



# August Forecast Update for Atlantic Hurricane Activity in 2003

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## Forecast Summary

**TSR lowers its previous forecasts and anticipates the 2003 Atlantic hurricane season will see activity above the 30-year climate norm but close to the 10-year climate norm.**

The TSR (Tropical Storm Risk) early August forecast update for Atlantic hurricane activity in 2003 anticipates a slightly above average activity season. The forecast spans the period from 1st June to 30th November 2003 and employs data through to the end of July 2003. TSR's two predictors are the forecast July-September 2003 trade wind speed over the Caribbean and tropical North Atlantic, and the forecast August-September 2003 sea surface temperature in the tropical North Atlantic. TSR anticipates both predictors will have a weak enhancing effect on activity. Appendices give the TSR predictions from previous months and compares these to forecasts issued by other groups. This month TSR introduces the landfalling ACE index for the Caribbean Lesser Antilles.

## Atlantic ACE Index and System Numbers in 2003

		ACE Index	Intense Hurricanes	Hurricanes	Tropical Storms
TSR Forecast ( $\pm$ FE)	2003	108 ( $\pm$ 33)	2.4( $\pm$ 1.3)	6.5 ( $\pm$ 1.2)	11.7 ( $\pm$ 2.2)
10yr Climate Norm ( $\pm$ SD)	1993-2002	114 ( $\pm$ 67)	3.0( $\pm$ 1.9)	6.9 ( $\pm$ 2.9)	12.1 ( $\pm$ 3.6)
30yr Climate Norm ( $\pm$ SD)	1973-2002	84 ( $\pm$ 52)	2.1 ( $\pm$ 1.4)	5.7 ( $\pm$ 2.4)	9.8 ( $\pm$ 3.4)
Forecast Skill at this Lead	1988-2002	69%	52%	71%	63%

- 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 1993-2002.  
Forecast Skill = Percentage Improvement in Mean Square Error over Running 10-year Prior Climate Norm from Replicated Real Time Forecasts 1988-2002.

There is a 76% probability that the 2003 Atlantic hurricane season ACE Index will be above the 30-year average.

## ACE Index & Numbers Forming in the MDR, Caribbean Sea and Gulf of Mexico in 2003

		ACE Index	Intense Hurricanes	Hurricanes	Tropical Storms
TSR Forecast ( $\pm$ FE)	2003	90 ( $\pm$ 38)	2.4( $\pm$ 1.3)	4.8 ( $\pm$ 1.5)	8.4 ( $\pm$ 1.8)
10yr Climate Norm ( $\pm$ SD)	1993-2002	97 ( $\pm$ 68)	3.0( $\pm$ 1.9)	5.2 ( $\pm$ 2.9)	8.8 ( $\pm$ 3.6)
30yr Climate Norm ( $\pm$ SD)	1973-2002	63 ( $\pm$ 55)	1.9 ( $\pm$ 1.5)	3.8 ( $\pm$ 2.5)	6.5 ( $\pm$ 3.6)
Forecast Skill at this Lead	1988-2002	62%	54%	65%	65%

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. 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 76% probability that the MDR, Caribbean Sea and Gulf of Mexico ACE Index will exceed the 30-year average in 2003.

### USA Landfalling ACE Index and Numbers in 2003

		ACE Index	Hurricanes	Tropical Storms
TSR Forecast (±FE)	2003	2.5 (±1.3)	1.5 (±0.9)	3.4 (±1.9)
Average (±SD)	1993-2002	2.3 (±1.6)	1.2 (±1.2)	3.8 (±2.1)
Average (±SD)	1973-2002	1.8 (±1.7)	1.2 (±1.3)	2.8 (±2.0)
Forecast Skill at this Lead	1988-2002	33%	25%	19%

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 Coming Within 30km of 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 70% probability that the 2003 US ACE index will be above the 30-year average.

### Caribbean Lesser Antilles Landfalling Numbers in 2003

		ACE Index	Intense Hurricanes	Hurricanes	Tropical Storms
TSR Forecast (±FE)	2003	1.9 (±2.1)	0.4 (±0.3)	0.7 (±0.6)	1.6 (±0.7)
10yr Climate Norm (±SD)	1993-2002	2.1 (±2.7)	0.3 (±0.5)	0.7 (±0.8)	1.5 (±0.9)
30yr Climate Norm (±SD)	1973-2002	1.3 (±2.1)	0.2 (±0.4)	0.4 (±0.6)	1.1 (±1.0)
Forecast Skill at this Lead	1988-2002	37%	33%	46%	49%

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 (10.0°N-18.5°N, 60.0°W-63.0°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 Coming Within 30km of Land.  
Lesser Antilles = Island Arc from Anguilla to Trinidad Inclusive.

### Key Predictors for 2003

The key factors behind the TSR forecast for a slightly above-average hurricane season in 2003 are the anticipated small enhancing effect of July-September forecast 925mb U(east/west)-winds 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 forecast anomalies (1973-2002 climatology) for these predictors are  $0.22 \pm 0.40$  ms<sup>-1</sup> (down from  $0.51 \pm 0.46$  ms<sup>-1</sup> last month) and  $0.26 \pm 0.11$ °C (up from  $0.15 \pm 0.14$ °C last month) respectively. The corresponding forecast skills for these predictors at this lead are 78% and 85%.

