



# November Forecast Update for Australian-Region Tropical Storm Activity in 2007/8

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## Forecast Summary

**TSR further raises its forecast and predicts activity ~10-20% above average in 2007/8.**

The TSR (Tropical Storm Risk) early November forecast update for Australian-region tropical cyclone activity in 2007/8 anticipates activity 10-20% above the 1975/6-2006/7 climate norm. This would make the 2007/8 season the most active for basin tropical storms since 1998/9. The forecast spans the Australian season from the 1st November 2007 to the 30th April 2008 and is based on data available through the end of October 2007. Our main predictor is the actual anomaly in October Niño 4 sea surface temperatures (SST) which is below average at  $-0.76^{\circ}\text{C}$ . Since SSTs in this region are linked to vertical wind shear over the Australian region during Austral summer, below-average Niño 4 SSTs indicate below-average wind shear and above-average tropical storm activity. Thus we expect Australian basin cyclone activity and landfalling numbers to be above-average in 2007/8. The reason for the slight increase in forecast activity from last month is that the October Niño 4 SST was cooler than expected.

### Australian Region Total Numbers Forecast for 2007/8

		ACE Index	Severe Tropical Cyclones	Tropical Storms
TSR Forecast ( $\pm$ FE)	2007/8	90 ( $\pm$ 37)	6.8 ( $\pm$ 2.0)	13.0 ( $\pm$ 2.9)
31yr Climate Norm ( $\pm$ SD)	1975/6-2006/7	83 ( $\pm$ 42)	5.7 ( $\pm$ 2.4)	10.6 ( $\pm$ 3.6)
Forecast Skill at this Lead	1975/6-2006/7	23%	32%	34%

Key: Severe Tropical Cyclone = 1 Minute Sustained Wind  $> 63\text{Kts}$  = Hurricane Category 1 to 5.  
 Tropical Storm = 1 Minute Sustained Wind  $> 33\text{Kts}$ .  
 SD = Standard Deviation.  
 FE (Forecast Error) = Standard Deviation of Errors in Simulated Real Time Forecasts 1975/6-2006/7.  
 Forecast Skill = Percentage Improvement in Mean Square Error Afforded by Cross-Validated Hindcasts 1975/6-2006/7 with 5-year block elimination over Hindcasts Made with the 1975/6-2006/7 Climate Norm.  
 Australian Region = Southern Hemisphere  $100^{\circ}\text{E}$  to  $170^{\circ}\text{E}$  (Storm Must Form as a Tropical Cyclone Within to Count).

- Very severe tropical cyclones (hurricane category 3-5) are not forecast due to data reliability problems in the historical record.
- Our Australian-region ( $100^{\circ}\text{E}$  to  $170^{\circ}\text{E}$ ), while slightly non-standard, is selected to provide the best overview for tropical cyclone activity around the whole of Australia.

There is a 64% probability that Australian-region tropical storm numbers in 2007/8 will be above average (defined as more than 12 tropical storms), a 32% likelihood they will be near normal (defined as between 9 and 12 tropical storms) and only a 4% chance they will be below normal (defined as less than 9 tropical storms). The 1975/6-2006/7 climatology probabilities for each category are 28% (above-normal), 38% (near-normal) and 34% (below-normal).

## Australian Landfalling Numbers in 2007/8

		Tropical Storms
TSR Forecast ( $\pm$ FE)	2007/8	5.5 ( $\pm$ 2.0)
Average ( $\pm$ SD)	1975/6-2006/7	4.6 ( $\pm$ 2.1)
Forecast Skill at this Lead	1975/6-2006/7	11%

Key: Landfalling Region = Northern Australian coast from Perth around to Brisbane.

- Severe tropical cyclone strikes are not forecast due to their low occurrence rate and to their lack of correlation with tropical storm strike numbers.

There is a 40% probability that Australian tropical storm strike numbers in 2007/8 will be above average (defined as more than 5 landfalling tropical storms), a 50% likelihood they will be near normal (defined as 4 or 5 landfalling tropical storms) and only a 10% chance they will be below normal (defined as less than 4 landfalling tropical storms). The 1975/6-2006/7 climatology probabilities for each category are 25% (above-normal), 44% (near-normal) and 31% (below-normal).

