



# December Forecast Update for Australian-Region Tropical Storm Activity in 2003/4

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## Forecast Summary

**TSR continues to anticipate the 2003/4 Australian region tropical cyclone season will see below average activity.**

The TSR (Tropical Storm Risk) early December forecast update for Australian-region tropical cyclone activity continues to anticipate a below average season for 2003/4. The forecast spans the Australian season from the 1st November 2003 to the 30th April 2004 and is based on data available through the end of November 2003. The TSR predictor for Australian-region total numbers is the observed October-November Niño 4 sea surface temperature (SST) which is warmer than average at 0.70 °C. The TSR predictor for Australian landfalling numbers is the forecast anomaly in December-March SST for the extended ENSO region 5°N-5°S, 120°W-177.5°W which is anticipated to be warmer than normal at 0.48±0.27 °C. Appendices give the TSR predictions from previous months.

## Australian Region Total Numbers Forecast for 2003/4

		Tropical Storms	Severe Tropical Cyclones	ACE Index
TSR Forecast (±FE)	2003 /4	8.7 (±2.2)	4.4 (±1.7)	60 (±38)
10yr Climate Norm (±SD)	1993/4-2002/3	10.7 (±2.9)	5.8 (±2.0)	73 (±41)
30yr Climate Norm (±SD)	1973/4-2002/3	11.2 (±3.9)	5.8 (±2.4)	85 (±42)
Forecast Skill at this Lead	1988/9-2002/3	56%	33%	12%

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> .
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 Replicated Real Time Forecasts 1993/4-2002/3.
Forecast Skill	=	Percentage Improvement in Mean Square Error over Running 10-year Prior Climate Norm from Replicated Real Time Forecasts 1988/9-2002/3.
Australian Region	=	Southern hemisphere 100°E to 170°E (Storm Must Form as a Tropical Cyclone Within to Count).

- Tropical storm, severe tropical cyclone numbers and the ACE index are expected to be below the 30-year climate norm in 2003/4.
- 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.

## Australian Landfalling Numbers in 2003/4

		Tropical Storms	ACE Index
TSR Forecast ( $\pm$ FE)	2003 /4	4.3 ( $\pm$ 1.8)	2.8 ( $\pm$ 2.8)
Average ( $\pm$ SD)	1993/4-2002/3	4.6 ( $\pm$ 1.9)	3.3 ( $\pm$ 2.9)
Average ( $\pm$ SD)	1973/4-2002/3	4.8 ( $\pm$ 2.3)	3.0 ( $\pm$ 2.2)
Forecast Skill at this Lead	1988/9-2002/3	5%	20%

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 Australian Mainland (reduced by a factor of 6). ACE Unit =  $\times 10^4$  knots<sup>2</sup>.  
 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.

## Key Predictors for 2003/4

The key factor behind our forecast for below average Australian-region tropical storm activity in 2003/4 is the anticipated suppressing effect of above average early austral summer SSTs in the Niño 4 region. Above average SSTs in this region lead to above average atmospheric vertical wind shear over the Australian region during Austral summer; a condition favouring below average tropical storm activity. The current anomaly (1973/4-2002/3 climatology) for October-November 2003 Niño 4 SST is 0.70 °C. Our landfalling predictor (December 2003 - March 2004 forecast SST value for the extended ENSO region 5°N-5°S, 120°W-177.5°W) is anticipated to be 0.48 $\pm$ 0.27 °C (similar to last month's value of 0.50 $\pm$ 0.30 °C). The forecast skill for this predictor at this lead is 92%.

## 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 'Long-Range Forecast for Australian-Region Tropical Storm Activity in 2003/4' document issued on the 16th May 2003 or from the TSR web site [tropicalstormrisk.com](http://tropicalstormrisk.com). This is the final TSR monthly forecast update for Australian region activity in 2003/4. A verification on our 2003/4 Australian region tropical storm forecasts will be issued in early June 2004. The TSR first extended range forecast for Australian-region tropical storm activity in 2004/5 will be issued in early May 2004.



## Appendix - Predictions from Previous Months

### 1. Australian Region Total Numbers

<b>Australian Region Total Numbers 2003/4</b>				
		<b>Tropical Storms</b>	<b>Severe Tropical Cyclones</b>	<b>ACE Index</b>
Average Number ( $\pm$ SD) (1993/4-2002/3)		10.6 ( $\pm$ 3.0)	5.8 ( $\pm$ 2.0)	73 ( $\pm$ 41)
Average Number ( $\pm$ SD) (1973/4-2002/3)		11.2 ( $\pm$ 3.9)	5.8 ( $\pm$ 2.4)	85 ( $\pm$ 42)
TSR Forecasts ( $\pm$ FE)	4 Dec 2003	8.7 ( $\pm$ 2.2)	4.4 ( $\pm$ 1.7)	60 ( $\pm$ 38)
	4 Nov 2003	9.0 ( $\pm$ 2.2)	4.5 ( $\pm$ 1.7)	62 ( $\pm$ 38)
	9 Oct 2003	9.6 ( $\pm$ 2.4)	4.7 ( $\pm$ 1.8)	-
	8 Sep 2003	9.6 ( $\pm$ 2.4)	4.8 ( $\pm$ 1.7)	-
	5 Aug 2003	10.0 ( $\pm$ 2.7)	4.9 ( $\pm$ 1.8)	-
	4 Jul 2003	11.3 ( $\pm$ 3.0)	5.3 ( $\pm$ 2.0)	-
	10 Jun 2003	12.1 ( $\pm$ 3.2)	5.6 ( $\pm$ 2.1)	-
	15 May 2003	11.6 ( $\pm$ 3.4)	5.5 ( $\pm$ 2.2)	-

### 2. Australian Landfalling Numbers

<b>Australian Landfalling Numbers 2003/4</b>			
		<b>Tropical Storms</b>	<b>ACE Index</b>
Average Number ( $\pm$ SD) (1993/4-2002/3)		4.1 ( $\pm$ 2.5)	3.3 ( $\pm$ 2.9)
Average Number ( $\pm$ SD) (1973/4-2002/3)		4.7 ( $\pm$ 2.5)	3.0 ( $\pm$ 2.2)
TSR Forecasts ( $\pm$ FE)	4 Dec 2003	4.3 ( $\pm$ 1.8)	2.8 ( $\pm$ 2.8)
	4 Nov 2003	4.3 ( $\pm$ 1.8)	2.7 ( $\pm$ 2.8)
	9 Oct 2003	4.5 ( $\pm$ 1.8)	-
	8 Sep 2003	4.5 ( $\pm$ 2.0)	-
	5 Aug 2003	4.7 ( $\pm$ 1.9)	-
	4 Jul 2003	5.0 ( $\pm$ 1.9)	-
	10 Jun 2003	5.2 ( $\pm$ 2.4)	-
	15 May 2003	5.2 ( $\pm$ 2.4)	-