



# April Forecast Update for Atlantic Hurricane Activity in 2005

Issued: 5th April 2005

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## Forecast Summary

**TSR continues to anticipate an active Atlantic hurricane season for 2005.**

The TSR (Tropical Storm Risk) April forecast update for Atlantic hurricane activity in 2005 continues to anticipate an above-average season. Based on current and projected climate signals Atlantic basin and US landfalling tropical cyclone activity are forecast to be about 160% of average in 2005. There is a high (80%) likelihood that activity will be in the above-average tercile. The forecast spans the period from 1st June to 30th November 2005 and employs data through to the end of March 2005. TSR's two predictors are the forecast July-September 2005 trade wind speed over the Caribbean and tropical North Atlantic, and the forecast August-September 2005 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 moderate enhancing effect on activity. Monthly updated forecasts will be issued through to August 2005.

## Atlantic ACE Index and System Numbers in 2005

		ACE Index	Intense Hurricanes	Hurricanes	Tropical Storms
TSR Forecast ( $\pm$ FE)	2005	155 ( $\pm$ 50)	3.6 ( $\pm$ 1.5)	7.8 ( $\pm$ 2.1)	13.9 ( $\pm$ 2.9)
55yr Climate Norm ( $\pm$ SD)	1950-2004	98 ( $\pm$ 57)	2.6 ( $\pm$ 1.8)	6.0 ( $\pm$ 2.4)	9.9 ( $\pm$ 3.3)
Forecast Skill at this Lead	1985-2004	24%	19%	23%	18%

- 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 1985-2004.  
Forecast Skill = Percentage Improvement in Mean Square Error over Running 10-year Prior Climate Norm from Replicated Real Time Forecasts 1985-2004.

There is an 80% probability that the 2005 Atlantic hurricane season ACE index will be above average (defined as an ACE index value in the upper tercile historically (>113)), a 16% likelihood it will be near-normal (defined as an ACE index value in the middle tercile historically (67 to 113) and only a 4% chance it will be below-normal (defined as an ACE index value in the lower tercile historically (<67)). The 55-year period 1950-2004 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 (1950-2004).  
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 2005

		ACE Index	Intense Hurricanes	Hurricanes	Tropical Storms
TSR Forecast ( $\pm$ FE)	2005	138 ( $\pm$ 51)	3.5( $\pm$ 1.5)	6.0 ( $\pm$ 2.2)	10.1 ( $\pm$ 3.1)
55yr Climate Norm ( $\pm$ SD)	1950-2004	76 ( $\pm$ 58)	2.3 ( $\pm$ 1.8)	4.2 ( $\pm$ 2.4)	6.9 ( $\pm$ 3.2)
Forecast Skill at this Lead	1985-2004	25%	23%	31%	27%

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 an 82% probability that in 2005 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 16% likelihood it will be near-normal (defined as an ACE index value in the middle tercile historically (35 to 91) and only a 2% chance it will be below-normal (defined as an ACE index value in the lower tercile historically ( $<35$ )). The 55-year period 1950-2004 is used for climatology.

## USA Landfalling ACE Index and Numbers in 2005

		ACE Index	Hurricanes	Tropical Storms
TSR Forecast ( $\pm$ FE)	2005	3.6 ( $\pm$ 1.8)	2.0 ( $\pm$ 1.6)	4.3 ( $\pm$ 2.0)
Average ( $\pm$ SD)	1950-2004	2.3 ( $\pm$ 2.1)	1.5 ( $\pm$ 1.3)	3.1 ( $\pm$ 2.0)
Forecast Skill at this Lead	1985-2004	23%	19%	15%

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 70% probability that in 2005 the USA landfalling ACE index will be above average (defined as a USA ACE index value in the upper tercile historically ( $>2.63$ )), a 21% 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 9% chance it will be below-normal (defined as a USA ACE index value in the lower tercile historically ( $<1.14$ )). The 55-year period 1950-2004 is used for climatology.

## Caribbean Lesser Antilles Landfalling Numbers in 2005

		ACE Index	Intense Hurricanes	Hurricanes	Tropical Storms
TSR Forecast ( $\pm$ FE)	2005	2.8 ( $\pm$ 2.3)	0.4 ( $\pm$ 0.4)	0.8 ( $\pm$ 0.6)	1.8 ( $\pm$ 1.0)
55yr Climate Norm ( $\pm$ SD)	1950-2004	1.4 ( $\pm$ 2.1)	0.3 ( $\pm$ 0.5)	0.5 ( $\pm$ 0.7)	1.1 ( $\pm$ 1.1)
Forecast Skill at this Lead	1985-2004	6%	14%	17%	5%

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 2005

The key factors behind the TSR forecast for an above-average hurricane season in 2005 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 forecast anomalies (1975-2004 climatology) for these predictors are  $0.62 \pm 0.68 \text{ ms}^{-1}$  (down from last month's value of  $0.66 \pm 0.75 \text{ ms}^{-1}$ ) and  $0.24 \pm 0.25^\circ\text{C}$  (up from last month's value of  $0.20 \pm 0.26^\circ\text{C}$ ). The forecast skills (1985-2004) for these predictors at this lead are 40% and 31% respectively.

## Forecasts and New Developments for 2005

For the 2005 Atlantic hurricane season TSR will be: (1) Issuing monthly updated deterministic and probabilistic forecasts through to early August for each basin, landfalling strength category and ACE index listed above; (2) Investigating the added value of including dynamical model forecasts of the Caribbean trade wind and Atlantic sea surface temperature predictors; (3) Introducing storm forecast strike probabilities out to 5 days lead and automatic storm alert e-mails to the features of the TSR Tropical Storm Tracker.

## 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 2005 Atlantic hurricane season will be issued on the 5th May 2005.