### Further Information

Further information on the TSR forecast methodology, the TSR simulated real-time forecast skill as a

function of lead time, and on TSR in general, may be obtained either from the TSR web site ([tropicalstormrisk.com](http://tropicalstormrisk.com)) or from the 'Extended Range Forecast for Atlantic Hurricane Activity in 2002' document issued on the 23rd November 2001. A summary of the 2003 Atlantic hurricane season and a verification of the TSR seasonal forecasts will be issued in December 2003.

## Appendix - Predictions from Previous Months

### 1. Atlantic ACE Index and System Numbers

<b>Atlantic ACE Index and System Numbers 2003</b>					
		ACE Index	Named Tropical Storms	Hurricanes	Intense Hurricanes
Average Number ( $\pm$ SD) (1993-2002)		114 ( $\pm$ 67)	12.1 ( $\pm$ 3.6)	6.9 ( $\pm$ 2.9)	3.0 ( $\pm$ 1.9)
Average Number ( $\pm$ SD) (1973-2002)		84 ( $\pm$ 52)	9.8 ( $\pm$ 3.4)	5.7 ( $\pm$ 2.4)	2.1 ( $\pm$ 1.4)
TSR Forecasts ( $\pm$ FE)	6 Aug 2003	108 ( $\pm$ 33)	11.7 ( $\pm$ 2.2)	6.5 ( $\pm$ 1.2)	2.4 ( $\pm$ 1.3)
	4 Jul 2003	122 ( $\pm$ 39)	12.7 ( $\pm$ 2.5)	7.2 ( $\pm$ 1.4)	2.9 ( $\pm$ 1.5)
	10 Jun 2003	115 ( $\pm$ 35)	12.2 ( $\pm$ 2.2)	6.8 ( $\pm$ 1.6)	2.8 ( $\pm$ 1.4)
	6 May 2003	118 ( $\pm$ 45)	12.4 ( $\pm$ 2.7)	7.0 ( $\pm$ 2.0)	2.8 ( $\pm$ 1.5)
	11 Apr 2003	97 ( $\pm$ 58)	11.1 ( $\pm$ 2.9)	6.1 ( $\pm$ 2.4)	2.4 ( $\pm$ 1.8)
	5 Mar 2003	123 ( $\pm$ 62)	12.7 ( $\pm$ 3.5)	7.1 ( $\pm$ 2.7)	2.9 ( $\pm$ 1.9)
	5 Feb 2003	133 ( $\pm$ 63)	13.3 ( $\pm$ 3.3)	7.6 ( $\pm$ 2.7)	3.1 ( $\pm$ 1.8)
	7 Jan 2003	116 ( $\pm$ 65)	12.3 ( $\pm$ 3.4)	6.9 ( $\pm$ 2.8)	2.7 ( $\pm$ 1.8)
	16 Dec 2002	-	12.4 ( $\pm$ 3.5)	7.0 ( $\pm$ 2.8)	2.8 ( $\pm$ 1.8)
Gray Forecasts	30 May 2003	-	14	8	3
	4 Apr 2003	-	12	8	3
	6 Dec 2002	-	12	8	3
NOAA Forecast	19 May 2003	110-180	11-15	6-8	2-4
Meteorological Institute, Cuba Forecasts	1 Aug 2003	-	12	8	-
	2 May 2003	-	10	6	-

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

<b>MDR, Caribbean Sea and Gulf of Mexico ACE Index and Numbers 2003</b>					
		ACE Index	Named Tropical Storms	Hurricanes	Intense Hurricanes
Average Number ( $\pm$ SD) (1993-2002)		97 ( $\pm$ 68)	8.8 ( $\pm$ 3.6)	5.2 ( $\pm$ 2.9)	3.0 ( $\pm$ 1.9)
Average Number ( $\pm$ SD) (1973-2002)		63 ( $\pm$ 55)	6.5 ( $\pm$ 3.6)	3.8 ( $\pm$ 2.5)	1.9 ( $\pm$ 1.5)
TSR Forecasts ( $\pm$ FE)	6 Aug 2003	90 ( $\pm$ 38)	8.4 ( $\pm$ 1.8)	4.8 ( $\pm$ 1.5)	2.4 ( $\pm$ 1.3)
	4 Jul 2003	105 ( $\pm$ 41)	9.4 ( $\pm$ 1.9)	5.5 ( $\pm$ 1.6)	2.9 ( $\pm$ 1.5)
	10 Jun 2003	98 ( $\pm$ 35)	8.9 ( $\pm$ 1.9)	5.1 ( $\pm$ 1.4)	2.8 ( $\pm$ 1.4)
	5 May 2003	100 ( $\pm$ 45)	9.1 ( $\pm$ 2.4)	5.3 ( $\pm$ 1.8)	2.8 ( $\pm$ 1.5)
	11 Apr 2003	79 ( $\pm$ 58)	7.8 ( $\pm$ 3.0)	4.4 ( $\pm$ 2.4)	2.4 ( $\pm$ 1.8)
	5 Mar 2003	106 ( $\pm$ 63)	9.4 ( $\pm$ 3.4)	5.4 ( $\pm$ 2.6)	2.9 ( $\pm$ 1.9)
	5 Feb 2003	116 ( $\pm$ 64)	10.0 ( $\pm$ 3.4)	5.9 ( $\pm$ 2.7)	3.1 ( $\pm$ 1.8)
	7 Jan 2003	99 ( $\pm$ 66)	9.0 ( $\pm$ 3.5)	5.2 ( $\pm$ 2.7)	2.7 ( $\pm$ 1.8)
	16 Dec 2002	-	9.2 ( $\pm$ 3.5)	5.3 ( $\pm$ 2.7)	3.0 ( $\pm$ 1.7)

