



July Forecast Update for Northwest Pacific Typhoon Activity in 2019

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Forecast Summary

TSR reduces its extended range outlook and anticipates the 2019 Northwest Pacific typhoon season will likely see activity below the 1965-2018 climate norm.

The TSR (Tropical Storm Risk) July forecast update anticipates the 2019 Northwest Pacific typhoon season will have activity 10-15% below the 1965-2018 norm. This is a sizeable decrease on our extended range outlook. The forecast spans the period from 1st January to 31st December 2019 (95% of typhoons occur historically after 1st May) and employs data through to the end of June 2019. 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 decreased since early May for three reasons: El Niño conditions in the equatorial tropical Pacific have weakened, early season typhoon activity has not occurred and June trade wind strength is consistent with a below norm typhoon season.

The current ENSO conditions over the central and western NW Pacific show an anomalous zonal temperature gradient that increases from east to west. This temperature gradient is consistent with stronger trade windspeeds (via anomalous Walker circulation). Our prediction of a below-norm activity season is supported by the occurrence of only three tropical storms by the end of June (the 11 years since 1979 when this has happened have subsequently had a mean ACE of 241). Additionally the June trade wind speed for the region 2.5°N-12.5°N, 120°E-180°E that is moderately linked to seasonal NW Pacific ACE was stronger than normal and indicates a below-norm activity season. An updated outlook for Northwest Pacific typhoon activity in 2019 will be issued in early August.

NW Pacific ACE Index and System Numbers in 2019

		ACE Index	Intense Typhoons	Typhoons	Tropical Storms
TSR Forecast (±FE)	2019	260 (±76)	8 (±2)	15 (±3)	25 (±4)
54yr Climate Norm (±SD)	1965-2018	295 (±101)	9 (±3)	16 (±4)	26 (±4)
Forecast Skill at this Lead	1965-2018	43%	44%	19%	7%

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 = $\times 10^4$ knots².

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 1965-2018.

Forecast Skill = Percentage Improvement in Mean Square Error Afforded by Cross-Validated Hindcasts 1965-2018 over Hindcasts Made with the 1965-2018 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 an 20% probability that the 2019 NW Pacific typhoon season ACE index will be above-average (defined as an ACE index value in the upper tercile historically (>335)), a 37% likelihood it will be near-normal (defined as an ACE index value in the middle tercile historically (245 to 335) and a 43% chance it will be below-normal (defined as an ACE index value in the lower tercile historically (<245)). The 54-year period 1965-2018 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 (1965-2018).

Predictors for 2019

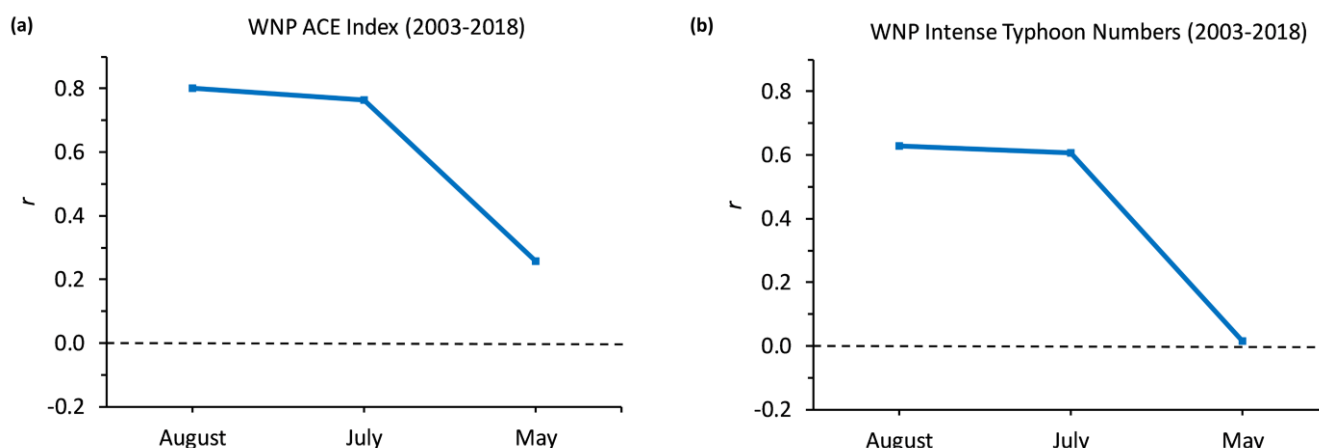
The TSR predictors are as follows. Intense typhoon numbers and the ACE index are predicted from the forecast value for the August-September Niño 3.75 index. Tropical storm and typhoon numbers are forecast using an ensemble of two models: the Niño 3 SST from the prior September and the forecast number of intense typhoons in 2019. Our prediction of the August-September Niño 3.75 index includes the current (19th June 2019) consensus ENSO outlook for the August-September 2017 Niño 3.4 index issued by the International Research Institute for Climate and Society.

The TSR forecasts are weighted by the recent prior trade wind speed over the region 2.5°N-12.5°N, 120°E-180°E and by the observed typhoon activity up to the date of forecast issue. A stronger trade wind speed (as occurred in June 2019) leads to lower cyclonic vorticity and to fewer intense typhoons over the Northwest Pacific.

It should be stressed that sizeable uncertainties remain in the seasonal typhoon forecast for 2019. The precision of TSR’s seasonal typhoon outlooks issued in early July is good as shown in the figure below.

The Precision of TSR Seasonal Forecasts 2003-2018

The figure shows the skill of the TSR-publicly-released seasonal outlooks for Northwest Pacific ACE (left panel) and intense typhoon numbers (right panel) assessed for the 16-year period 2003-2018. Skill is shown as the Pearson correlation r between the forecast values (issued separately in early May, early July and early August) and the observed values. The figure shows low prediction skill from early May but good prediction skill ($r = 0.65$ to 0.75) by early July. The correlation skill for typhoon numbers (not shown) is lower reaching 0.35 by early August.



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. The first TSR forecast update for the 2019 Northwest Pacific typhoon season will be issued on Wednesday 7th August 2019.

Appendix – Predictions from Previous Months

a) Deterministic forecast

NW Pacific ACE Index and System Numbers 2019					
		ACE Index ($\times 10^4$ knots ²)	Intense Typhoons	Typhoons	Tropical Storms
Average Number (\pm SD) (1965-2018)		295 (\pm 101)	9 (\pm 3)	16 (\pm 4)	26 (\pm 4)
TSR Forecasts	5 July 2019	260 (\pm 76)	8 (\pm 2)	15 (\pm 3)	25 (\pm 4)
	7 May 2019	354 (\pm 86)	10 (\pm 3)	17 (\pm 3)	27 (\pm 4)

b) Probabilistic forecast

NW Pacific ACE Index 2019				
		Tercile Probabilities		
		below normal	normal	above normal
Climatology 1965-2018		33.3	33.3	33.3
TSR Forecasts	5 July 2019	43	37	20
	7 May 2019	10	31	59