



# July Forecast Update for Atlantic Hurricane Activity in 2007

Issued: 4th July 2007

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## Forecast Summary

### TSR slightly lowers its forecast but continues to forecast an active Atlantic hurricane season in 2007.

The TSR (Tropical Storm Risk) July forecast update for Atlantic hurricane activity in 2007 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 about 40% above the 1950-2006 norm in 2007. There is a high (~72%) likelihood that activity will be in the top one-third of years historically. The forecast spans the period from 1st June to 30th November 2007 and employs data through to the end of June 2007. TSR's two predictors are the forecast July-September 2007 trade wind speed over the Caribbean and tropical North Atlantic, and the forecast August-September 2007 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 the trade wind predictor having a moderate enhancing effect on activity and the sea surface temperature predictor a weak enhancing effect.

### Atlantic ACE Index and System Numbers in 2007

		ACE Index	Intense Hurricanes	Hurricanes	Tropical Storms
TSR Forecast ( $\pm$ FE)	2007	142 ( $\pm$ 46)	3.5 ( $\pm$ 1.6)	7.9 ( $\pm$ 2.3)	14.7 ( $\pm$ 3.4)
57yr Climate Norm ( $\pm$ SD)	1950-2006	102 ( $\pm$ 61)	2.7 ( $\pm$ 1.9)	6.2 ( $\pm$ 2.6)	10.3 ( $\pm$ 4.0)
Forecast Skill at this Lead	1987-2006	43%	24%	38%	33%

- 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 1987-2006.
- Forecast Skill = Percentage Improvement in Mean Square Error over Running 10-year Prior Climate Norm from Replicated Real Time Forecasts 1987-2006.

There is a 72% probability that the 2007 Atlantic hurricane season ACE index will be above average (defined as an ACE index value in the upper tercile historically (>115)), a 22% likelihood it will be near-normal (defined as an ACE index value in the middle tercile historically (71 to 115) and only a 6% chance it will be below-normal (defined as an ACE index value in the lower tercile historically (<71)). The 57-year period 1950-2006 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 (1950-2006).
- Upper Tercile = ACE index value greater than 115.
- Middle Tercile = ACE index value between 71 and 115.
- Lower Tercile = ACE index value less than 71.

## ACE Index & Numbers Forming in the MDR, Caribbean Sea and Gulf of Mexico in 2007

		ACE Index	Intense Hurricanes	Hurricanes	Tropical Storms
TSR Forecast ( $\pm$ FE)	2007	115 ( $\pm$ 46)	3.2( $\pm$ 1.4)	5.6 ( $\pm$ 1.8)	9.8 ( $\pm$ 2.3)
57yr Climate Norm ( $\pm$ SD)	1950-2006	79 ( $\pm$ 59)	2.3 ( $\pm$ 1.8)	4.3 ( $\pm$ 2.5)	7.0 ( $\pm$ 3.3)
Forecast Skill at this Lead	1987-2006	43%	36%	55%	58%

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 70% probability that in 2007 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 25% likelihood it will be near-normal (defined as an ACE index value in the middle tercile historically (40 to 91) and only a 5% chance it will be below-normal (defined as an ACE index value in the lower tercile historically ( $<40$ )). The 57-year period 1950-2006 is used for climatology.

## USA Landfalling ACE Index and Numbers in 2007

		ACE Index	Hurricanes	Tropical Storms
TSR Forecast ( $\pm$ FE)	2007	3.6 ( $\pm$ 1.6)	2.0 ( $\pm$ 1.3)	4.3 ( $\pm$ 1.9)
57yr Climate Norm ( $\pm$ SD)	1950-2006	2.4 ( $\pm$ 2.2)	1.5 ( $\pm$ 1.3)	3.1 ( $\pm$ 2.0)
Forecast Skill at this Lead	1987-2006	27%	25%	11%

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 2007 the USA landfalling ACE index will be above average (defined as a USA ACE index value in the upper tercile historically ( $>2.57$ )), a 20% likelihood it will be near-normal (defined as a USA ACE index value in the middle tercile historically (1.12 to 2.57) and only a 7% chance it will be below-normal (defined as a USA ACE index value in the lower tercile historically ( $<1.12$ )). The 57-year period 1950-2006 is used for climatology.