## Predictors and Key Influences for 2007/8

Our model exploits the predictability of tropical SSTs. Anomalous patterns of SST are the primary source of tropical atmosphere forcing at seasonal and interannual timescales. The predictors in our model for Australian-region tropical storm numbers are:

1. The forecast October-November SST for the El Niño Southern Oscillation (ENSO) Niño 4 region 5°N-5°S, 150°W-160°E. (Main predictor for leads up to October).
2. The observed October SST for the Niño 4 region. (Main predictor for November forecast).
3. The observed October-November SST for the Niño 4 region. (Main predictor for December forecast).

Australian-region severe tropical cyclones and landfalling tropical storm numbers are forecast by thinning from the total tropical storm numbers.

The Niño 4 forecast comes from an in-house multi-ensemble extension of the Knaff and Landsea (1997) ENSO-CLIPER model (Lloyd-Hughes et al, 2004).

The key factor behind our forecast for Australian-region tropical storm activity in 2007/8 being above-normal is the anticipated enhancing effect of early austral summer SSTs in the Niño 4 region. Below-average SSTs in this region lead to below-average atmospheric vertical wind shear over the Australian region during Austral summer; a condition favouring above-average tropical storm activity. The current SST anomaly (1975-2006 climatology) for October 2007 Niño 4 SST is  $-0.76^{\circ}\text{C}$ .

## Further Information

Further information on the TSR forecast methodology and on TSR in general, may be obtained from the TSR website (<http://tropicalstormrisk.com>). The final TSR monthly forecast update for Australian-region tropical storm activity in 2007/8 will be issued on the 5th December 2007.



## Appendix - Predictions from Previous Months

### 1. Australian Region Total Numbers

#### a) Deterministic forecasts

<b>Australian Region Total Numbers 2007/8</b>				
		ACE Index	Severe Tropical Cyclones	Tropical Storms
Average Number ( $\pm$ SD) (1975/6-2006/7)		81 ( $\pm$ 42)	5.7 ( $\pm$ 2.4)	10.6 ( $\pm$ 3.6)
TSR Forecasts ( $\pm$ FE)	7 November 2007	90 ( $\pm$ 37)	6.8 ( $\pm$ 2.0)	13.0 ( $\pm$ 2.9)
	9 October 2007	90 ( $\pm$ 37)	6.3 ( $\pm$ 2.0)	12.3 ( $\pm$ 3.1)
	7 September 2007	-	5.6 ( $\pm$ 2.0)	10.8 ( $\pm$ 2.9)
	7 August 2007	-	5.7 ( $\pm$ 2.1)	10.8 ( $\pm$ 3.0)
	6 July 2007	-	6.0 ( $\pm$ 2.1)	10.7 ( $\pm$ 3.1)
	5 June 2007	-	6.2 ( $\pm$ 2.2)	11.9 ( $\pm$ 3.3)
	3 May 2007	-	6.0 ( $\pm$ 2.2)	11.2 ( $\pm$ 3.4)

#### b) Probabilistic forecasts

<b>Australian Region Tropical Storm Numbers 2007/8</b>				
		Tercile Probabilities		
		below normal	normal	above normal
Climatology 1975/6-2006/7		34	38	28
TSR Forecasts	7 November 2007	4	32	64
	9 October 2007	9	38	53
	7 September 2007	17	49	34
	7 August 2007	17	48	35
	6 July 2007	19	46	35
	5 June 2007	12	40	48
	3 May 2007	17	42	41

## 2. Australian Landfalling Numbers

### a) Deterministic forecasts

<b>Australian Landfalling Numbers 2007/8</b>		
		Tropical Storms
Average Number ( $\pm$ SD) (1975/6-2006/7)		4.6 ( $\pm$ 2.1)
TSR Forecasts ( $\pm$ FE)	7 November 2007	5.5 ( $\pm$ 2.0)
	9 October 2007	5.2 ( $\pm$ 2.0)
	7 September 2007	4.7 ( $\pm$ 1.9)
	7 August 2007	4.7 ( $\pm$ 1.9)
	6 July 2007	4.6 ( $\pm$ 2.0)
	5 June 2007	5.0 ( $\pm$ 2.0)
	3 May 2007	4.8 ( $\pm$ 2.0)

### b) Probabilistic forecasts

<b>Australian Landfalling Numbers 2007/8</b>				
		Tercile Probabilities		
		below normal	normal	above normal
Climatology 1975/6-2006/7		31	44	25
TSR Forecasts	7 November 2007	10	50	40
	9 October 2007	13	53	34
	7 September 2007	19	57	24
	7 August 2007	19	56	25
	6 July 2007	20	55	25
	5 June 2007	15	54	31
	3 May 2007	18	55	27