



# July Forecast Update for Northwest Pacific Typhoon Activity in 2016

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## Forecast Summary

**TSR slightly increases its extended range outlook but still predicts the 2016 Northwest Pacific typhoon season will be quiet with activity well below the 1965-2015 climate norm.**

The TSR (Tropical Storm Risk) July forecast update anticipates the 2016 Northwest Pacific typhoon season will have activity 20% below the 1965-2015 norm. This is a slight increase on our extended range outlook. The forecast spans the period from 1<sup>st</sup> January to 31<sup>st</sup> December 2016 (95% of typhoons occur historically after 1<sup>st</sup> May) and employs data through to the end of June 2016. The forecast includes deterministic and probabilistic projections for overall basin activity, and deterministic projections for the ACE index and numbers of intense typhoons, typhoons and tropical storms. The TSR forecast has increased slightly since early May because La Niña is developing more slowly than anticipated. It is now thought La Niña will reach only weak levels by August-September.

TSR's main predictor for overall activity is the forecast anomaly in August-September Niño 3.75 (region 5°S-5°N, 140°W-180°W) sea surface temperature (SST) which we anticipate being 0.5±0.3°C cooler than normal. A cool Niño 3.75 SST would have a suppressing effect on typhoon activity. Sizeable uncertainties remain in the ENSO forecast but the prediction of a below-norm activity season is supported by the Northwest Pacific ACE index being zero until the 3<sup>rd</sup> July 2016. ACE has been zero at the end of June on only two occasions (1973 and 1998) and zero at the end of May on only four occasions (1973, 1983, 1984 and 1998) since reliable records began in 1965. On each such occasion the subsequent annual ACE was well below-norm. It is interesting to note that three of these four years (1973, 1983 and 1998) immediately follow a major El Niño year – as 2016 also does.

## NW Pacific ACE Index and System Numbers in 2016

		ACE Index	Intense Typhoons	Typhoons	Tropical Storms
TSR Forecast (±FE)	2016	239 (±82)	7 (±2)	13 (±3)	22 (±4)
51yr Climate Norm (±SD)	1965-2015	298 (±102)	9 (±3)	16 (±4)	26 (±4)
Forecast Skill at this Lead	1965-2015	28%	40%	16%	13%

- 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>.
- Intense Typhoon = 1 Minute Sustained Wind > 95Kts = Hurricane Category 3 to 5.  
 Typhoon = 1 Minute Sustained Wind > 63Kts = Hurricane Category 1 to 5.  
 Tropical Storm = 1 Minute Sustained Winds > 33Kts.  
 SD = Standard Deviation.  
 FE (Forecast Error) = Standard Deviation of Errors in Cross-Validated Hindcasts 1965-2015.  
 Forecast Skill = Percentage Improvement in Mean Square Error Afforded by Cross-Validated Hindcasts 1965-2015 over Hindcasts Made with the 1965-2015 Climate Norm.  
 Northwest Pacific = Northern Hemisphere Region West of 180°W Including the South China Sea. Any Tropical Cyclone (Irrespective of Where it Forms) Which Reaches Tropical Storm Strength Within this Region Counts as an Event.

There is a 48% probability that the 2016 NW Pacific typhoon season ACE index it will be below-normal (defined as an ACE index value in the lower tercile historically (<238), a 38% likelihood it will be near-normal (defined as an ACE index value in the middle tercile historically (238 to 335) and only a 14% chance it will be above-normal (defined as an ACE index value in the upper tercile historically (>335)). The 51-year period 1965-2015 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 (1965-2015).

## Predictors for 2016

The TSR predictors are as follows. Intense typhoon numbers and the ACE index are predicted from the forecast value for the August-September Niño 3.75 index. Tropical storm and typhoon numbers are forecast using an ensemble of two models: the Niño 3 SST from the prior September and the forecast number of intense typhoons in 2016. Our prediction of the August-September Niño 3.75 index includes the current (16th June 2016) consensus ENSO outlook for the August-September 2016 Niño 3.4 index issued by the International Research Institute for Climate and Society.

The main factor behind the TSR forecast for a below-normal Northwest Pacific typhoon season in 2016 is the weak-to-moderate negative Niño 3.75 SST anomaly anticipated in August-September 2016. A negative Niño 3.75 SST is associated with stronger trade wind strength over the region 2.5°N-12.5°N, 120°E-180°E. This in turn leads to lower cyclonic vorticity over the Northwest Pacific region where most intense typhoons form.

It should be stressed that sizeable uncertainties remain in the August-September ENSO forecast and thus in the seasonal typhoon forecast. Should a stronger-than-anticipated La Niña develop by August-September 2016 we would expect that Northwest Pacific typhoon activity will be lower than forecast.

## Further Information

For more information about the TSR forecasts and their verifications for Northwest Pacific typhoon activity please see [http://www.tropicalstormrisk.com/for\\_typh.html](http://www.tropicalstormrisk.com/for_typh.html). The final TSR forecast update for the 2016 Northwest Pacific typhoon season will be issued on the 8<sup>th</sup> August 2016.

## Appendix – Predictions from Previous Months

### a) Deterministic forecast

<b>NW Pacific ACE Index and System Numbers 2016</b>					
		ACE Index (x10 <sup>4</sup> knots <sup>2</sup> )	Intense Typhoons	Typhoons	Tropical Storms
Average Number (±SD) (1965-2015)		298 (±102)	9 (±3)	16 (±4)	26 (±4)
TSR Forecast (±FE)	6 July 2016	239 (±82)	7 (±2)	13 (±3)	22 (±4)
	7 May 2016	217 (±80)	6 (±3)	13 (±3)	22 (±4)

### b) Probabilistic forecast

<b>NW Pacific ACE Index 2016</b>				
		Tercile Probabilities		
		below normal	normal	above normal
Climatology 1965-2015		33.3	33.3	33.3
TSR Forecast	6 July 2016	48	38	14
	7 May 2016	60	32	8