June Forecast Update for Atlantic Hurricane Activity in 2008

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Forecast Summary

TSR continues to predict an active Atlantic hurricane season in 2008.

The TSR (Tropical Storm Risk) June forecast update for Atlantic hurricane activity in 2008 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 30% above the 1950-2007 norm in 2008. There is a high (~62%) likelihood that activity will be in the top one-third of years historically. The forecast spans the period from 1st June to 30th November 2008 and employs data through to the end of May 2008. TSR's two predictors are the forecast July-September 2008 trade wind speed over the Caribbean and tropical North Atlantic, and the forecast August-September 2008 sea surface temperature in the tropical North Atlantic. TSR anticipates the trade wind predictor having a moderate enhancing effect on activity and the sea surface temperature having a small enhancing effect.

Atlantic ACE Index and System Numbers in 2008

		ACE Index	Intense Hurricanes	Hurricanes	Tropical Storms
TSR Forecast (±FE)	2008	131 (±52)	3.4 (±1.6)	7.7 (±2.4)	14.4 (±3.4)
58yr Climate Norm (±SD)	1950-2007	101 (±60)	2.7(±1.9)	6.2 (±2.6)	10.3 (±4.0)
Forecast Skill at this Lead	1988-2007	28%	21%	24%	23%

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 = $x10^4$ $knots^2$.
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 1988-2007.
Forecast Skill = Percentage Improvement in Mean Square Error over Running 10-year Prior Climate Norm from Replicated Real Time Forecasts 1988-2007.

There is a 62% probability that the 2008 Atlantic hurricane season ACE index will be above average (defined as an ACE index value in the upper tercile historically (>115)), a 26% likelihood it will be near-normal (defined as an ACE index value in the middle tercile historically (70 to 115) and only a 12% chance it will be below-normal (defined as an ACE index value in the lower tercile historically (<70)). The 58-year period 1950-2007 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 (1950-2007).
Upper Tercile = ACE index value greater than 115.
Middle Tercile = ACE index value between 70 and 115.
Lower Tercile = ACE index value less than 70.

ACE Index & Numbers Forming in the MDR, Caribbean Sea and Gulf of Mexico in 2008

		ACE Index	Intense Hurricanes	Hurricanes	Tropical Storms
TSR Forecast (±FE)	2008	104 (±47)	3.1 (±1.4)	5.5 (±1.8)	9.6 (±2.6)
58yr Climate Norm (±SD)	1950-2007	78 (±59)	2.3 (±1.8)	4.3 (±2.5)	7.1 (±3.3)
Forecast Skill at this Lead	1988-2007	34%	32%	45%	43%

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 61% probability that in 2008 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 30% likelihood it will be near-normal (defined as an ACE index value in the middle tercile historically (41 to 91) and only a 9% chance it will be below-normal (defined as an ACE index value in the lower tercile historically (<41)). The 58-year period 1950-2007 is used for climatology.

USA Landfalling ACE Index and Numbers in 2008

		ACE Index	Hurricanes	Tropical Storms
TSR Forecast (±FE)	2008	2.9 (±1.2)	1.7 (±1.0)	4.0 (±1.3)
58yr Climate Norm (±SD)	1950-2007	2.4 (±2.2)	1.5 (±1.3)	3.1 (±2.0)
Forecast Skill at this Lead	1988-2007	35%	29%	6%

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 = $x10^4$ $knots^2$.

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 60% probability that in 2008 the USA landfalling ACE index will be above average (defined as a USA ACE index value in the upper tercile historically (>2.55)), an 33% likelihood it will be near-normal (defined as a USA ACE index value in the middle tercile historically (1.14 to 2.55) 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 58-year period 1950-2007 is used for climatology.

Caribbean Lesser Antilles Landfalling Numbers in 2008

		ACE Index	Intense Hurricanes	Hurricanes	Tropical Storms
TSR Forecast (±FE)	2008	1.8 (± 2.1)	0.3 (±0.4)	0.6 (±0.4)	1.5 (±1.0)
58yr Climate Norm (±SD)	1950-2007	1.4 (±2.0)	0.2 (±0.5)	0.5 (±0.7)	1.1 (±1.0)
Forecast Skill at this Lead	1988-2007	18%	15%	32%	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 within the boxed region (10°N-18°N,60°W-63°W) (reduced by a factor of 6). ACE Unit = $x10^4$ $knots^2$.