### 3. US Landfalling ACE Index and Numbers

US Landfalling ACE Index and Numbers 2003				
		ACE Index	Named Tropical Storms	Hurricanes
Average Number ( $\pm$ SD) (1993-2002)		2.7 ( $\pm$ 1.7)	3.8 ( $\pm$ 2.1)	1.2 ( $\pm$ 1.2)
Average Number ( $\pm$ SD) (1973-2002)		1.8 ( $\pm$ 1.7)	2.8 ( $\pm$ 2.0)	1.2 ( $\pm$ 1.3)
TSR Forecasts ( $\pm$ FE)	6 Aug 2003	2.5 ( $\pm$ 1.3)	3.4 ( $\pm$ 1.9)	1.5 ( $\pm$ 0.9)
	4 Jul 2003	2.9 ( $\pm$ 1.2)	3.7 ( $\pm$ 1.9)	1.7 ( $\pm$ 0.9)
	10 Jun 2003	2.7 ( $\pm$ 1.2)	3.6 ( $\pm$ 1.9)	1.6 ( $\pm$ 0.9)
	6 May 2003	2.8 ( $\pm$ 1.3)	3.6 ( $\pm$ 1.9)	1.7 ( $\pm$ 1.0)
	11 Apr 2003	2.2 ( $\pm$ 1.5)	3.2 ( $\pm$ 1.9)	1.4 ( $\pm$ 1.1)
	5 Mar 2003	2.9 ( $\pm$ 1.5)	3.7 ( $\pm$ 1.9)	1.7 ( $\pm$ 1.1)
	5 Feb 2003	1.8 ( $\pm$ 1.7)	3.9 ( $\pm$ 1.9)	1.8 ( $\pm$ 1.1)
	7 Jan 2003	-	3.6 ( $\pm$ 1.9)	1.6 ( $\pm$ 1.1)
	16 Dec 2002	-	3.6 ( $\pm$ 1.9)	1.7 ( $\pm$ 1.1)

### 4. Lesser Antilles Landfalling Numbers

Lesser Antilles Landfalling Numbers 2003					
		ACE Index	Named Tropical Storms	Hurricanes	Intense Hurricanes
Average Number ( $\pm$ SD) (1993-2002)		2.1 ( $\pm$ 2.7)	1.5 ( $\pm$ 0.9)	0.7 ( $\pm$ 0.8)	0.3 ( $\pm$ 0.5)
Average Number ( $\pm$ SD) (1973-2002)		1.3 ( $\pm$ 2.1)	1.1 ( $\pm$ 1.0)	0.4 ( $\pm$ 0.6)	0.2 ( $\pm$ 0.4)
TSR Forecasts ( $\pm$ FE)	6 Aug 2003	1.9 ( $\pm$ 2.1)	1.6 ( $\pm$ 0.7)	0.7 ( $\pm$ 0.6)	0.4 ( $\pm$ 0.3)
	4 Jul 2003	-	1.7 ( $\pm$ 0.8)	0.7 ( $\pm$ 0.6)	0.4 ( $\pm$ 0.4)
	10 Jun 2003	-	1.6 ( $\pm$ 0.8)	0.7 ( $\pm$ 0.6)	0.4 ( $\pm$ 0.4)
	6 May 2003	-	1.6 ( $\pm$ 0.9)	0.7 ( $\pm$ 0.7)	0.4 ( $\pm$ 0.4)
	11 Apr 2003	-	1.4 ( $\pm$ 1.0)	0.6 ( $\pm$ 0.7)	0.3 ( $\pm$ 0.4)
	5 Mar 2003	-	1.7 ( $\pm$ 1.0)	0.7 ( $\pm$ 0.8)	0.4 ( $\pm$ 0.4)
	5 Feb 2003	-	1.8 ( $\pm$ 1.0)	0.8 ( $\pm$ 0.8)	0.4 ( $\pm$ 0.4)
	7 Jan 2003	-	1.6 ( $\pm$ 1.0)	0.7 ( $\pm$ 0.8)	0.4 ( $\pm$ 0.4)
	16 Dec 2002	-	1.7 ( $\pm$ 0.8)	0.7 ( $\pm$ 0.7)	0.4 ( $\pm$ 0.4)