## Caribbean Lesser Antilles Landfalling Numbers in 2007

		ACE Index	Intense Hurricanes	Hurricanes	Tropical Storms
TSR Forecast ( $\pm$ FE)	2007	2.0 ( $\pm$ 2.1)	0.4 ( $\pm$ 0.4)	0.6 ( $\pm$ 0.6)	1.5 ( $\pm$ 1.0)
57yr Climate Norm ( $\pm$ SD)	1950-2006	1.4 ( $\pm$ 2.0)	0.2 ( $\pm$ 0.5)	0.4 ( $\pm$ 0.7)	1.1 ( $\pm$ 1.0)
Forecast Skill at this Lead	1987-2006	19%	23%	29%	12%

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 2007

The key factors behind the TSR forecast for an above-average hurricane season in 2007 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 weak 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  $0.45 \pm 0.47 \text{ ms}^{-1}$  (down from last month's value of  $0.66 \pm 0.47 \text{ ms}^{-1}$ ) weaker than normal (1977-2006 climatology) and  $0.11 \pm 0.17^\circ\text{C}$  (similar to last month's value of  $0.13 \pm 0.22^\circ\text{C}$ ) warmer than normal (1977-2006 climatology). The forecast skills (assessed for the period 1987-2006) for these predictors at this lead are 59% and 56% respectively. The main reason for the forecast for hurricane activity in 2007 falling from 55% above-norm (June forecast) to 40% above-norm (July forecast) is the increased expectation since last month that trade winds will be stronger than thought previously in August-September.

## 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 final TSR monthly forecast update for the 2007 Atlantic hurricane season will be issued on the 6th August 2007.

## Appendix - Predictions from Previous Months

### 1. Atlantic ACE Index and System Numbers

<b>Atlantic ACE Index and System Numbers 2007</b>					
		ACE Index	Named Tropical Storms	Hurricanes	Intense Hurricanes
Average Number ( $\pm$ SD) (1950-2006)		102 ( $\pm$ 61)	10.3 ( $\pm$ 4.0)	6.2 ( $\pm$ 2.6)	2.7 ( $\pm$ 1.9)
TSR Forecasts ( $\pm$ FE)	4 Jul 2007	142 ( $\pm$ 46)	14.7 ( $\pm$ 3.4)	7.9 ( $\pm$ 2.3)	3.5 ( $\pm$ 1.6)
	4 Jun 2007	156 ( $\pm$ 48)	15.7 ( $\pm$ 3.4)	8.6 ( $\pm$ 2.4)	3.9 ( $\pm$ 1.5)
	3 May 2007	166 ( $\pm$ 50)	16.1 ( $\pm$ 3.8)	8.9 ( $\pm$ 2.6)	4.0 ( $\pm$ 1.5)
	3 Apr 2007	173 ( $\pm$ 55)	16.7 ( $\pm$ 4.1)	9.2 ( $\pm$ 2.7)	4.2 ( $\pm$ 1.7)
	5 Mar 2007	177 ( $\pm$ 56)	16.7 ( $\pm$ 4.3)	9.4 ( $\pm$ 2.7)	4.3 ( $\pm$ 1.7)
	5 Feb 2007	162 ( $\pm$ 57)	15.7 ( $\pm$ 4.6)	8.7 ( $\pm$ 2.9)	3.9 ( $\pm$ 1.7)
	3 Jan 2007	152 ( $\pm$ 62)	15.0 ( $\pm$ 4.7)	8.3 ( $\pm$ 3.0)	3.7 ( $\pm$ 1.8)
	7 Dec 2006	162 ( $\pm$ 60)	15.7 ( $\pm$ 4.5)	8.5 ( $\pm$ 2.8)	3.9 ( $\pm$ 1.8)
Gray Forecasts	31 May 2007	170	17	9	5
	3 Apr 2007	170	17	9	5
	8 Dec 2006	130	14	7	3
NOAA Forecast	22 May 2007	109-184	13-17	7-10	3-5
Met Office Forecast	19 Jun 2007	-	12 ( $\pm$ 3)	-	-



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

<b>MDR, Caribbean Sea and Gulf of Mexico ACE Index and Numbers 2007</b>					
		ACE Index	Named Tropical Storms	Hurricanes	Intense Hurricanes
Average Number ( $\pm$ SD) (1950-2006)		79 ( $\pm$ 59)	7.0 ( $\pm$ 3.3)	4.3 ( $\pm$ 2.5)	2.3 ( $\pm$ 1.8)
TSR Forecasts ( $\pm$ FE)	4 Jul 2007	115 ( $\pm$ 46)	9.8 ( $\pm$ 2.3)	5.6 ( $\pm$ 1.8)	3.2 ( $\pm$ 1.4)
	4 Jun 2007	129 ( $\pm$ 44)	10.8 ( $\pm$ 2.5)	6.3 ( $\pm$ 1.9)	3.6 ( $\pm$ 1.3)
	3 May 2007	139 ( $\pm$ 47)	11.3 ( $\pm$ 2.8)	6.6 ( $\pm$ 2.0)	3.7 ( $\pm$ 1.3)
	3 Apr 2007	145 ( $\pm$ 53)	11.9 ( $\pm$ 3.3)	6.9 ( $\pm$ 2.3)	3.9 ( $\pm$ 1.5)
	5 Mar 2007	149 ( $\pm$ 55)	11.9 ( $\pm$ 3.6)	7.1 ( $\pm$ 2.4)	4.0 ( $\pm$ 1.5)
	5 Feb 2007	135 ( $\pm$ 55)	10.9 ( $\pm$ 3.9)	6.4 ( $\pm$ 2.5)	3.6 ( $\pm$ 1.5)
	3 Jan 2007	125 ( $\pm$ 60)	10.2 ( $\pm$ 4.0)	6.0 ( $\pm$ 2.6)	3.4 ( $\pm$ 1.6)
	7 Dec 2006	137 ( $\pm$ 58)	10.9 ( $\pm$ 3.9)	6.5 ( $\pm$ 2.6)	3.6 ( $\pm$ 1.6)

