December Forecast Update for Australian-Region Tropical Storm Activity in 2008/9

Issued: 4th December 2008

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Forecast Summary

TSR continues to predict activity ~10% above average in 2008/9.

The TSR (Tropical Storm Risk) early December forecast update for Australian-region tropical cyclone activity in 2008/9 anticipates activity approximately 10% above the 1975/6-2007/8 climate norm. The forecast spans the Australian season from the 1st November 2008 to the 30th April 2009 and is based on data available through the end of November 2008. Our main predictor is the observed anomaly in October-November Niño 4 sea surface temperatures (SST) which is below average at -0.50°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 2008/9.

Australian Region Total Numbers Forecast for 2008/9

		ACE Index	Severe Tropical Cyclones	Tropical Storms
TSR Forecast (±FE)	2008/9	99 (±37)	6.5 (±2.1)	12.2 (±2.9)
31yr Climate Norm (±SD)	1975/6-2007/8	80 (±42)	5.7 (±2.3)	10.6 (±3.5)
Forecast Skill at this Lead	1975/6-2007/8	22%	21%	34%

Key: Severe Tropical Cyclone = 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 Simulated Real Time Forecasts 1975/6-2007/8.
Forecast Skill = Percentage Improvement in Mean Square Error Afforded by Cross-Validated Hindcasts 1975/6-2007/8 with 5-year block elimination over Hindcasts Made with the 1975/6-2007/8 Climate Norm.
Australian Region = Southern Hemisphere 100°E to 170°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°E to 170°E), while slightly non-standard, is selected to provide the best overview for tropical cyclone activity around the whole of Australia.

There is a 45% probability that Australian-region tropical storm numbers in 2008/9 will be above average (defined as more than 12 tropical storms), a 45% likelihood they will be near normal (defined as between 9 and 12 tropical storms) and only a 10% chance they will be below normal (defined as less than 9 tropical storms). The 1975/6-2006/7 climatology probabilities for each category are 36% (above-normal), 31% (near-normal) and 33% (below-normal).

Australian Landfalling Numbers in 2008/9

		Tropical Storms
TSR Forecast (±FE)	2008/9	5.2 (±2.0)
Average (±SD)	1975/6-2007/8	4.5 (±2.1)
Forecast Skill at this Lead	1975/6-2007/8	7%

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 43% probability that Australian tropical storm strike numbers in 2008/9 will be above average (defined as more than 5 landfalling tropical storms), a 36% likelihood they will be near normal (defined as 4 or 5 landfalling tropical storms) and a 21% chance they will be below normal (defined as less than 4 landfalling tropical storms). The 1975/6-2007/8 climatology probabilities for each category are 33% (above-normal), 43% (near-normal) and 24% (below-normal).

Predictors and Key Influences for 2008/9

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^{o}N-5^{o}S, 150^{o}W-160^{o}E. (Main predictor for leads up to November).
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 2008/9 being above-norm 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 (1975-2007 climatology) for October-November 2008 Niño 4 SST is -0.50^{o}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). This is the final TSR monthly forecast update for Australian-region tropical storm activity in 2008/9. A summary of the 2008/9 Australian tropical cyclone season and a verification of the TSR seasonal forecasts will be issued in early May 2009. The TSR first extended range forecast for Australian-region tropical storm activity in 2009/10 will be issued in early May 2009.

Appendix - Predictions from Previous Months

1. Australian Region Total Numbers

a) Deterministic forecasts

Australian Region Total Numbers 2008/9				
		ACE Index	Severe Tropical Cyclones	Tropical Storms
Average Number (±SD) (1975/6-2007/8)		80 (±42)	5.7 (±2.3)	10.6 (±3.5)
TSR Forecasts (±FE)	4 Dec 2008	99 (±37)	6.5 (±2.1)	12.2 (±2.9)
	6 Nov 2008	99 (±37)	6.4 (±2.1)	11.9 (±2.9)
	10 Sep 2008	-	6.6 (±2.1)	12.3 (±2.9)
	8 July 2008	-	6.6 (±2.2)	12.4 (±3.1)
	13 May 2008	-	6.6 (±2.2)	12.3 (±3.3)

b) Probabilistic forecasts

Australian Region Tropical Storm Numbers 2008/9				
		Tercile Probabilities		
		below normal	normal	above normal
Climatology 1975/6-2007/8		34	38	28
TSR Forecasts	4 Dec 2008	10	45	45
	6 Nov 2008	12	46	42
	10 Sep 2008	9	44	47
	8 July 2008	11	41	48
	13 May 2008	13	40	47

2. Australian Landfalling Numbers

a) Deterministic forecasts

Australian Landfalling Numbers 2008/9		
		Tropical Storms
Average Number (±SD) (1975/6-2007/8)		4.5 (±2.0)
TSR Forecasts (±FE)	4 Dec 2008	5.2 (±2.0)
	6 Nov 2008	5.1 (±2.0)
	10 Sep 2008	5.2 (±1.9)
	8 July 2008	5.2 (±2.0)
	13 May 2008	5.2 (±2.0)

b) Probabilistic forecasts

Australian Landfalling Numbers 2008/9				
		Tercile Probabilities		
		below normal	normal	above normal
Climatology 1975/6-2007/8		31	44	25
TSR Forecasts	4 Dec 2008	21	36	43
	6 Nov 2008	22	36	42
	10 Sep 2008	19	37	44
	8 July 2008	19	36	45
	13 May 2008	20	36	44