down from last month's value of  $0.34 \pm 0.51 \text{ ms}^{-1}$ ) weaker than normal (1976-2005 climatology), and  $0.40 \pm 0.13^\circ\text{C}$  (up from last month's value of  $0.27 \pm 0.17^\circ\text{C}$ ) warmer than normal (1976-2005 climatology). The forecast skills (assessed for the period 1986-2005) for these predictors at this lead are 76% and 86% respectively.

## 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>. This is the final TSR monthly forecast update for the 2006 Atlantic hurricane season. A verification of the 2006 Atlantic hurricane season forecasts and an extended range forecast for the 2007 Atlantic hurricane season will be issued in December 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)	4 Aug 2006	145 ( $\pm$ 32)	3.5 ( $\pm$ 1.2)	7.9 ( $\pm$ 1.2)	15.9 ( $\pm$ 2.3)
	5 Jul 2006	143 ( $\pm$ 37)	3.4 ( $\pm$ 1.5)	7.7 ( $\pm$ 1.9)	14.1 ( $\pm$ 3.6)
	6 Jun 2006	138 ( $\pm$ 39)	3.4 ( $\pm$ 1.5)	7.6 ( $\pm$ 2.3)	13.9 ( $\pm$ 3.7)
	5 May 2006	147 ( $\pm$ 36)	3.6 ( $\pm$ 1.5)	7.9 ( $\pm$ 2.2)	14.6 ( $\pm$ 3.7)
	4 Apr 2006	152 ( $\pm$ 46)	3.8 ( $\pm$ 1.7)	8.2 ( $\pm$ 2.4)	15.4 ( $\pm$ 3.9)
	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 Forecasts	3 Aug 2006	-	3	7	15
	31 May 2006	-	5	9	17
	4 Apr 2006	-	5	9	17
	6 Dec 2005	-	5	9	17
NOAA Forecast	22 May 2006	118-179	4-6	8-10	13-16
Meteorological Institute, Cuba Forecast	1 Aug 2006	-	-	9	15
	2 May 2006	-	-	9	15



## 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 ( $\pm$ 1.9)	4.3 ( $\pm$ 2.5)	7.1 ( $\pm$ 3.4)
TSR Forecasts ( $\pm$ FE)	4 Aug 2006	118 ( $\pm$ 50)	3.2 ( $\pm$ 1.4)	5.7 ( $\pm$ 1.5)	9.2 ( $\pm$ 1.9)
	5 Jul 2006	116 ( $\pm$ 44)	3.1 ( $\pm$ 1.3)	5.5 ( $\pm$ 1.5)	9.4 ( $\pm$ 2.1)
	6 Jun 2006	112 ( $\pm$ 39)	3.1 ( $\pm$ 1.3)	5.4 ( $\pm$ 1.6)	9.2 ( $\pm$ 2.2)
	5 May 2006	121 ( $\pm$ 35)	3.3 ( $\pm$ 1.2)	5.7 ( $\pm$ 1.5)	9.9 ( $\pm$ 2.2)
	4 Apr 2006	125 ( $\pm$ 44)	3.5 ( $\pm$ 1.4)	6.0 ( $\pm$ 1.8)	10.7 ( $\pm$ 2.6)
	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)	4 Aug 2006	3.2 ( $\pm$ 1.5)	2.0 ( $\pm$ 1.2)	4.2 ( $\pm$ 1.9)
	5 Jul 2006	3.6 ( $\pm$ 1.7)	2.0 ( $\pm$ 1.4)	4.3 ( $\pm$ 2.1)
	6 Jun 2006	3.5 ( $\pm$ 1.7)	2.0 ( $\pm$ 1.4)	4.3 ( $\pm$ 2.1)
	5 May 2006	3.8 ( $\pm$ 1.6)	2.1 ( $\pm$ 1.4)	4.5 ( $\pm$ 2.0)
	4 Apr 2006	4.0 ( $\pm$ 1.7)	2.2 ( $\pm$ 1.4)	4.8 ( $\pm$ 2.0)
	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)