



# Extended Range Forecast for Australian-Region Tropical Storm Activity in 2009/10

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## Forecast Summary

**TSR anticipates the 2009/10 Australian season will see activity close to average. Users should note that the precision of TSR's extended range outlooks for Australian-region tropical storm activity between 1975/6 and 2008/9 is low.**

The TSR (Tropical Storm Risk) consortium presents a long-range forecast for Australian-region tropical storm and severe tropical cyclone numbers, and for Australian tropical storm strike numbers in 2009/10. The forecast spans the Australian season from the 1st November 2009 to the 30th April 2010 and is based on data available through the end of April 2009. Our main predictor is the forecast anomaly in October-November Niño 4 sea surface temperature (SST) which we anticipate will be close to average at  $0.19 \pm 0.52$  °C. Since SSTs in this region are linked to vertical wind shear over the Australian region during Austral summer, near-average Niño 4 SST indicates near-average wind shear and near-average tropical storm activity. Thus we expect Australian basin cyclone activity and landfalling numbers to be near-average in 2009/10. Bi-monthly updated forecasts will follow through to early December 2009.

## Australian Region Total Numbers Forecast for 2009/10

		Severe Tropical Cyclones	Tropical Storms
TSR Forecast ( $\pm$ FE)	2009/10	5.3 ( $\pm$ 2.3)	9.8 ( $\pm$ 3.3)
34yr Climate Norm ( $\pm$ SD)	1975/6-2008/9	5.6 ( $\pm$ 2.4)	10.6 ( $\pm$ 3.5)
Forecast Skill at this Lead	1975/6-2008/9	8%	12%

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 1975/6-2008/9.		
Forecast Skill	=	Percentage Improvement in Mean Square Error Afforded by Cross-Validated Hindcasts 1975/6-2008/9 with 5-year block elimination over Hindcasts Made with the 1975/6-2008/9 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 31% probability that Australian-region tropical storm numbers in 2009/10 will be above average (defined as more than 11 tropical storms), a 35% likelihood they will be near normal (defined as between 9 and 11 tropical storms) and a 34% chance they will be below normal (defined as less than 9 tropical storms). The 1975/6-2008/9 climatology probabilities for each category are 38% (above-normal), 30% (near-normal) and 32% (below-normal).

## Australian Landfalling Numbers in 2009/10

		<u>Tropical Storms</u>
TSR Forecast ( $\pm$ FE)	2009/10	4.3 ( $\pm$ 2.0)
Average ( $\pm$ SD)	1975/6-2008/9	4.5 ( $\pm$ 2.1)
Forecast Skill at this Lead	1975/6-2008/9	6%

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 28% probability that Australian tropical storm strike numbers in 2009/10 will be above average (defined as more than 5 landfalling tropical storms), a 38% likelihood they will be near normal (defined as 4 or 5 landfalling tropical storms) and a 34% chance they will be below normal (defined as less than 4 landfalling tropical storms). The 1975/6-2008/9 climatology probabilities for each category are 35% (above-normal), 41% (near-normal) and 24% (below-normal).

## Predictors and Key Influences for 2009/10

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 November).
2. 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 2009/10 being close to average is the anticipated near-neutral effect of early austral summer SSTs in the Niño 4 region. Near-average SSTs in this region lead to near-average atmospheric vertical wind shear over the Australian region during Austral summer; a condition favouring near-average tropical storm activity. Our current forecast SST anomaly (1975-2008 climatology) for October-November 2009 Niño 4 SST is  $0.19\pm 0.52^{\circ}\text{C}$ . The forecast skill for this predictor at this lead is 45% (assessed using cross-validated hindcasts over the period 1975-2008).

## Forecasts for 2009/10

For the 2009/10 Australian-region season, TSR will be: (1) Issuing updated deterministic forecasts through to early December for Australian-region tropical storm and severe tropical cyclone numbers and for Australian tropical storm strike numbers; (2) Issuing forecasts in early November and early December for the basin ACE index. The ACE index reflects a combination of intensity and duration for all storms each season and may be linked more closely to total losses and disruption than is the number of tropical storms or severe tropical cyclones; (3) Issuing probabilistic forecasts for the numbers of basin and landfalling tropical storms; (4) Issuing forecast storm windspeed and accumulated rainfall probabilities out to 5 days lead through the TSR Tropical Storm Tracker; (5) Issuing automatic storm e-mail alerts with an option for users to select their preferred windspeed and probability thresholds for an alert to be

triggered.

## Potential Benefits

Tropical storms are a costly natural disaster for the northern coastline of Australia and for southwest Pacific islands between latitudes 10°S and 30°S and longitudes 100°E and 170°E. The average storm damage bill per year 1990/1-2000/1 for this region was US \$60 million (2005 \$). By providing a lead time, storm forecasts help governments, administrators and businesses plan ahead, thereby reducing the risk and uncertainty from varying active and inactive storm seasons. TSR has an impressive seasonal forecast track record. Its forecasts for Australian-region tropical cyclone activity were successful in all years between 2001/2 and 2006/7.

## Further Information

Further information on the TSR forecast methodology and on TSR in general, may be obtained from the TSR website (<http://tropicalstormrisk.com>). Forecast updates for Australian-region tropical storm activity in 2009/10 will be issued by TSR on the 6th July 2009, 7th September 2009, 5th November 2009 and 7th December 2009.