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 2008

The key factors behind the TSR forecast for an above-average hurricane season in 2008 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 the neutral effect of August-September forecast sea surface temperature (SST) for the Atlantic MDR (10°N - 20°N, 20°W - 60°W). The current forecasts for these predictors are 0.31±0.43 ms^{-1} (down slightly from April's value of 0.40±0.64 ms^{-1}) weaker than normal (1978-2007 climatology) and 0.08±0.23°C (similar to April's value of 0.06±0.28°C) warmer than normal (1978-2007 climatology). The forecast skills (assessed for the period 1988-2007) for these predictors at this lead are 60% and 53% respectively.

The July-September trade wind speed influences cyclonic vorticity (the spinning up of storms) in the main hurricane track region. The August-September MDR SST provides heat and moisture to power incipient storms in the main track region.

The Precision of Seasonal Hurricane Forecasts

The 2004 and 2005 North Atlantic and U.S. landfalling hurricane seasons were both predicted to have 'high activity' (i.e. within the top one third of years historically) to high (65-70%) probability from the previous December. However, the extended range, April and June forecasts for the 2006 and 2007 hurricane seasons proved less impressive. The precision of seasonal Atlantic hurricane forecasts as a function of issue time is assessed over many years in this recent article:

Saunders, M. A., Winds of change, *Post Magazine Risk Report*, pp28-29, 9 November 2006, http://tsr.mssl.ucl.ac.uk/docs/Hurricanes-Post09112006.pdf

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 forecast update for the 2008 Atlantic hurricane season will be issued on the 4th July 2008.

Appendix - Predictions from Previous Months

1. Atlantic ACE Index and System Numbers

Atlantic ACE Index and System Numbers 2008					
		ACE Index	Named Tropical Storms	Hurricanes	Intense Hurricanes
Average Number (±SD) (1950-2007)		101 (±60)	10.3 (±4.0)	6.2 (±2.6)	2.7 (±1.9)
TSR Forecasts (±FE)	5 Jun 2008	131 (±52)	14.4 (±3.4)	7.7 (±2.4)	3.4 (±1.6)
	7 Apr 2008	136 (±61)	14.8 (±4.1)	7.8 (±2.7)	3.5 (±1.8)
	10 Dec 2007	149 (±66)	15.4 (±4.7)	8.3 (±3.0)	3.7 (±1.8)
Gray Forecast	3 Jun 2008	150	15	8	4
	9 Apr 2008	150	15	8	4
	7 Dec 2007	125	13	7	3
NOAA forecast	22 May 2008	88-184	12-16	6-9	2-5

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

MDR, Caribbean Sea and Gulf of Mexico ACE Index and Numbers 2008					
		ACE Index	Named Tropical Storms	Hurricanes	Intense Hurricanes
Average Number (±SD) (1950-2007)		78 (±59)	7.1 (±3.3)	4.3 (±2.5)	2.3 (±1.8)
TSR Forecasts (±FE)	5 Jun 2008	104 (±47)	9.6 (±2.6)	5.5 (±1.8)	3.1 (±1.4)
	7 Apr 2008	109 (±57)	10.0 (±3.4)	5.6 (±2.3)	3.2 (±1.6)
	10 Dec 2007	122 (±62)	10.6 (±4.0)	6.1 (±2.6)	3.4 (±1.7)

3. US ACE Index and Landfalling Numbers

US Landfalling Numbers 2008				
		ACE Index	Named Tropical Storms	Hurricanes
Average Number (±SD) (1950-2007)		2.4 (±2.2)	3.1 (±2.0)	1.5 (±1.3)
TSR Forecasts (±FE)	5 Jun 2008	2.9 (±1.2)	4.0 (±1.3)	1.7 (±1.0)
	7 Apr 2008	2.9 (±1.2)	4.0 (±1.4)	1.7 (±1.0)
	10 Dec 2007	3.1 (±1.3)	4.1 (±1.4)	1.8 (±1.0)

4. Lesser Antilles ACE Index and Landfalling Numbers

Lesser Antilles Landfalling Numbers 2008					
		ACE Index	Named Tropical Storms	Hurricanes	Intense Hurricanes
Average Number (±SD) (1950-2007)		1.4 (±2.0)	1.1 (±1.0)	0.5 (±0.7)	0.2 (±0.5)
TSR Forecasts (±FE)	5 Jun 2008	1.8 (±2.1)	1.5 (±1.0)	0.6 (±0.6)	0.3 (±0.4)
	7 Apr 2008	1.9 (±2.4)	1.5 (±1.1)	0.7 (±0.6)	0.3 (±0.4)
	10 Dec 2007	2.2 (±2.4)	1.6 (±1.0)	0.7 (±0.6)	0.4 (±0.4)