## Appendix - Predictions from Previous Months

### 1. Atlantic ACE Index and System Numbers

<b>Atlantic ACE Index and System Numbers 2005</b>					
		ACE Index	Named Tropical Storms	Hurricanes	Intense Hurricanes
Average Number ( $\pm$ SD) (1950-2004)		95 ( $\pm$ 54)	9.9 ( $\pm$ 3.3)	6.0 ( $\pm$ 2.3)	2.5 ( $\pm$ 1.9)
TSR Forecasts ( $\pm$ FE)	5 Apr 2005	155 ( $\pm$ 50)	13.9 ( $\pm$ 2.9)	7.8 ( $\pm$ 2.1)	3.6 ( $\pm$ 1.5)
	7 Mar 2005	156 ( $\pm$ 52)	14.0 ( $\pm$ 3.2)	7.9 ( $\pm$ 2.3)	3.6 ( $\pm$ 1.6)
	9 Feb 2005	151 ( $\pm$ 53)	13.6 ( $\pm$ 3.3)	7.7 ( $\pm$ 2.3)	3.5 ( $\pm$ 1.6)
	5 Jan 2005	157 ( $\pm$ 56)	13.9 ( $\pm$ 3.5)	7.8 ( $\pm$ 2.4)	3.6 ( $\pm$ 1.6)
	10 Dec 2004	145 ( $\pm$ 56)	13.4 ( $\pm$ 3.6)	7.5 ( $\pm$ 2.5)	3.4 ( $\pm$ 1.6)
Gray Forecast	1 Apr 2005	-	13	7	3
	3 Dec 2004	-	11	6	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 2005</b>					
		ACE Index	Named Tropical Storms	Hurricanes	Intense Hurricanes
Average Number ( $\pm$ SD) (1950-2004)		73 ( $\pm$ 55)	6.8 ( $\pm$ 3.1)	4.1 ( $\pm$ 2.4)	2.2 ( $\pm$ 1.8)
TSR Forecasts ( $\pm$ FE)	5 Apr 2005	138 ( $\pm$ 51)	10.1 ( $\pm$ 3.1)	6.0 ( $\pm$ 2.2)	3.5 ( $\pm$ 1.5)
	7 Mar 2005	138 ( $\pm$ 55)	10.2 ( $\pm$ 3.5)	6.1 ( $\pm$ 2.4)	3.5 ( $\pm$ 1.5)
	9 Feb 2005	133 ( $\pm$ 56)	9.8 ( $\pm$ 3.6)	5.9 ( $\pm$ 2.4)	3.4 ( $\pm$ 1.5)
	5 Jan 2005	139 ( $\pm$ 59)	10.1 ( $\pm$ 3.7)	6.0 ( $\pm$ 2.5)	3.5 ( $\pm$ 1.6)
	10 Dec 2004	128 ( $\pm$ 59)	9.6 ( $\pm$ 3.8)	5.7 ( $\pm$ 2.6)	3.3 ( $\pm$ 1.6)

## 3. US ACE Index and Landfalling Numbers

<b>US Landfalling Numbers 2005</b>				
		ACE Index	Named Tropical Storms	Hurricanes
Average Number ( $\pm$ SD) (1950-2004)		2.2 ( $\pm$ 2.0)	3.0 ( $\pm$ 1.9)	1.4 ( $\pm$ 1.2)
TSR Forecasts ( $\pm$ FE)	5 Apr 2005	3.6 ( $\pm$ 1.8)	4.3 ( $\pm$ 2.0)	2.0 ( $\pm$ 1.6)
	7 Mar 2005	3.6 ( $\pm$ 1.9)	4.3 ( $\pm$ 2.1)	2.0 ( $\pm$ 1.6)
	9 Feb 2005	3.5 ( $\pm$ 1.9)	4.2 ( $\pm$ 2.2)	2.0 ( $\pm$ 1.6)
	5 Jan 2005	3.6 ( $\pm$ 2.0)	4.3 ( $\pm$ 1.9)	2.0 ( $\pm$ 1.7)
	10 Dec 2004	3.4 ( $\pm$ 2.0)	4.1 ( $\pm$ 2.2)	1.9 ( $\pm$ 1.7)

## 4. Lesser Antilles ACE Index and Landfalling Numbers

<b>Lesser Antilles Landfalling Numbers 2005</b>					
		ACE Index	Named Tropical Storms	Hurricanes	Intense Hurricanes
Average Number (SD) (1950-2004)		1.4 ( $\pm$ 2.1)	1.1 ( $\pm$ 1.0)	0.4 ( $\pm$ 0.7)	0.2 ( $\pm$ 0.5)
TSR Forecasts ( $\pm$ FE)	5 Apr 2005	2.8 ( $\pm$ 2.3)	1.8 ( $\pm$ 1.0)	0.8 ( $\pm$ 0.6)	0.4 ( $\pm$ 0.4)
	7 Mar 2005	2.8 ( $\pm$ 2.4)	1.8 ( $\pm$ 1.0)	0.8 ( $\pm$ 0.6)	0.4 ( $\pm$ 0.4)
	9 Feb 2005	2.7 ( $\pm$ 2.4)	1.8 ( $\pm$ 1.0)	0.7 ( $\pm$ 0.6)	0.4 ( $\pm$ 0.4)
	5 Jan 2005	2.8 ( $\pm$ 2.4)	1.8 ( $\pm$ 1.0)	0.8 ( $\pm$ 0.6)	0.4 ( $\pm$ 0.4)
	10 Dec 2004	2.6 ( $\pm$ 2.4)	1.7 ( $\pm$ 1.0)	0.7 ( $\pm$ 0.6)	0.4 ( $\pm$ 0.4)