## 3. US ACE Index and Landfalling Numbers

<b>US Landfalling Numbers 2007</b>				
		ACE Index	Named Tropical Storms	Hurricanes
Average Number ( $\pm$ SD) (1950-2006)		2.4 ( $\pm$ 2.2)	3.1 ( $\pm$ 2.0)	1.5 ( $\pm$ 1.3)
TSR Forecasts ( $\pm$ FE)	4 Jul 2007	3.6 ( $\pm$ 1.6)	4.3 ( $\pm$ 1.9)	2.0 ( $\pm$ 1.3)
	4 Jun 2007	3.9 ( $\pm$ 1.6)	4.7 ( $\pm$ 1.9)	2.2 ( $\pm$ 1.3)
	3 May 2007	4.2 ( $\pm$ 1.6)	4.8 ( $\pm$ 1.9)	2.3 ( $\pm$ 1.3)
	3 Apr 2007	4.4 ( $\pm$ 1.6)	5.1 ( $\pm$ 2.0)	2.4 ( $\pm$ 1.3)
	5 Mar 2007	4.5 ( $\pm$ 1.6)	5.1 ( $\pm$ 2.0)	2.4 ( $\pm$ 1.4)
	5 Feb 2007	4.0 ( $\pm$ 1.6)	4.7 ( $\pm$ 2.0)	2.2 ( $\pm$ 1.4)
	3 Jan 2007	3.8 ( $\pm$ 1.9)	4.5 ( $\pm$ 2.0)	2.1 ( $\pm$ 1.4)
	7 Dec 2006	4.1 ( $\pm$ 2.2)	4.7 ( $\pm$ 2.2)	2.2 ( $\pm$ 1.7)

## 4. Lesser Antilles ACE Index and Landfalling Numbers

<b>Lesser Antilles Landfalling Numbers 2007</b>					
		ACE Index	Named Tropical Storms	Hurricanes	Intense Hurricanes
Average Number ( $\pm$ SD) (1950-2006)		1.4 ( $\pm$ 2.0)	1.1 ( $\pm$ 1.0)	0.4 ( $\pm$ 0.7)	0.2 ( $\pm$ 0.5)
TSR Forecasts ( $\pm$ FE)	4 Jul 2007	2.0 ( $\pm$ 2.1)	1.5 ( $\pm$ 1.0)	0.6 ( $\pm$ 0.6)	0.4 ( $\pm$ 0.4)
	4 Jun 2007	2.3 ( $\pm$ 2.1)	1.7 ( $\pm$ 1.0)	0.7 ( $\pm$ 0.6)	0.4 ( $\pm$ 0.4)
	3 May 2007	2.4 ( $\pm$ 2.2)	1.7 ( $\pm$ 1.1)	0.7 ( $\pm$ 0.6)	0.4 ( $\pm$ 0.4)
	3 Apr 2007	2.6 ( $\pm$ 2.3)	1.8 ( $\pm$ 1.1)	0.8 ( $\pm$ 0.6)	0.4 ( $\pm$ 0.4)
	5 Mar 2007	2.6 ( $\pm$ 2.4)	1.8 ( $\pm$ 1.1)	0.8 ( $\pm$ 0.7)	0.4 ( $\pm$ 0.4)
	5 Feb 2007	2.4 ( $\pm$ 2.4)	1.7 ( $\pm$ 1.1)	0.7 ( $\pm$ 0.7)	0.4 ( $\pm$ 0.4)
	3 Jan 2007	2.2 ( $\pm$ 2.4)	1.6 ( $\pm$ 1.1)	0.7 ( $\pm$ 0.7)	0.4 ( $\pm$ 0.4)
	7 Dec 2006	2.4 ( $\pm$ 2.3)	1.7 ( $\pm$ 1.1)	0.7 ( $\pm$ 0.6)	0.4 ( $\pm$ 0.4)